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2021 Consulting Engineer's Annual Report

November 2021

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2021 Consulting Engineer's Annual Report

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PITTSBURGH WATER AND SEWER AUTHORITY
(Allegheny County, Pennsylvania)

2021 CONSULTING ENGINEER'S ANNUAL REPORT

CERTIFICATE OF ENGINEER

I am a Professional Engineer registered in the Commonwealth of Pennsylvania and am employed by Mott MacDonald. I am qualified to offer the following information being familiar with the operations of The Pittsburgh Water and Sewer Authority (Authority) and having worked in similar capacities for other such entities.

I hereby report and certify that the statements of opinions, projections of efforts and schedules, and presentation of other information contained in the following report, relevant to the water and sewer systems of the Authority, are consistent with my understanding of the conditions of the systems and future plans of the Authority as provided by the Authority as of November 12, 2021.

IN WITNESS WHEREOF, I have executed this document on behalf of Mott MacDonald on November 15, 2021.

MOTT MACDONALD

A handwritten signature in blue ink, appearing to read "Stephen B. Polen", is written over a faint, illegible background.

By:
Stephen B. Polen, PE

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
Draft	10-29-21	D.J. Healey Langley	K. Chavara	S.B. Polen	Draft version
Revised Draft	11-10-21	D.J. Healey Langley	K. Chavara	S.B. Polen	Incorporate PWSA review comments
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Final	12-1-21	D.J. Healey Langley	K. Chavara	S.B. Polen	Report with signature submitted to PWSA

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Executive Summary

The Pittsburgh Water and Sewer Authority (PWSA) retained Mott MacDonald, LLC, to prepare the Annual Report of the Consulting Engineer in September of 2021. The Annual Report is required under Article VII, Section 7.11 of the 2019 Senior Indenture and Subordinate Indenture. There are several sections in the 2019 Senior Indenture and Subordinate Indenture referring to the duties of the Consulting Engineer, (see Appendix A of this report). In accordance with the 2019 Senior Indenture and Subordinate Indenture, "Consulting Engineer" shall be a qualified independent consultant having the skill and experience necessary to provide the particular certificate, report, or approval required by the provision of the Indenture or any Supplemental Indenture. The Consulting Engineer completing this report is a Professional Engineer Registered in the Commonwealth of Pennsylvania and is qualified to offer the findings and recommendations being familiar with the operations of the PWSA. Mott MacDonald's work included:

- a. The duties of the Consulting Engineer mentioned in Article VII, Section 7.11 of the 2019 Senior Indenture and Subordinate Indenture, including the following Consulting Engineers' services: Provide advice and recommendations as to the proper maintenance, repair, and operation of the water and sewer systems during the next Fiscal Year and estimate the amounts of money that should be expended for such purposes.
- b. Provide advice and recommendations as to the Capital Additions that should be made during the next Fiscal Year and estimate (review) the amount of money that is recommended for such purposes.
- c. Indicate whether the properties of the water and sewer systems have been maintained in good repair and sound operating condition and the Consulting Engineer's estimate of the amount, if any, required to place such properties in such condition and the details of such expenditures and the approximate time required to do this.

Article I, Section 1.01; Article V, Sections 5.01 and 5.03; and Article VII, Sections 7.07 and 7.10, discuss consulting engineer duties that are not included in the scope of service or discussions herein.

In this 2021 Consulting Engineer's Annual Report, the Consulting Engineer describes a system that is functional but is currently subject to Administrative and Consent Orders and Agreements from State and Federal regulatory agencies to address numerous water system regulatory standards and other compliance requirements.

The water and sewer systems require upgrades to address end of useful life conditions and updates to current operational, regulatory, and safety standards. The PWSA's water and sewer systems also include critical facilities which expose customers to the risk of loss of water if taken offline for repairs due to a lack of redundant facilities.

The PWSA has made great strides on most of the necessary upgrades and updates for these critical facilities. Highlights of the PWSA's work in 2021 include continued progress on improvements to key components of the water treatment and distribution system, the initiation of design work on critical water transmission system projects, and an achievement of reduction and compliance goals with required lead levels.

Additionally, to sustain cost-effective operations while optimizing asset performance and life expectancy, significant structural, operational, and maintenance improvements are required and

must be undertaken in the near-term to address long-standing deficiencies in both the water and sewer systems. The PWSA is making progress in addressing these deficiencies.

In the Cooperative Agreement executed on October 3, 2019, the PWSA and the City of Pittsburgh (City) agreed upon their respective responsibilities associated with the division of services related to the system, payments, collections, cooperation by the City and the PWSA in their respective capital projects that may impact each other, and the separate stormwater system within the City, and to confirm that the system will remain under public ownership. The Cooperative Agreement states that the PWSA will have responsibility for operations, maintenance, repair, and replacement of water mains and service lines, sanitary sewer and combined sewer mains and sewer laterals, and stormwater infrastructure in the 11 City parks that are 50 acres or greater. The City is treated like other commercial customers of the PWSA with respect to water service lines and sewer laterals, with two exceptions: in the 11 City parks that are 50 acres or larger; and, the City's share of the cost is being phased in over five years, to become 100 percent in 2025 and thereafter. This 2021 Annual Report does not address complete City-wide stormwater management and improvements because, as described above, the PWSA does not have responsibility for all stormwater management and improvements in the City.

The Cooperative Agreement executed on October 3, 2019 constitutes a supplement to the original Cooperative Agreement within the meaning of the PWSA's 2017 Amended and Restated Trust Indenture and 2019 Amended and Restated Subordinate Trust Indenture.

The PWSA has stated that an agreement between the City and the PWSA is being developed that will assign responsibilities related to stormwater compliance and combined sewer system operations, maintenance, improvements, and compliance.

Water System

The PWSA's water treatment plant (drinking water) has the permitted capacity to provide 100 million gallons per day (MGD). The PWSA's PGH2O Fact Sheet prepared in May 2021 states the water treatment plant daily production is 70 MGD. In 2019, the PWSA conducted a water audit following guidelines established by the American Water Works Association and produced the 2020 Water Audit report. This audit showed that an average of 66.5 MGD was delivered to existing customers. The water system has the capacity to deliver adequate water supply to meet the demands of the customers into the foreseeable future, assuming the PWSA continues the rehabilitation and replacement program provided for in its ongoing Capital Improvement Program (CIP). The PWSA monitors water quality for contaminants that may be present in source water prior to treatment, during treatment, and in finished water from the water treatment plant. This monitoring is necessary to verify that water quality meets or exceeds regulatory standards.

In 2020, the PWSA succeeded in replacing public lead service lines as stipulated in the Consent Order and Agreement (COA) issued by the Pennsylvania Department of Environmental Protection (PADEP) on November 17, 2017. Since then, the PWSA has continued to prioritize reducing the number of public and private lead service lines in the water distribution system, which would reduce the risk of these lines leaching lead into the water supply. The program to reduce the presence of lead in the water supply is one of the PWSA's success stories for 2021, as it was in 2018, 2019, and 2020.

As of November 5, 2021, the PWSA has completed 595 public lead service line replacements and 489 private lead line replacements in 2021.

Since July 1, 2016, as of November 5, 2021, the PWSA has replaced a total of 8,798 public lead service lines and 5,783 private lead service lines.

The PWSA conducted two compliance water sampling rounds in December 2019 and June 2020, respectively, and the testing showed that lead concentrations were less than state and federal action levels, which indicated that the lead level is in compliance with the limit established by the United States Environmental Protection Agency (USEPA) and the PADEP. After these two consecutive testing events proved the lead levels in the system to be in compliance, the PWSA is no longer required to replace 7 percent of the lead service lines in the system each year. Going forward, the PWSA has stated they will continue to conduct aggressive water quality testing and work towards replacing all lead service lines by 2026. Starting in 2020, the lead service line replacement program was merged with the Small Diameter Water Main Replacement (SDWMMR) Program in order to more cost effectively replace lead lines as the small diameter mains are replaced. The SDWMMR program has continued in 2021.

In addition to reducing the potential sources of lead by replacing lead service lines, the PWSA began adding orthophosphate to the water supply in 2019. The orthophosphate forms a barrier separating the water from the interior of the lead pipes which reduces leaching of lead into the water system from corrosion of lead lines.

In its 2020 Annual Drinking Water Quality Report, the PWSA reported a 90th percentile value lead concentration from 158 sites sampled in the water distribution system as 5.13 parts per billion (ppb) for 2020, which is less than the state and federal action level of 15 ppb. The PWSA has continued its compliance sampling in the water distribution system in 2021. In September of 2021, following the corrosion control optimization period, PWSA began conducting a compliance monitoring sampling program.

The PWSA has actively engaged with their Water Reliability Plan, which is a comprehensive series of projects that will provide a resilient and redundant water system and water service. In 2021, the PWSA awarded contracts for the Rising Main 3 rehab/rehabilitation and the Highland No. 2 reservoir project. The PWSA also submitted permit applications for the design of the Aspinwall Pump Station, Bruecken Pump Station, Clearwell Emergency Bypass, Aspinwall Pump Station to Lanpher Rising Main, Highland Reservoir Pump Station and Rising Main, and Rising Main 4 during 2021.

Wastewater and Stormwater System

Approximately 26 percent of the sewer collection system consists of sanitary sewers and sanitary pump stations. These systems are in satisfactory operating condition and have adequate capacity for dry weather flows. There are some localized areas in the sanitary sewer system that become overtaxed during wet weather. The PWSA has made progress on their plan to rehabilitate sanitary sewers and pump stations and on meeting the regulatory requirements for operation of the sewers.

An estimated 74 percent of the wastewater collection system consists of combined sewers where sewage and storm water are conveyed in the same pipe. The collection system is designed so that during wet weather, a portion of the collected storm water and diluted wastewater is discharged to natural water courses through diversion chambers located throughout the sewer system including at connections to the Allegheny County Sanitary Authority (ALCOSAN) interceptors.

The combined sewer system is in satisfactory operating condition and has adequate capacity for the dry weather sewer flows. However, even during minor wet weather events, the sewer

system is often taxed beyond its capacity, resulting in overflows, bypassing, and flooding. The PWSA's sewer system overflows are the subject of a 2004 Consent Order issued by the PADEP. Numerous projects have been identified to meet the terms of the 2004 Consent Order. Some of these projects have been started and some of have been completed. The 2004 Consent Order has expired but the PWSA began negotiations in 2021 for a new Consent Decree with the USEPA and the U.S. Department of Justice (DOJ) to require the PWSA to continue to address these issues. Negotiations are underway and will continue in 2022.

Several combined sewer overflow (CSO) abatement projects, basement flooding reduction projects, sewer rehabilitation, and stormwater infrastructure improvements are in various stages of design, construction, or regulatory review. These projects are expected to require significant operational and capital investments once the Consent Decree is finalized with the USEPA and DOJ. The collection system requires ongoing attention and funds from the CIP to correct existing deficiencies and repair, rehabilitate, and upgrade the system to meet regulatory requirements and reduce localized backups. If the Capital Improvement Program continues to fund the identified sewer system improvements and projects are implemented, it is anticipated that foreseeable future demands on the system can be met and progress can be made in working toward CSO compliance.

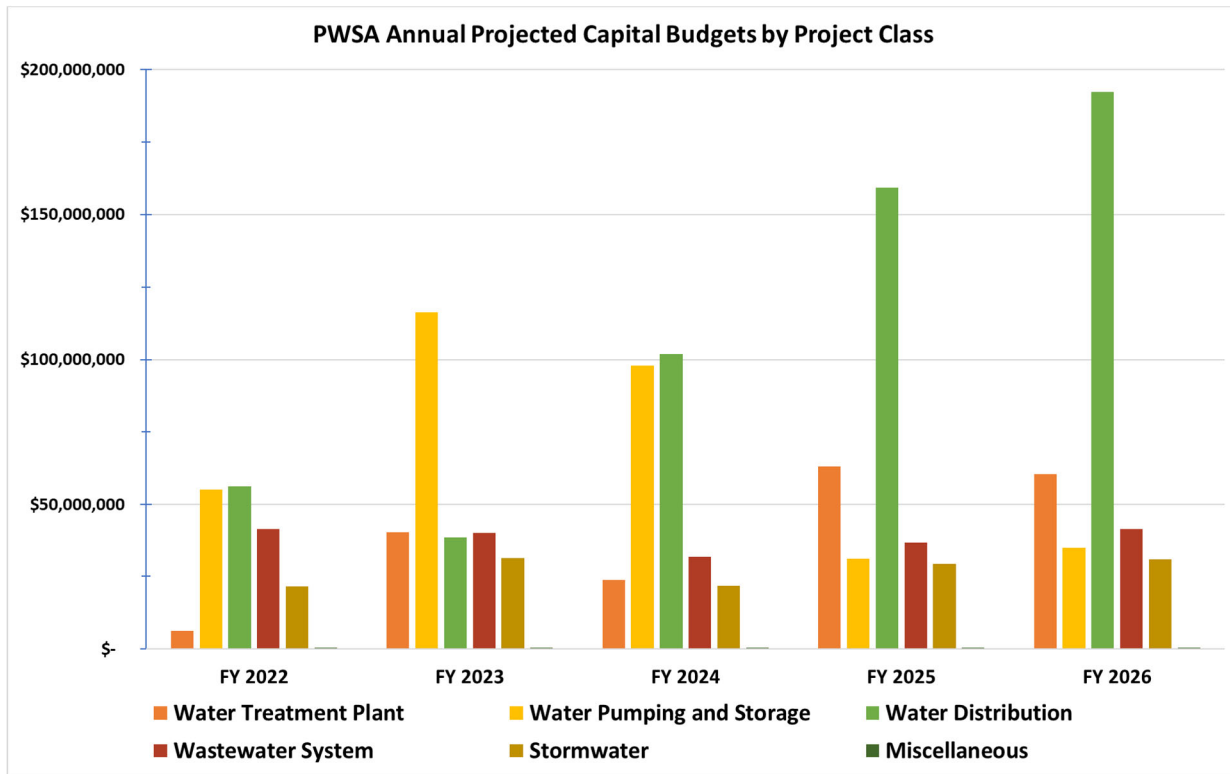
In summary, the PWSA has made progress during 2021. A few of the key progress points are:

- Advanced the CIP to address requirements of the water treatment and distribution system Consent Orders, and improved the water, sewer, and stormwater systems.
- Made organization changes to broaden the management team and increase attention to environmental and regulatory compliance, including the appointment of a Chief Environmental Compliance and Ethics Officer.
- Increased the number of staff.
- Made positive strides to improve maintenance and operation within the system.
- Improved compliance with regulations and Orders regarding abatement of lead, system resiliency, and overall water treatment and quality.
- Acted to improve the aging sewer system with repairs and maintenance.
- Continuing compliance activities related to the water treatment plant and stormwater system, emphasizing a culture of compliance, and creating a new Environmental Compliance Manual for the water production system.
- Successfully developed and obtained Board approval for a robust PWSA 2022 – 2026 Capital Improvement Plan.

Capital Improvement Plan

Figure ES.1 presents an illustration of the CIP for the fiscal years 2022 through 2026 that was approved by the PWSA Board of Directors on September 24, 2021. The CIP is divided into six project classes: water treatment plant, water pumping and storage, water distribution, wastewater system, stormwater, and miscellaneous.

Figure ES.1: PWSA Annual Projected Capital Budgets by Project Class



Mott MacDonald was authorized to begin preparation of the Annual Report of the Consulting Engineer on September 10, 2021. As of the date of this report, the 2022 final operational budget has not yet been approved by the Board or reviewed by the Consulting Engineer.

Based upon our review of the financial summaries of the CIP expenditures during 2021; review of progress made on the CIP; review of the Board approved CIP for 2022-2026; operation and maintenance expenditures during 2021 and the planned expenditures during 2022 (draft only); recommendations from the PUC, the PADEP, the third party corporate monitor, and the USEPA; facility reviews Mott MacDonald has conducted during 2021; and, through interviews with key staff; it is the Consulting Engineer's opinion that the PWSA is managing their systems, organization, and finances to move the utility forward toward their goal of providing improved water and sewer service to their customers.

1 History and Background

1.1 General

In February 1984, the leadership of the City of Pittsburgh (City) formed The Pittsburgh Water and Sewer Authority (PWSA) under the provisions of the Pennsylvania Municipality Authorities Act, 53 Pa. C.S.A. §5601 et. seq. The PWSA's Articles of Incorporation were originally approved on February 17, 1984, by the Commonwealth of Pennsylvania. In 2008, the Commonwealth approved an Amendment to the Articles of Incorporation as adopted by the City and the PWSA to extend its term of existence to 2045 to ensure that its term covers the duration of certain bond obligations. In 2019, the Commonwealth of Pennsylvania approved an Amendment to the Articles of Incorporation as adopted by the City and the PWSA to extend its term of existence to March 13, 2070 and to include stormwater systems. Under its Articles of Incorporation, the Authority is specifically authorized to acquire, hold, construct, finance, improve, maintain, operate, own and lease, either as lessor or lessee, projects of the following kinds and character: sewers, sewer systems or parts thereof, waterworks, water supply works, and water distribution systems, low head dams, facilities for generating surplus power, and stormwater systems.

1.2 Initial Operation

Pursuant to a Lease and Management Agreement dated March 29, 1984, between the PWSA and the City (the "Lease and Management Agreement"), the water and sewer systems were leased to the PWSA and the PWSA took over operations of these systems on May 1, 1984.

Under the Lease and Management Agreement, the PWSA was authorized to operate and maintain the water and sewer systems, construct all necessary improvements, establish and collect rates and charges for its service, and finance its operations and improvements through revenue collections and sale of bonds and notes payable solely from the PWSA's revenues. The PWSA appointed and designated the City as the PWSA's agent to manage, operate, and maintain the water and sewer systems for the term of the lease, subject to the general supervision, direction, and the control of the PWSA. The City provided the services necessary to operate the water and sewer systems to the PWSA with the PWSA reimbursing the City for all expenses incurred and expended by the City.

The Capital Lease Agreement and Cooperation Agreement, each between the PWSA and the City, as authorized in Resolution No. 47 of 1995, terminated the Lease and Management Agreement. The Cooperation Agreement provided that the City render certain services to the PWSA as set forth in the agreement and provided the basis of payment for such services to be rendered by the City. As of January 1, 1995, all positions in the City Water Department and certain positions in the City Water and Sewer Division of the Department of Engineering and Construction were eliminated from the City's budget, and similar positions were created and filled by the PWSA. Under the terms of the Capital Lease Agreement, the PWSA will own the water and sewer systems on September 1, 2025 upon payment of \$1.00 to the City.

1.3 Capital Improvement Program (CIP) Funding Sources

The PWSA has employed various funding mechanisms since 1984 to fund their annual Capital Improvement Plans. Appendix B provides the history of the bond issuances and refunding from 1984 through 2013. Funding mechanisms from 2016 to the present are outlined as follows:

1.3.1 Revolving Line of Credit in 2016, 2018, and 2020

In July 2016 and pursuant to Resolution No. 36 of 2016, the PWSA entered a drawdown, revolving line of credit financing with JPMorgan Chase Bank NA. The maximum amount that can be drawn and outstanding at any one time is \$80,000,000 and had an initial term of four years. The PWSA used funds borrowed under this vehicle to finance capital projects. The intention of the PWSA was to draw down the balance to near capacity and then to issue bonds to replenish this vehicle before using it again.

In June 2018 and pursuant to Resolution No. 63 of 2018, the PWSA amended the revolving line of credit financing agreement with JP Morgan Chase Bank NA to increase the maximum line of credit limit from \$80,000,000 to \$150,000,000. The JP Morgan line of credit expired in June 2020.

In June 2020, the PWSA entered into a new revolving line of credit bank loan with PNC Bank National Association in an amount of \$150,000,000 with a maturity date of June 23, 2023.

1.3.2 2017 Bond Refunding

In December 2017 and pursuant to Resolution No. 190 of 2017, the PWSA issued \$165,390,000 Water and Sewer First Lien Revenue Refunding Bonds composed of Series A (\$159,795,000) and Series B (taxable) (\$5,595,000). The proceeds of the Bonds were used to fund the costs of the refunding of all or a portion of the PWSA's outstanding Series 1998B, 2008A, 2008D-1, and 2013B Water and Sewer System Revenue Bonds. The refunding was completed to reduce the PWSA's debt service payments over the next 15 years by approximately \$6,275,000 and to obtain an economic gain (difference between present values of old debt and new debt service payments) of \$5,311,111.

In addition, the PWSA issued \$218,805,000 Series C First Lien Revenue Refunding Bonds, the proceeds of which were used to fund the costs of refunding the PWSA's outstanding Series 2008 B-1, B-2, and D-2 Water and Sewer System Revenue Bonds. The refunding was completed to reduce the PWSA's debt service payments over the next 23 years by approximately \$9,782,000 and to obtain an economic gain (difference between present values of old and new debt service payments) of \$7,852,000.

1.3.3 2019 Bond Issuance and Refunding

In July 2019 and pursuant to Resolution No. 62 of 2019, the PWSA issued \$109,900,000 (fixed-rate) Series A First Lien Water and Sewer Revenue Bonds and \$104,290,000 (fixed-rate) Series B Subordinate Water and Sewer Refunding Bonds. The proceeds from the Series A of 2019 Bonds were used to pay down the balance of the revolving line of credit. This increased the capacity on the revolving line of credit to allow the PWSA to continue funding capital projects. The proceeds from the Series B of 2019 were used to refund the PWSA's outstanding Series C-1 and C-2 of 2008 Water and Sewer System Revenue Bonds and terminating the associated swaps. The cost to terminate the swaps was \$27,605,000, of which \$5,700,000 was funded with a cash contribution. The refunding was completed to reduce the PWSA's exposure from the risks associated with swaps.

1.3.4 2020 Bond Issuance and Remarketing

In December 2020, and pursuant to Resolution No. 108 of 2020, the PWSA issued \$890,000 (fixed-rate) taxable Series A First Lien Water and Sewer Revenue Bonds, \$91,520,000 (fixed-rate) Series B First Lien Water and Sewer Bonds and remarketed \$218,805,000 of the Series C of 2017 First Lien Revenue Refunding Bonds.

The proceeds from the Series B of 2020 Bonds were used to pay down the balance of the revolving line of credit. The proceeds from the Series A of 2020 Bonds were used to pay for the cost of issuance for the remarketing of the Series C of 2017 Refunding Bonds.

The Series C of 2017 Refunding Bonds were originally sold as soft tender index bonds with a three-year LIBOR Index Rate Period prior to a mandatory tender on December 1, 2020 at 70 percent of 1-month LIBOR plus 64 basis points. The remarketing of the Series C of 2017 Refunding Bonds were sold with a SIFMA Index Rate Period prior to a mandatory tender on December 1, 2023 at SIFMA plus 65 basis points. The Series C of 2017 Refunding Bonds can be called at par June 1, 2023. In addition, the PWSA entered into a basis swap with Merrill Lynch Capital Services, Inc. where the PWSA receives SIFMA and pays 70 percent of 1-month LIBOR to manage variable rate interest payments associated with the remarketing.

1.3.5 PENNVEST Funding

Act 16 of 1988 established the Pennsylvania Infrastructure Investment Authority (PENNVEST) to assist local governments in financing water and sewer projects. The PENNVEST Program provides loans and grants for acquisition, construction, improvement, expansion, extension, repair and/or rehabilitation of all or part of any water or sewer system. Funding under the PENNVEST Program is primarily in the form of low-interest, 20-year loans.

In the last few years, two PENNVEST loans have significantly helped fund the PWSA's work in continuing the lead service line replacements (LSLR) in 2019, 2020, and 2021. The LSLR Program transitioned in 2020 to become part of the Small Diameter Water Main Replacement (SDWMR) Program. The LSLR and the SDWMR programs are detailed in Section 2.2.2.

In 2021, there were five PENNVEST low-interest loan awards and two PENNVEST grant awards to the PWSA. The details of the awards are as follows.

- On January 20, 2021, a \$7,750,000 loan to rehabilitate approximately 7.4 miles of sewers in the Brighton Heights, Hazelwood, and South Side Slopes neighborhoods.
- On April 21, 2021, a \$2,976,450 grant and a \$35,573,550 loan to replace approximately 25,000 feet of water distribution piping and 592 lead service lines.
- On July 26, 2021, a \$23,970,000 loan to line or repair approximately 22 miles of sewers in the Homewood, Squirrel Hill, Marshall-Shadeland, Spring Garden, Highland Park, and Maytide areas.
- On October 20, 2021, a \$1,830,833 loan and a \$2,875,679 grant to replace 200 public and 167 private lead service lines throughout the water distribution system.
- On October 20, 2021, a \$36,277,000 loan to rehabilitate approximately 4,500 feet of large diameter sewers and approximately 22 miles of small diameter sewers.

Table 1.1 summarizes the active and complete PENNVEST loans secured by the PWSA.

Table 1.1: PENNVEST Loans

Project Name	Project Type	Loan Approval Date	Status	Loan Amount ¹
Railside Street Sanitary Sewer Ext.	Wastewater	11/15/00	Complete	\$158,399.23
Ollie Street & Overbrook Blvd. Storm Sewer	Storm	11/15/00	Complete	\$800,963.48
Water System Improvements No. 1	Water	3/21/01	Complete	\$3,940,113.91
Streets Run Interceptor	Wastewater	7/18/01	Complete	\$1,928,470.44
Water System Improvements No. 2	Water	3/20/02	Complete	\$5,112,263.50
Water System Improvements No. 3	Water	7/17/02	Complete	\$4,821,500.00
Sewer System Improvements – Phase I	Wastewater	10/27/08	Complete	\$4,672,410.00
Sewer System Improvements – Phase II	Wastewater	4/20/09	Complete	\$10,264,250.00
Sewer System Improvements – Phase III	Wastewater	7/21/09	Complete	\$4,865,613.00
Water System Improvements – Phase V	Water	4/20/09	Complete	\$8,613,546.00
Water System Improvements – Phase VI	Water	7/21/09	Complete	\$8,393,478.00
Sewer System Improvements – Phase IV	Wastewater	1/22/13	Complete	\$3,275,316.00
Water System Improvements – Phase VII	Water	1/22/13	Complete	\$2,713,065.00
Water System Improvements – Phase VIII	Water	4/24/13	Complete	\$3,813,561.00
Lower Hill Sewer Infrastructure Project Phase 1A	Wastewater	10/23/13	Complete	\$1,712,506.00
COA Storm Sewer Separation Project 2013	Storm	10/23/13	Complete	\$2,361,405.00
Lead Service Line Replacements	Water	10/17/18	Active	\$35,441,231.00
Small Diameter Water Main Replacement Program	Water	1/29/20	Active	\$65,220,000.00
Sewer Rehabilitation in Brighton Heights, South Side Slopes, & Hazelwood	Wastewater	1/20/21	Active	\$7,750,000.00
Water Distribution and Lead Service Line Replacements	Water	4/21/21	Active	\$35,573,550.00
Sewer Repair & Rehabilitation in Homewood, Squirrel Hill, Marshall-Shadeland, Spring Garden, Highland Park, & Carrick	Wastewater	7/26/21	Active	\$23,970,000.00
Lead Service Line Replacements	Water	10/20/21	Active	\$1,830,833.00
Large Diameter and Small Diameter Sewer Rehabilitation	Wastewater	10/20/21	Active	\$36,277,000.00
TOTAL PENNVEST LOANS				\$273,509,474.56

¹ PENNVEST loan amount shown is final loan amount for completed project or original approved loan amount for active projects. Table 1.1 does not include PENNVEST grant funds.

1.3.6 Water Infrastructure Finance and Innovation Act Loan

The PWSA received an invitation from the United States Environmental Protection Agency (USEPA) to apply for a Water Infrastructure Finance and Innovation Act (WIFIA) low-interest loan. The application was submitted in spring 2021 and will provide \$165 million of the funding needed to complete the water production and distribution system improvements, such as the Aspinwall Pump Station Improvements, Bruecken Pump Station Improvements, Clearwell Emergency Response Project, and Clearwell Improvements Project. The scheduled closing on the WIFIA loan is in the first quarter of 2022.

1.3.7 Green Revitalization of our Waterways (GROW) Grants

The PWSA applied to the Allegheny County Sanitary Authority's (ALCOSAN) GROW Grant Program during 2021 for projects involving removal of stream flow to a combined sewer and extraneous flow reduction to sanitary sewers. The PWSA was awarded a total grant amount in 2021 of \$10,391,700. The 2021 grant awards were:

- Direct stream inflow removal, Four Mile Run project – \$10,000,000
- Sanitary sewer lining in Carrick – \$391,700

1.3.8 Brokerage Account

In February 2021, the PWSA Board of Directors approved management to open and maintain a brokerage account with PNC Capital Markets LLC for the purpose of investing operating and revenue funds. Funds invested will follow the objectives included within the Investment Policy that was approved and adopted by the PWSA Board of Directors on October 25, 2019.

1.3.9 Rate Request to Pennsylvania Public Utility Commission

The PWSA's 2021 Tariff Filing Package was submitted to the Pennsylvania Public Utility Commission (PUC) in April 2021. The request included a rate increase and a new stormwater fee. If approved by the PUC, the rate request will provide additional revenue to fund the CIP and operating expenses. If accepted by the PUC, the new rates would go into effect in 2022. The PWSA proposed to phase in the rate increases over a two-year period, in 2022 and in 2023. PUC's final decision about the rate request is expected in December 2021.

1.4 Funding to Support Specific Projects

The PWSA has received grants in 2021 to support the development of the Stormwater Master Plan, which began in March 2021 and is budgeted in the PWSA's operating budget. In total, the PWSA has received \$300,000 to support this project from three Pittsburgh foundations: the Heinz Endowments, the Richard King Mellon Foundation, and the Hillman Foundation.

In 2021, the City of Pittsburgh allocated \$17,500,000 of the funding received from the American Rescue Plan to the PWSA in the form of a grant to fund critical infrastructure improvements, such as lead service line replacements.

1.5 Water System Background

The Allegheny River provides the sole source of water for the system. The Pennsylvania Department of Environmental Protection (PADEP) issued a Water Allocation Permit to the PWSA in March 1989, which allows for water withdrawal of up to 100 million gallons per day (MGD) from the river. The PADEP has advised the PWSA that the permitted allocation would be re-evaluated in the future if the PWSA's demand increases because of growth within the City or through the sale of water to surrounding municipalities.

The PWSA, through its water supply and distribution system, provides water service to more than 300,000 people and over 80,500 service line connections to residential, commercial, industrial, and public customers with potable water and water for fire protection within the geographic boundaries of the City and surrounding areas. The system consists of:

- Rapid sand-type water treatment plant with a maximum capacity of 117 million gallons per day
- 20.8 MGD microfiltration water treatment plant
- Approximately 961 miles of water mains
- Over 32,000 valves and hydrants
- Raw water pump station located along the Allegheny River
- Ten finished water pump stations
- Three finished water reservoirs
- One Source water reservoir
- 13 storage tanks located at 9 sites

The total storage capacity of the reservoirs and the tanks is approximately 455 million gallons. The useable storage capacity within the reservoir and tank system provides adequate volume and pressure under normal water usage for the equivalent of about two days.

The Pennsylvania-American Water Company (PAAW) supplies water to approximately 26,000 customers in the southern and western sections of the City. The PWSA provides sewer conveyance to these customers. The PWSA previously had an agreement with PAAW to subsidize the water purchased for these PWSA customers because PAAW has a higher rate for water than the PWSA. As part of the PWSA compliance filing with the PUC at Docket No. M-2018-2640802, effective January 1, 2020, the PAAW subsidy was eliminated. This filing was supported by the PUC to ensure an appropriate cost of service model was implemented across the service area.

Two additional small areas, one in the eastern part of the City and the other in the western end of the City, are served by the Wilkesburg-Penn Joint Water Authority and the West View Water Authority, respectively. In each of these areas, the respective independent water purveyor owns and maintains the distribution system elements such as the waterlines, valves, hydrants and other equipment. In addition, the PWSA, through interconnections with other systems, provides bulk water supply to Borough of Aspinwall, Borough of Fox Chapel, and Reserve Township, and emergency use water to several adjacent municipalities.

1.5.1 PADEP Administrative Order, April 2016

In April 2016, the PWSA received an Administrative Order from the PADEP for violations under the Pennsylvania Safe Drinking Water Act and regulations related to a modification of corrosion control treatment chemical in 2014. The PWSA reinstated the original corrosion control chemical in early 2016 and completed a corrosion control study in 2017. The recommendations approved by the PADEP in 2018 included the introduction of orthophosphate into the system at strategic locations to reduce corrosion and help control lead levels. In 2019, four orthophosphate systems (at seven application points) were placed into service. These corrosion control systems have decreased the lead concentration and the corrosion in the water distribution system over the past three years.

Significant progress has been made to replace lead service lines. Since June 2016 and as of November 5, 2021, the PWSA has replaced 8,798 public lead lines and 5,783 private lead service lines.

Two Lead and Copper Rule compliance sampling rounds were completed in December 2019 and June 2020, respectively, and the testing showed that lead concentrations in the water distribution system were less than State and Federal action levels. The lead levels indicated compliance with the USEPA and the PADEP regulatory standards. In its 2020 Annual Drinking Water Quality Report, the PWSA reported a 90th percentile value lead concentration from 158 sites sampled in the water distribution system as 5.13 parts ppb for 2020, which is less than the state and federal action level of 15 ppb. The PWSA has continued its compliance sampling in the water distribution system in 2021. In September of 2021, following the corrosion control optimization period, PWSA began conducting a compliance monitoring sampling program.

The PWSA has stated they will continue to conduct aggressive water quality testing and work towards replacing all lead service lines by 2026. The lead line inventory, tracking, and mapping has continued in 2021. There is one remaining requirement on the Administrative Order that the PWSA continues to work on and update monthly, the updated materials evaluation (service line inventory), and this is due on December 31, 2022.

1.5.2 September 6, 2019 Consent Order and Agreement (COA), the May 13, 2020 COVID-19 Extension, and the May 7, 2021 COA First Amendment

On September 6, 2019, the PWSA entered into a COA with the PADEP in the matter of “violations of the Pennsylvania Safe Drinking Water Act and the Rules and Regulations Promulgated Pursuant Thereto.” The COA mandates that the PWSA take action to implement a previously recommended clearwell improvement plan and eliminate “washout” cross-connections; (washouts are used to drain or flush the water system).

The issues surrounding the clearwell have been studied by technical experts from six different consultants since 1994. Three consultants discussed the condition of the clearwell. It was found that the clearwell was structurally stable but identified areas of concern including, but not limited to build-up of sediment in the bottom of the tank prohibiting inspection; infiltrating tree roots; erosion evidence, deterioration and cracks in the concrete walls; clearwell equalization chamber leaks and rusted gates on the clearwell and gatehouse. The other three consultants provided reports in 2008, 2012, and 2017 that focused on available alternatives to address, as one of the reports stated, “PWSA’s desires to have a clearwell system with the operational flexibility of being able to remove approximately one half of the clearwell from service for cleaning and maintenance while the other half remains in service; and to have the ability to bypass the clearwell and send filtered water directly to the Bruecken Pump Station in emergency situations.”

The September 2019 COA establishes the requirements to bring the PWSA clearwell and cross-connection systems into compliance along with a timeline for the improvements. On May 13, 2020, an extension was granted because of the COVID-19 pandemic. On May 7, 2021, a First Amendment to the September 6, 2019 Consent Order and Agreement was entered as an order of the PADEP and agreed to by the PWSA. Because of delays associated with the COVID-19 pandemic and changes in design and construction approaches, the PWSA requested the amendment to the 2019 COA for the purpose of: 1) extending the deadline for the PWSA to submit applications for permits to construct two new pump stations; 2) shortening the deadline for the PWSA to submit an application for a permit to construct a new clearwell bypass system; and, 3) establishing a new stipulated civil penalty in the event the PWSA fails to meet the new deadlines under the First Amendment. Four paragraphs of the COA were amended and the changes are documented in the First Amendment. The PWSA met the deadlines of #1 and #2 above and submitted permit applications by September 30, 2021, and thus did not incur any penalties in #3.

Table 1.2 provides an overview of the requirements and due dates from the September 6, 2019 Consent Order and Agreement, the 90-day extension for some of the requirements granted on May 13, 2020 by the PADEP because of COVID-19, and the First Amendment.

In order to meet the requirements of the COA, the PWSA will need to complete three additional support projects including the Aspinwall Water Treatment Plant (WTP) Electrical and Backup Power Improvements, the Highland Reservoir Pump Station and Rising Main, and the booster chlorination system portion of the Lanpher Reservoir Improvements. The PWSA developed a timeline in order to accomplish these requirements as shown in Table 1.3. For some of the projects, schedule dates were adjusted to reflect a 90-day extension granted by the PADEP on May 13, 2020 because of COVID-19, and the First Amendment.

During interviews conducted in October 2021, the PWSA stated that all COA projects are in progress, with the exception of the Clearwell Improvements Project (replacement of the Clearwell), which is scheduled to begin design in early 2023.

Table 1.2: Subject and Location of COA Requirements (9/6/19 Signed COA, Revised on 5/13/20 for COVID-19 Extension, and Modified by the 5/7/21 Signed First Amendment)

Subject and Location	Requirement	Design/Permit Application Date; Construction Complete Date (Construction Starts After Permit Approval)	COA Section Reference
Aspinwall WTP Clearwell bypass	Design, permit, and construct bypass system that will enable the PWSA to remove the Clearwell from service and replace it.	September 30, 2021; Construction - permit issue date plus 2 years	#3a & #3b
Rehabilitate or replace Rising Main #3 to Highland 2 Reservoir	Design, permit, and construct rehabilitation or replacement of Rising Main #3.	September 1, 2020; Construction - permit issue date plus 1 year	#3c(i) and (ii) & #3d
Rehabilitate or replace Rising Main #4 to Highland 2 Reservoir	Design, permit, and construct rehabilitation or replacement of Rising Main #4 to Highland 2 Reservoir to facilitate the Clearwell bypass system.	June 1, 2021; Construction - permit issue date plus 2 years	#3e & #3f
Aspinwall Pump Station to Lanpher Rising Main	Design, permit, and construct second rising main from Aspinwall Pump Station to the Lanpher Reservoir.	March 31, 2021; Construction - permit issue date plus 2 years	#3g
Replace the cover and liner of the Highland 2 Reservoir to facilitate the Clearwell bypass system	Design, permit, and construct replacement of the cover and liner of the Highland 2 Reservoir to facilitate the Clearwell bypass system.	June 30, 2020; Construction - permit issue date plus 18 months	#3i & #3j

Subject and Location	Requirement	Design/Permit Application Date; Construction Complete Date (Construction Starts After Permit Approval)	COA Section Reference
Replace or rehabilitate the Aspinwall and Bruecken Pump Stations	Design, permit, and construct a combined pump station to replace the existing Aspinwall and Bruecken Pump Stations OR Design, permit, and construct the rehabilitation of the existing Aspinwall and Bruecken Pump Stations.	September 30, 2021; Construction - permit issue date plus 2 years	#3k (i) and (ii) & #3l
Replace the Clearwell and begin Clearwell operations	Design, permit, and construct the replacement of the Clearwell.	January 1, 2024; Construction - permit issue date plus 2 years; Operate - within 30 days of operation permit issuing from the PADEP	#3m & #3n
Cross Connections Investigation and Report	Complete an investigation of the locations where valves, blow-offs, meters or other such appurtenances to the distribution system are found within chambers, pits or manholes connected directly or indirectly to any storm drain or sanitary sewer and submit a report detailing the findings, including the number and locations of all such cross-connections within the PWSA system.	August 30, 2020	#3q
Cross Connection Elimination Action Plan and Schedule	Submit to the Department a plan and proposed schedule to eliminate all the identified cross-connections including whether the requested modification to eliminate each cross-connection identified in the report constitutes a major or minor change.	Within 90 days of Cross Connection Investigation Report submittal	#3r
Cross Connections Permits	For any modification the Department determines to require a permit, submit a complete and technically sufficient application to the Department for a construction permit.	Within 60 days of the issue date of the written determination.	#3s
Cross Connection Elimination	Design, permit and eliminate all identified cross connections.	Consistent with the cross-connection elimination plan and as approved or as modified and approved by the PADEP	#3t

Subject and Location	Requirement	Design/Permit Application Date; Construction Complete Date (Construction Starts After Permit Approval)	COA Section Reference
Cross Connection Elimination Report	Submit a report confirming the elimination of all previously existing cross-connections. Report includes confirmatory photographs, dates and details of the corrective work performed.	Within 90 days of completion of cross-connection elimination	#3t

Table 1.3: PADEP Consent Order Related Capital Projects Schedule, Actual or Projected

Description	Design Start Date	Design Complete	Submit Construction Permit	Construction Permit Issued	Construction Complete
<i>Projects Specifically Stated in COA</i>					
Rising Main 3 – Rehabilitation and partial replacement	11/1/2019	4/15/2021	9/1/2020	6/8/2021	12/16/2022
Highland No. 2 Reservoir Improvements (Liner and Cover Replacement)	11/15/2019	1/8/2021	6/30/2020	1/8/2021	12/1/2022
Rising Main 4 – Rehabilitation or replacement	1/31/2020	5/16/2021	6/1/2021	11/1/2021	11/15/2023
Aspinwall Pump Station to Lanpher Reservoir Rising Main	1/1/2019	11/12/2021	3/31/2021	10/18/2021	5/2/2024
Aspinwall Pump Station Improvements	7/26/2020	1/27/2022	9/30/2021	4/14/2022	4/20/2024
Brucken Pump Station Improvements	7/26/2020	1/27/2022	9/30/2021	4/14/2022	11/14/2024
Aspinwall WTP Clearwell Bypass (Emergency Response)	7/26/2020	1/27/2022	9/30/2021	4/14/2022	4/20/2024
Aspinwall WTP Clearwell Improvements (Replacement)	1/2/2023	3/1/2024	1/1/2024	3/29/2024	3/31/2026
<i>The PWSA-Identified Projects Necessary to Support COA Projects (not stated in COA)</i>					
Aspinwall Water Treatment Plant Electrical and Backup Power Improvements	1/1/2020	TBD	TBD	TBD	TBD
Highland Reservoir Supply and Rising Main	10/23/2020	9/24/2021	6/30/2021	1/19/2022	8/23/2023
Highland Reservoir Pump Station	10/1/2018	9/24/2021	9/27/2021	4/25/2022	1/17/2025

Description	Design Start Date	Design Complete	Submit Construction Permit	Construction Permit Issued	Construction Complete
Lanpher Reservoir Improvements - booster chlorination system	1/22/2021	10/18/2021	5/18/2021	1/31/2022	4/26/2024
4 Mile Run – Water Main Replacement	3/1/2021	2/15/2022	5/4/2021	12/24/2021	4/15/2023

1.5.3 COA on May 7, 2021

On May 7, 2021, the PWSA entered into a COA with the PADEP in the matter of “violations of the Pennsylvania Safe Drinking Water Act and the Rules and Regulations Promulgated Pursuant Thereto” and describes five violations related to the water system. After negotiation of these matters, the COA mandates, as ordered by the PADEP and agreed to by the PWSA, corrective actions as follows:

1. Submit a Corrective Action Plan (CAP), also called Permit CAP, by 7/7/2021, and implement the CAP after receiving approval of it from the PADEP.
2. Submit a plan and schedule, called a Meter and Valve Pit Inspection Plan, by 6/7/2021 and implement the Plan after receiving approval of it from the PADEP.
3. Conduct weekly monitoring of meter and valve pits.
4. Install barriers or other methods by 7/7/2021 to prevent future spills from entering meter or pump station valve pits.
5. Annual training about the Chemical Delivery Procedure Standard Operating Procedure.
6. Civil penalty settlement by 6/7/2021
7. Submit a proposal for a Community Environmental Project by 7/7/2021.

The PWSA has submitted the requirements of #1, 2, 6, and 7 to the PADEP by the due dates listed above, and is awaiting responses about the documents in #1, 2, and 7. The PWSA is continuing the work for #3 and has completed the work for #4.

1.5.4 Plea Agreement and Administrative Agreement in 2021

Related to past WTP violations, Pre-Disposition Remediation Resolution (PDRR) dated July 15, 2020 was developed between the Pennsylvania Attorney General's (AG) Office and the PWSA. The PDRR required the PWSA to issue a statement, make donations totaling \$500,000, and enter into a two-year Corporate Monitorship. The Corporate Monitor is overseeing WTP and lead and copper water distribution system compliance and providing quarterly reports to the AG.

Also related to past WTP violations, a Plea Agreement dated January 13, 2021 among DOJ, USEPA, and the PWSA was signed. The Plea Agreement established a three-year probation period, a \$500,000 self-paid compliance fund, development of an Environmental Compliance Program, creation of Environmental Compliance Manual for water production, creation of the Environmental Compliance Manager position, and retaining an Independent Environmental Consultant to perform annual compliance audits of the WTP. The PWSA was sentenced on September 14, 2021.

Also related to past WTP violations, an Administrative Agreement dated September 14, 2021 between USEPA Suspension and Debarment Office and the PWSA was signed. The Administrative Agreement is for a four-year term and required establishment of a Chief Environmental Compliance and Ethics Officer (CECEO), implementation of improved ethics and

compliance programs, expansion of the environmental compliance program, and an Independent Monitor to oversee compliance and report to regulatory authorities. The CECEO serves as the Environmental Compliance Manager under the terms of the Plea Agreement.

In response to the Plea Agreement and the Administrative Agreement, the PWSA implemented new initiatives in 2021 with the intent of improving water treatment plant operations and attention to environmental compliance. These initiatives are described in Section 2.1.1.

1.5.5 Summary of Water System-Related Regulatory Orders and Agreements

Table 1.4 summarizes the orders and agreements that the PWSA is complying with related to the water treatment and distribution system.

Table 1.4: Current Orders and Agreements Related to the PWSA’s Water Treatment and Distribution System

Order or Agreement	Start Date	Order or Agreement End Date
PADEP Administrative Order	April 2016	December 31, 2022
PADEP Consent Order and Agreement, the May 13, 2020 COVID-19 Extension, and the May 7, 2021 COA First Amendment	September 6, 2019	March 31, 2026
PADEP Consent Order and Agreement	May 7, 2021	Varies
PDRR (Monitorship)	November 10, 2020	November 10, 2022
Plea Agreement	January 13, 2021	January 13, 2024
Administrative Agreement	September 14, 2021	September 14, 2025

1.6 Wastewater System and Stormwater System Background

The PWSA sewer system conveys wastewater collected from 24 neighboring suburban municipalities and wastewater generated by 306,000 residents and businesses within the City boundaries to the ALCOSAN interceptors. The ALCOSAN interceptors are located along the rivers and tributaries for conveyance to ALCOSAN’s Wastewater Treatment Facility (WWTF) for treatment prior to discharge into the Ohio River. As a point of reference, the ALCOSAN WWTF is operating in compliance with the National Pollutant Discharge Elimination System (NPDES) under Permit No. 0025984. In total, the ALCOSAN WWTF receives wastewater flows from 83 municipalities and authorities in the region. ALCOSAN also conducts enforcement of industrial pretreatment in the PWSA service area.

The PWSA’s sewer collection system serves over 111,000 customers (accounts) and includes:

- An extensive network of approximately 1,227 miles of sanitary, storm, and combined sewers
- 29,502 manholes (some manholes include flow dividers and diversion chambers)
- 24,463 inlets (includes catch basins and storm inlets; excludes private inlets)
- 98 combined sewer overflow (CSO) diversion chambers maintained by the PWSA
- Three sanitary sewer overflow (SSO) structures maintained by the PWSA (previously designed/constructed as part of the original system)
- 35 CSO outfall structures maintained by the PWSA and 169 CSO outfall structures included in ALCOSAN’s Consent Decree
- 195 storm sewer outfalls
- Four wastewater pump stations and ancillary facilities

1.6.1 Combined and Sanitary Sewers

Approximately 26 percent of the PWSA sewer system consists of sanitary sewers and sanitary pump stations. However, as redevelopment occurs in the City and portions of the combined sewer system are replaced by separate sewer systems, the percentage of separate sanitary and storm sewers is gradually increasing.

Approximately 74 percent of the sewer system has combined sewers designed so that during wet weather events, when capacity in the combined sewer pipes is exceeded, a portion of the collected storm water and diluted wastewater is discharged into natural watercourses through 98 CSO diversion chambers. The PADEP issued CSO NPDES Permit PA0217611 to the PWSA and the City (as co-permittees), with an effective date of May 1, 2004. The PADEP has administratively extended this permit since April 30, 2009. The PWSA continues to prioritize work associated with the compliance requirements in the CSO NPDES Permit.

The 24 neighboring municipalities combined and sanitary-only sewer system connections to the PWSA collection system were established pursuant to agreements with the City to convey their wastewater to the ALCOSAN WWTF. While some agreements with neighboring municipalities specify sharing of the costs associated with construction and maintenance of the trunk sewers carrying this sewage flow, most do not.

The sewer system has adequate capacity to convey dry weather wastewater flows; however, during wet weather events, the system often exceeds its capacity, which results in overflows, bypassing, and flooding.

The USEPA has adopted regulations regarding overflows from combined sewer outfalls during events that result in the discharge of untreated sanitary sewage into receiving waters. These CSOs contain pollutants that are present in domestic and industrial wastewater, as well as those in urban storm water. The USEPA regulations require owners of any sewer system having CSOs to acquire NPDES discharge permits for each overflow site. The PWSA's CSO permit requires the implementation of the USEPA's "Nine Minimum Control Measures" (NMCs). The NMCs define the basic steps for maintaining the combined sewer system in proper operational order and identifying potential areas requiring updates and repairs.

During dry weather conditions, the ALCOSAN interceptor system is designed to intercept wastewater flows from the City and surrounding municipalities and convey the flows to the ALCOSAN WWTF. This system includes shallow-cut pipes, deep tunnels, and diversion structures. During wet weather conditions, the flow diversion structures (which are maintained by ALCOSAN, the PWSA, and other municipalities) limit or "regulate" the amount of combined sewage that enters trunk sewers and ALCOSAN's interceptor system. In addition, there are regulator points in the sanitary sewer system that relieve or overflow untreated sewage (sanitary sewer overflows or SSOs) to the nearest water body when the systems are overtaxed. ALCOSAN's WWTF has a NPDES permitted dry weather capacity of 190 MGD and wet weather capacity of 250 MGD. Currently, the ALCOSAN WWTF is operating at capacity. The flow regulation at the plant limits peak wet weather flow to the permitted capacity. The combined sewage that exceeds the capacity of the flow regulators at the trunk sewers, interceptors, and treatment plant is discharged as CSOs to the receiving waters of the Commonwealth. There are 252 combined sewer outfalls in the ALCOSAN conveyance system (source: ALCOSAN 2020 Modified Consent Decree), and some of the diversion structures are maintained by ALCOSAN, and some of the diversion structures are maintained by the PWSA and other municipalities and authorities. In 2020, ALCOSAN signed a Modified Consent Decree with the USEPA, the DOJ, the PADEP, and the Allegheny County Health Department, which the PWSA is not a party to,

and ALCOSAN will be increasing the WWTF capacity and conveyance capacities in coming years.

1.6.2 Storm Sewer System

The PADEP issued the most recent Municipal Separate Storm Sewer System (MS4) NPDES Permit PAI136133 to the PWSA and the City (as co-permittees), with an effective date of July 1, 2020. The PWSA has made significant progress with MS4 compliance in the last four years. The PWSA is currently working with the City on an extensive process to update ordinances and create a Unified Stormwater Code.

As part of the PWSA's MS4 permit with the City, the PADEP requires implementation of stormwater management practices for operation of the storm sewer system, and to reduce the amount of sediment that enters the streams from the storm sewer system. On January 20, 2021, PWSA and the City of Pittsburgh entered into an Administrative Order on Consent with the USEPA to resolve violations related to the MS4. The Order requires PWSA and the City to develop and implement a program for conducting inspections and enforcement of construction erosion and sediment controls, and post-construction Best Management Practices, including submission of an amended unified Stormwater Code to the City of Pittsburgh by July 1, 2021; in addition, the inspection and enforcement program must be fully implemented by March 31, 2022. The PWSA and the City are working on a framework to establish and define shared responsibilities related to construction and post-construction stormwater management required by the MS4 permit. City Ordinance 34 made amendments related to stormwater management in the City and was certified on October 12, 2021.

1.6.3 Administrative Consent Orders and Consent Order and Agreements

Administrative Consent Orders (ACOs) and COAs were issued in early 2004 to the City and the other 82 communities tributary to ALCOSAN. The Orders directed compliance with the Pennsylvania Clean Streams Law of 1937 and the Federal Clean Water Act, to eliminate SSOs, and fulfill the Pennsylvania and USEPA CSO Policy obligations. The ACOs were issued to separate sewer communities by the Allegheny County Health Department (ACHD) and the COAs were issued to combined sewer communities by the PADEP. The initial COA among the PWSA, the City, the PADEP, and the ACHD was entered on January 29, 2004, and later amended in July 2007. The original Orders required communities to complete the following: assess, map, clean, and televise the sewer collection system, make critical repairs, conduct flow monitoring, and develop a long-term wet weather control plan in conjunction with ALCOSAN.

The PWSA completed the Consent Order's compliance requirements, including the preparation and submission of a Wet Weather Feasibility Study on July 31, 2013. The submitted Feasibility Study proposes the use of green infrastructure and integrated watershed management (IWM) to assist in the control of combined sewer overflows. The integrated approach, which utilizes a combination of 'green' and 'gray' solutions to address combined sewer overflows, considers all types of pollutant sources in the watershed to holistically address water quality challenges.

On March 27, 2015, the PADEP sent a letter to ALCOSAN customer municipalities and authorities setting forth a procedure to provide additional time to explore flow reduction. The obligations of the COAs and ACOs, as amended, terminated on March 30, 2015. In mid-2015, the City and the PWSA requested to work with USEPA rather than the PADEP on future orders and agreements relating to wet weather overflows. In late 2015, 82 municipalities in the ALCOSAN service area (all municipalities except Pittsburgh) received new COAs outlining Corrective Actions with a due date of December 1, 2017. The Corrective Actions included development of a Source Reduction Study, which the PWSA completed on December 1, 2017,

that identified the types of projects that will most effectively reduce flows in the sewer system and at least one flow reduction demonstration project.

1.6.4 USEPA 308 Information Request

In January 2016, the PWSA and the City received an Information Request from the USEPA under Section 308 of the Clean Water Act. The PWSA's Information Request response was completed and submitted to the USEPA and the PADEP on December 1, 2017. The PWSA is advancing selected source reduction projects in situations where hydraulically they make sense and are cost effective. The PWSA continues to prioritize the ongoing monthly reporting compliance requirements required by the 2016 USEPA 308 Information Request.

1.6.5 Developing Consent Decree for CSO Compliance

USEPA and DOJ representatives began negotiations in 2021 to develop a consent decree with the PWSA and the City related to CSO compliance. It is anticipated that negotiations will continue in 2022. In October 2021, the PWSA awarded a contract to a consulting firm to assist the PWSA with Wet Weather Program Management during and following consent decree negotiations.

1.7 Staffing

The PWSA employs 346 people (as stated in the PWSA's PGH2O Fact Sheet dated May 2021) and projects a total workforce of over 500 employees by 2025. Some of the key positions hired in 2021 include the Senior Group Manager for Stormwater, the Chief Environmental Compliance and Ethics Officer, the Director of Human Resources, a Training and Development Manager, and a Talent Acquisition Specialist. It is anticipated that a greater number of staff positions will be needed in the engineering, procurement, and environmental compliance departments to address the responsibilities of the CIP program and numerous regulatory requirements. As of October 25, 2021, the PWSA has posted approximately 16 open staff positions such as Deputy Director-Water Production, Environmental Compliance Program Manager, Deputy Director of Finance, Laboratory Manager, and Plant Operator.

In 2021, the PWSA Board of Directors approved a revised domicile policy to allow non-union and union employees, if specified in the union contracts, to live in the City of Pittsburgh or the surrounding 36 municipalities. This is expected to increase the number of applicants for the PWSA's job postings. As of November 3, 2021, two of the three PWSA union groups have entered into new contracts that allow employees to follow the revised domicile policy. The contract for the remaining union group is currently being negotiated.

2 Maintenance, Repair, and Operation of the Water, Wastewater, and Stormwater Systems

Two primary sources of information were used to construct the findings and recommendations of Section 2 for the maintenance, repair, and operation of the water and sewer systems:

- Discussions with the PWSA Directors and other staff were conducted in October 2021 to have a dialogue and obtain current data;
- Site visits were completed with the PWSA staff to view facility conditions. A Draft Consulting Engineer's 2021 Facility Condition Assessment Report will be submitted to the PWSA in November 2021.

Mott MacDonald prepared the *Draft Consulting Engineer's 2021 Facility Condition Assessment Report* for the PWSA to provide a current summary of maintenance, repair, and operating conditions relative to the Authority's facilities. The information presented in the report is based on field observations and discussions with operations personnel during field visits. The PWSA's *2015 Facility Physical Condition Assessment* reflects a prior conditions benchmark and was used as the basis for beginning the 2021 evaluation. Both the status of prior conditions and new findings are presented in the *Draft Consulting Engineer's 2021 Facility Condition Assessment Report*. To evaluate the condition of each of the facilities, an investigation was performed that included site visits, review of the previous inspection report, and limited personnel interviews. The site visits provided an opportunity to visually inspect and photo document the facilities, interview staff on the condition of the assets, and generally ascertain the conditions relative to the general physical condition, operations, maintenance, and health and safety of each facility.

The PWSA's work to maintain and renew the water, wastewater, and stormwater infrastructure is divided into operating expenses and capital expenses. Operating expenses include routine maintenance and repair work that allows the systems to continue to operate as designed. The operating budget funds expenses such as smaller scale water and sewer main repairs, catch basin cleaning, water treatment chemicals, vehicles, and employee salaries and benefits. Given the advanced age of much of the infrastructure, investing in maintenance is not enough. For this reason, the PWSA Capital Improvement Plan consists of prioritized projects intended to replace and upgrade key infrastructure. The 2022-2026 Capital Improvement Plan is discussed primarily in Section 3 of this report. However, the allocation of funds for future projects is relevant to the information in Section 2.

The PWSA has experienced modest effects from the pandemic in 2020-2021. There were some projects that were delayed for 2 or 3 months, but by June 2020, planned projects were active. There have been no layoffs because of the pandemic. The PWSA stated that because of the pandemic, there was a modest reduction in revenues from water and sewer billings in 2020, but this has not been the case so far in 2021. In 2021, the PWSA has experienced another effect of the pandemic, supply chain issues. Supply chain issues have created construction delays in 2021, affecting supplies or equipment for capital projects, and bid prices have also been affected by this.

The PWSA's Operation and Maintenance (O&M) final budget for 2022 will not be available until December 17, 2021; therefore, it was unavailable when this report was prepared.

2.1 Findings on Current Maintenance, Repair, and Operation of the Water and Sewer Systems

In September and October 2021, Mott MacDonald conducted a Facility Physical Condition Assessment of the majority of the PWSA's "vertical" facilities to evaluate the condition of each of the facilities. The facilities that were evaluated are listed in Table 2.1. The evaluations consisted of site observations and suggested remedial actions relative to the following considerations:

- **General Physical Condition:** Condition of the physical building such as (but not limited to) walls, foundation, floors, ceiling, roof, doors, windows, access road, grounds, lighting, signage, parking, and overall condition of the interior and exterior of the facility.
- **Operations:** Condition of operational components such as (but not limited to) equipment, pumps, electrical controls, wiring, gauges, valves, controls, supports, piping, platforms, tanks, containers, lifts, cranes, special equipment, and overall operation of the facility.
- **Maintenance:** Condition of the facility in respect to (but not limited to) general cleanliness; condition and location of stored materials; leaks; drips; puddles; accessibility; temperature; humidity; condition and operability of fans; heaters; lighting and overall maintenance of the building and grounds.
- **Health and Safety:** Condition of safety considerations such as (but not limited to) railing, ramps, lights, alarms, detectors, signage, clear pathways, clearances, warning signs and labels, training, and posted procedures.

The 2021 investigation included site visits, review of previous inspection reports, and limited personnel interviews. The site visits provided an opportunity to visually inspect the equipment and briefly interview staff on the condition of the assets at the approximately 60 discrete facilities visited. Confined spaces were not entered, and equipment was not operated.

Table 2.1: Facility Physical Condition Assessment Locations and Current Status

Facility	Current Status
Water Pump Stations	
Aspinwall Pump Station (subject of COA)	Design in progress
Bruecken Pump Station (subject of COA)	Design in progress
Fox Chapel Pump Station (in the basement of the Aspinwall Pump Station)	
Herron Hill Pump Station	In CIP FY 2023-FY 2026
Herron Hill Tank Pump Station	In CIP FY 2023-FY 2026
Highland Pump Station	Design to be complete in Fall 2021
Howard Pump Station	In CIP FY 2024-FY 2026
Inline Pump Station (Coral and Pacific)	In CIP FY 2024-FY 2026
Lincoln Pump Station	Bypass Pump Station for Lincoln PS – design in progress
Mission Pump Station	In CIP FY 2023-FY 2026
Saline Pump Station	In CIP FY 2024-FY 2026

Facility	Current Status
Chlorine Booster Stations	
Allentown Chlorine Booster Station	
Brashear Chlorine Booster	Design in progress
Bedford Chlorine Booster	Design in progress
Herron Hill Chlorine Booster Station	
Highland No. 1 Chlorine Booster Station	
Highland No. 2 Chlorine Booster Station	Design nearly complete; Public Water Supply Permit Application submitted on 10/27/21
Lanpher Chlorine Booster Station	
Lincoln Chlorine Booster Station	
McNaugher Chlorine Booster Station	
Squirrel Hill Chlorine Booster Station	
Water Storage Reservoirs	
Herron Hill Reservoir	Construction complete
Highland Reservoir No. 1	Construction contract awarded
Highland Reservoir No. 2	In construction
Lanpher Reservoir	Design to be complete in early 2022
McNaugher Reservoir	
Water Storage Tanks	
Allentown Tanks	
Bedford Tank	
Brashear Tank	
Garfield Tank	In CIP FY 2023-FY 2026
Herron Hill Tank Pump Station	In CIP FY 2023-FY 2026
Lincoln Tank	In CIP FY 2023-FY 2025
McNaugher Tank	
Spring Hill Tanks	In CIP FY 2023-FY 2026
Squirrel Hill Tank	
Water Treatment	
Highland Park Microfiltration Plant (MFP) Improvements	In CIP FY 2022
MFP1 Corrosion Control Chemical Storage & Feed System	

Facility	Current Status
MFP2 Corrosion Control Chemical Storage & Feed System	
WTP – West Raw Water Intake Structure	In CIP FY 2023-FY 2026
WTP – East Raw Water Intake	In CIP FY 2024-FY 2026
WTP – Ross Pump Station	In CIP FY 2024-FY 2026
WTP – Walkway from Ross to Clarifiers	
WTP – Rapid Mix and Clarifier	In CIP FY 2023-FY 2026
WTP – Backwash retention (old)	
WTP – Clarifiers, Flumes	
WTP – Fluoride Building	
WTP – Gas Meter Building (at Ross PS)	
WTP – Clearwell Bypass (subject of COA)	Design in progress
WTP – Clearwell Improvements (subject of COA)	In CIP FY 2023-FY 2026
WTP – Clearwell Inlet Gate House	
WTP – Clearwell Outlet Gate House	
WTP – Emergency Access Tunnel	
WTP – Chemical Facilities (at Ross PS)	
WTP – Chemical Feed – Carbon	Construction
WTP – Mechanical Room	
WTP – Operations Building	
WTP – Rapid Sand Filtration	
WTP – Screen Room, Flash Mix Tank	
WTP – Sedimentation Basins	In CIP FY 2022–FY 2024 & FY 2026
WTP – Site and Grounds	
WTP – Sodium Hypochlorite Building	
Wastewater Pump Stations	
Rodgers and Mifflin Pump Stations	In CIP FY 2022-FY 2026
Browns Hill Road Pump Station	In CIP FY 2022-FY 2024
Evergreen Pump Station	
Other	
Brilliant Warehouse	

Facility	Current Status
Central Warehouse	
Various Facilities – Pump Component Deficiencies	
Various Facilities – Electrical Deficiencies	
Various Facilities – Security	In CIP FY 2022-FY 2026
Various Facilities – Vegetation	
Various Facilities – Defective Downspouts	
Various Facilities – Roof Deficiencies	
Various Facilities – Emergency Light Fixtures	
Various Facilities – Spill Containment	

Detailed site investigation findings, which are documented in the *2021 Draft Consulting Engineer's Facility Condition Assessment Report*, are presented by facility and identify the various components of the facility and suggested corrective actions to address observed deficiencies.

The findings about current conditions of the facilities are described in the *2021 Draft Consulting Engineer's Facility Condition Assessment Report*. Both the water and sewer systems are functional, and the PWSA has addressed numerous findings presented in the *2015 Facility Physical Condition Assessment*, whether through routine maintenance or the completion of PWSA's past CIP projects. The PWSA is also proceeding with additional CIP improvements, in various stages of implementation ranging between programming and active construction, that will address or eliminate ongoing deficiencies.

The PWSA inspects their facilities individually as part of the design process when a particular facility is being renewed, renovated or replaced. The Senior Manager of Safety and Security performs safety inspections of facilities on an as-needed basis.

The PWSA Operations and Maintenance staff report that the organization is focused on goals for maintenance and repair rates, customer service, and the reporting measures that are required in the Compliance Plan established by the PUC. Overall, there are approximately 60 performance metrics that the PWSA is required to report to the PUC. Examples include valve turning and hydrant flushing. The PWSA maintains an organizational performance improvement dashboard called Headwaters and it is publicly available on a PWSA website at <https://headwaters.pgh2o.com>. The dashboard provides a snapshot of the PWSA's progress for nine metrics that are being measured and tracked: number of lead service line replacements (PWSA side); four metrics for customer communications; time to review development permit applications; number of water meters repaired or replaced; number of training hours per employee per year; and, length of service disruptions. The PWSA has exceeded the expectations for several of the metrics shown in the Headwaters webpage.

2.1.1 Water System Findings

Facilities Assessments were conducted in September and October 2021 for the PWSA's vertical facilities, and a Facilities Assessment Report is being drafted, with the intention of submitting it to the PWSA in November 2021. The report will document the significant site observations and summarize the big-picture considerations for ongoing:

- Maintenance, repair, and operation of the water and sewer systems
- Capital addition and planning projects
- Recommendations for funding for renewal and replacement projects

Many recommended repairs and/or replacements are currently identified and prioritized in the 2022-2026 CIP. Water system projects in the 2022-2026 CIP consist of:

- 19 projects at the Water Treatment Plant, with estimated capital costs of \$193,736,322.
- 28 water pumping and storage projects, with estimated capital costs of \$335,121,843.
- 23 water distribution projects, with estimated capital costs of \$548,090,057.

Water Treatment Plant improvements will be required to meet current and upcoming water quality regulations. The PWSA uses their WTP Master Plan as the framework for the current CIP related to the WTP. There are several facilities that are in use beyond their useful lives and have not had a detailed condition assessment to check for major or moderate structural defects. Detailed analyses are required to determine actual conditions and appropriate maintenance and/or rehabilitation. For the water distribution system, the PWSA uses the 2019 Water Distribution Master Plan as a guide. This Plan included an assessment of each system within the storage and distribution system, and a plan to address noted deficiencies or required improvements. In the interim, needed maintenance and near-term capital improvements are moving forward.

The floating covers and liners on the water reservoirs have reached their normal life expectancy. Replacement of the cover and liner at the Lanpher Reservoir was completed in 2019, and other improvements at Lanpher Reservoir are scheduled in the CIP. Improvements are scheduled for Highland No. 2 Reservoir in the CIP; however, we recommend continued frequent visual inspections of the reservoir cover until it is replaced.

Water storage tank inspections are overdue for many of the 13 tanks in the PWSA system. Water storage tanks should be inspected every five years. Table 2.2 provides storage tank inspection and renovation information. Improvements for three water storage tanks (Garfield, Lincoln, and Spring Hill) are identified in the CIP, as well as tank reservoir security.

Table 2.2: Water Storage Tank Inspections and Renovations

Name	Type	Construction Material	Year Constructed	Last Major Renovation	Last Known Inspection Date	Year Inspection Required*
Allentown Tanks (2)	Standpipe	Riveted steel	1939	2015	2019	2024
Bedford Tank	Standpipe	Welded steel	1993	N/A	2006	2011
Brashear Tanks (2)	Standpipe	Welded steel	Undetermined	2010	2006	2015
Garfield Tank	Elevated	Welded steel	1959	1992	2018	2023
Herron Hill Tank	Elevated	Welded steel	1967	2012	2008	2017
Lincoln Tank	Standpipe	Welded steel	1939	1982	2020	2023
McNaugher Tanks (2)	Standpipe	Concrete	1998	N/A	Undetermined	2017

Name	Type	Construction Material	Year Constructed	Last Major Renovation	Last Known Inspection Date	Year Inspection Required*
Spring Hill Tanks (2)	Standpipe	Riveted steel	1928	1982	2006	2011
Squirrel Hill Tank	Standpipe	Welded steel	1939	2012	2008	2017

*Based on AWWA standard five-year inspection cycle and consideration for PWSA renovations.

There are several facilities that have potential major to moderate structural defects as historically documented. Detailed structural analyses are required to determine current conditions and to assist with the determination of the PWSA' planned improvements.

Heating, ventilation, electrical, security, and auxiliary equipment have experienced significant deterioration and near-term maintenance and/or replacement is strongly advised.

Emergency backup power has been a concern in the past. The PWSA has been working with Duquesne Light Company on this. The PWSA submitted an Uninterrupted System Service Plan (USSP) to the PADEP on August 17, 2021. The CIP includes plans for adding generators to provide emergency backup power at the PWSA facilities.

The existing water distribution system has significant portions of the system operating beyond their useful lives. Preventative maintenance and/or replacement in a prioritized manner is strongly recommended in the near-term to ensure reliable water supply and public safety. The PWSA's program for rehabilitation and/or replacement of large- and intermediate-sized diameter water mains is addressing the most critical lines to prevent system outages. A robust water distribution system replacement program is included in the CIP.

Inspection and condition assessment of below-ground infrastructure, pipelines, and storage facilities need to be conducted on a more frequent and routine basis.

Significant portions of the PWSA facilities and infrastructure are located outside of the public right-of-way, and existing easements may not have been obtained at the time of installation. To allow for unincumbered access and necessary maintenance, the PWSA should establish easements where the PWSA facilities or infrastructure are located.

To prevent premature failure and undue deterioration of valves and hydrants, routine maintenance, testing, operation, and inspection should be increased in breadth and frequency.

Known changes in future water quality standards require a plan for implementing changed operating treatment materials and procedures. The PWSA has restored its pilot plant within the laboratory at the Water Treatment Plant as well as joined Partnership For Safe Water in order to prepare for future changes and advancements.

As described in Section 1.4.1, since 2016, the PWSA has made significant progress with reducing lead levels in the water distribution system, by implementing corrosion control with the addition of orthophosphate in the water lines, and by replacing lead service lines. Highlights of the PWSA's additional larger water system projects initiated in 2021 include the following awarded projects:

- Construction of 2021 Valve Replacement
- Construction and construction management and construction inspection (CM/CI) of Bus Rapid Transit Water Distribution

- Procurement of Supervisory Control and Data Acquisition (SCADA) Equipment
- Construction and CM/CI of Highland No. 2 Reservoir Liner and Cover Replacement
- 2021 Small Meter Replacement Project
- Construction and CM/CI of 2019 Large Diameter Water Main Improvements (Rising Main 3)
- Construction of the 2019 Small Diameter Water Main Replacement – Second Avenue and Tecumseh Street
- Design and Engineering Services for the 2022 Small Diameter Water Main Replacement
- Construction of Herron Hill Reservoir Improvements: Sodium Hypochlorite Building
- Construction management for the WTP Filter Building Sodium Hypochlorite Improvements is anticipated to be awarded in November 2021

In response to the Plea Agreement and the Administrative Agreement in 2021 related to past WTP violations, the PWSA implemented new initiatives in 2021 with the intent of improving water treatment plant operations and attention to environmental compliance. Three new roles include: a consultant functioning for two years as a PADEP Corporate Monitor focused on the WTP and lead and copper rule compliance in the water distribution system, who reports to the State AG; an independent monitor who is overseeing the operations and processes for four years; and a consultant to conduct an annual audit of the WTP in 2021, 2022, and 2023. The independent auditor will produce a report called the Corrective Action Plan, which will be publicly posted in January 2022. In addition, the PWSA created an Environmental Compliance Manual for the WTP that has improved the understanding and accountability of operations, organization, and staff roles at the WTP. The PWSA has revised the organization of the water treatment plant and compliance personnel, and two of the PWSA's intents are for more staff to be involved with environmental compliance and more emphasis on compliance requirements related to water treatment and quality.

2.1.2 Wastewater System and Stormwater System Findings

Condition assessments should continue to prioritize repairs and rehabilitation.

The existing wastewater and storm sewer systems have significant portions of the systems operating beyond their useful lives. Preventative maintenance, rehabilitation, and/or replacement is strongly recommended in the near-term to ensure reliable wastewater and storm service.

Inspection and condition assessment of below-ground infrastructure, pipelines, and storage facilities must be conducted at a more rapid pace to complete an assessment of the entire system every five years. This work has moved forward; however, it is behind schedule.

The sewer system contains a significant number of "junctions" serving as sewer connections in place of manholes. These sewer connections are inaccessible for maintenance and repair purposes and construction of new junctions should be avoided wherever possible. It is recommended that manholes are constructed instead of junctions. The maximum distance between manholes should be 400 feet, as per "Recommended Standards for Wastewater Facilities," also known as "10 State Standards."

Paragraph 7 of the 2004 Consent Order and Agreement requires all municipal catch basins within 100 feet of a sanitary sewer to be tested to verify that they are not connected to the sanitary sewer. The PWSA completed testing of the catch basins in 2011. It is recommended that the PWSA continues to disconnect the catch basins that failed inspection.

Flooding has continued to be an issue in several parts of the service area during heavy and intense rain events. The PWSA is collaborating with the City in developing a strategic Stormwater Master Plan. This Plan will provide a guide for implementing stormwater improvements and flood control and will establish level of service thresholds for stormwater infrastructure throughout the City. The PWSA should continue to collaborate with the City and, where applicable, the Pennsylvania Department of Transportation (PennDOT), to mitigate flooding.

Negotiations began in 2021 with the USEPA, the DOJ, the PWSA, and the City to develop a consent decree for implementing CSO reductions. A CSO Long Term Control Plan (LTCP) has not been accepted by the USEPA and the DOJ for the City and the PWSA. It is anticipated that the PWSA will develop a new LTCP in the next few years, after the Federal consent decree is agreed upon. It is expected that it will include stormwater management integrated with CSO reduction and a watershed approach. In October 2021, the PWSA awarded a contract for Wet Weather Program Management consultant to assist the PWSA with negotiating the consent decree and developing the new LTCP. This LTCP, once finalized and accepted, will create a significant draw on the PWSA resources.

Related to the stormwater system in Pittsburgh, work on the requirements of the January 2021 stormwater system Administrative Order should continue, with the PWSA and the City developing an agreement about sharing responsibilities for compliance with Minimum Control Measures #4 (stormwater management during construction), #5 (post-construction stormwater management), and #6 (pollution prevention and good housekeeping). It is expected that most of the work will be incurred by the City and the PWSA's efforts will be modest.

Current regulatory requirements defined in the PWSA's and the City's MS4 NPDES Permit include 10 percent sediment reduction to be completed by June 30, 2025 in the Saw Mill Run watershed, the Streets Run-Monongahela River watershed, and the Chartiers Creek watershed. In late 2021, the PWSA began partnering with PennDOT on sediment reduction projects in the Saw Mill Run watershed, and it is presumed that both organizations will share the sediment reduction benefits when the projects are complete. PennDOT is planning to implement design/build projects to achieve sediment reduction. The Invitation for Bids occurred in October 2021.

The PWSA is continuing to prioritize sewer rehabilitation projects, green infrastructure projects, repairs for wastewater pump stations, and closed-circuit televising of sewers. Highlights of the PWSA's larger sanitary, combined, and storm sewer system projects initiated in 2021 has included the following projects awarded:

- Construction of Wightman Park Phase 2
- Professional Services Agreement for Developing Strategic Plan for Stormwater Program
- Construction of the M-29 Outfall Improvements
- Construction of the Maryland Avenue Green Infrastructure Project
- Construction of the Woodland Road Green Infrastructure Project
- Construction of the 2019 Small Diameter Sewer Rehabilitation – Brownsville Road Storm Sewer Project
- Construction of the Nobles Lane Storm System Improvements
- Construction of Winchester Drive at Grovemount Storm System Improvements
- Construction of the Fleury Way Stormwater Infrastructure Improvements
- Construction of the Thomas and McPherson Green Infrastructure Project

- Construction of 31st Ward Sewer Rehabilitation and Separation Project – Nollhill Street
- Construction for 2021 Sewer Reconstruction
- Design and Engineering Services for the 2022 Small Diameter Sewer Rehabilitation
- Construction of the 2021 ALCOSAN Regionalization Sewer Repairs
- Construction and CM/CI of the 2018 and 2020 Sewers Under Structures
- Design and Engineering Services for the 2022 Large Diameter Sewer Rehabilitation
- Professional Services Agreement for the Wet Weather Program Manager
- Construction of 2020 and 2021 Small Diameter Sewer Rehabilitation – anticipated to be awarded in the fourth quarter of 2021

The 2022-2026 CIP includes:

- Nine wastewater system projects, with estimated capital costs of \$190,448,059.
- 23 stormwater system projects, with estimated capital costs of \$134,448,077, including budget for Wet Weather Program projects in 2024, 2025, and 2026.

In June 2021, the PWSA engaged a project team to initiate a collaborative community process to develop a Stormwater Master Plan. This Master Plan is expected to serve as Pittsburgh's blueprint to address local stormwater challenges. The Master Plan will build off past planning efforts by using climate change data, community input, and prioritizing public health and wellness to provide a cost-effective, inclusive, and sustainable way to address one of the region's most challenging problems. The plan will identify the priorities and milestones to implement within the next five years while keeping an eye on the future so the PWSA can be better prepared for the impacts of climate change. The Final Master Plan is expected to be completed in June 2022, and implementation will take place over many years. The CIP for 2022 through 2026 doesn't include any projects related to the Stormwater Master Plan, presumably because the Master Plan hasn't been completed yet. The goals of the Master Plan are to:

- Improve the quality of life for residents by creating a community that is healthier, safer, and more resilient to the impacts of stormwater.
- Develop cost-effective solutions to improve water quality, reduce street flooding and basement backups, and beautify neighborhoods.
- Establish guiding principles and the framework to establish a minimum level of storm protection to equitably protect Pittsburgh residents from local stormwater challenges.
- Identify short-term stormwater projects using an effective combination of green and gray infrastructure and climate data projections to plan for future projects.
- Recommend funding strategies and governance models to create a sustainable and more resilient city.

2.1.3 Information Management System Findings

Condition assessments should be updated on a priority basis to determine any changes in condition and to prioritize work on all facilities.

Continued reliance on existing information and lack of coordination between various information systems will result in incomplete communication of critical system information, slower responses to system deficiencies, and overall increased management and capital costs. Implementation of a Computerized Maintenance Management System would provide the ability for operations and engineering to make effective operating decisions, rank capital investments, improve customer service, and lower operation, maintenance, and capital costs. Also, this system would provide

transparent access for the PWSA's management to efficiently monitor project work, costs, and budgets.

In 2020, the PWSA implemented a mobile application called SpryMobile, which is a cloud-hosted maintenance management system that is interfaced with its customer information system. This application enables real-time digital reporting using tablets for work orders, metering deployment, and equipment testing. The PWSA Operations and Maintenance staff use this application daily for field inspections, for example, meters, leaks, non-revenue water, sewer televising, catch basins, and hydrants. The PWSA can query orders and evaluate trends using the data captured in SpryMobile. The PWSA is expanding the use of the application and is anticipating a future roll-out for field (mobile) work orders and adding asset management and maintenance systems at the WTP.

In addition, the PWSA has implemented a cloud-based Document Management System (known as DocuWare), which provides PWSA employees with the ability to electronically view and analyze engineering and administrative documents that were previously only available in paper copy form. The PWSA is also in the process of implementing a new Enterprise Resource Planning System and upgrading the current Geographic Information System (GIS).

The PWSA built and calibrated a hydraulic water model using WaterGems by Bentley. This model work was completed in November 2019, and the PWSA uses the hydraulic water model frequently for water system analyses.

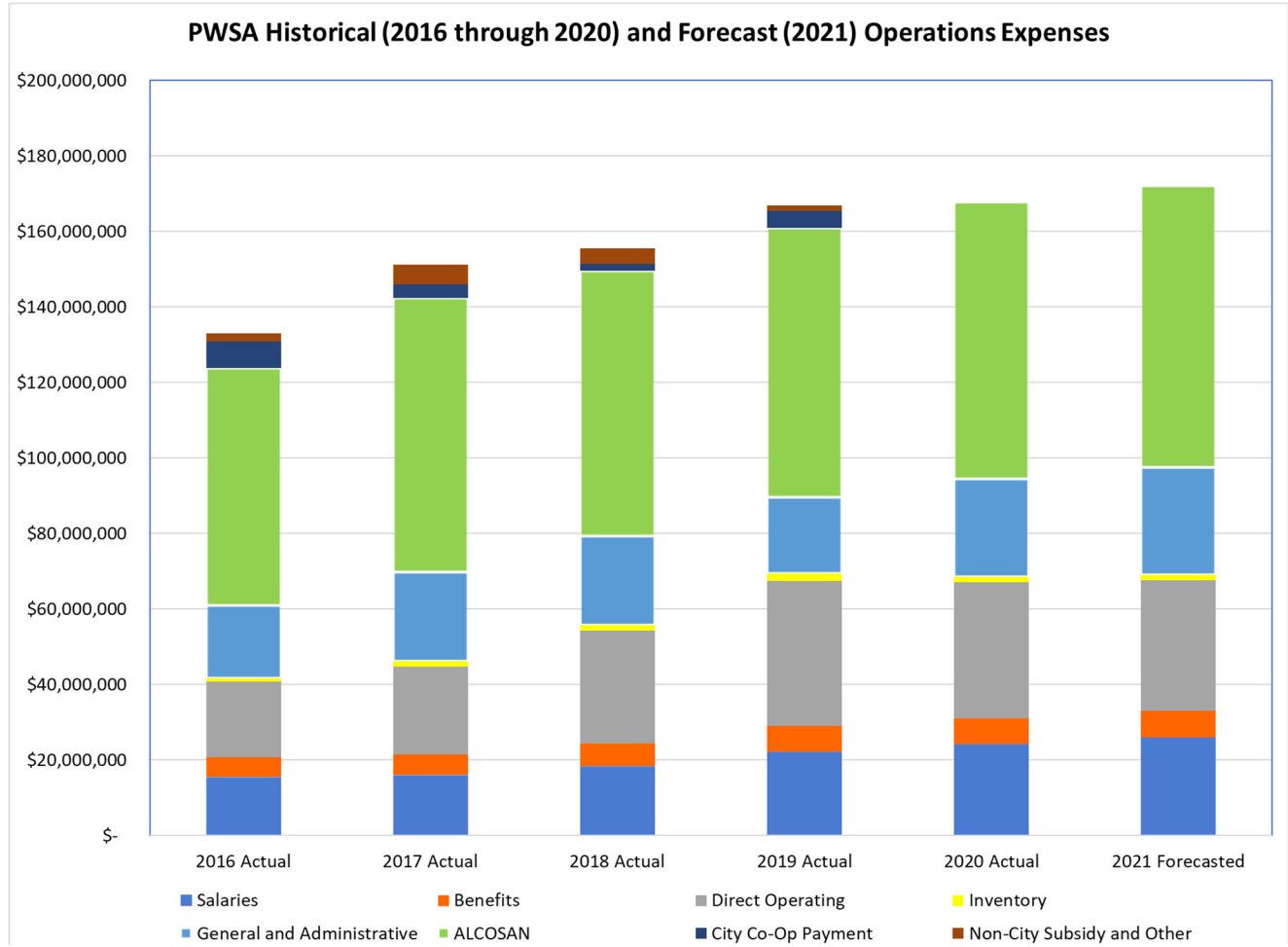
The PWSA's hydrologic and hydraulic sewer system model is a valuable tool for assessing and evaluating the sewer system and should be upgraded as necessary and maintained and updated on a regular basis. The existing sewer model is incomplete and the PWSA is planning to build it out for all sewersheds and update the model to provide a calibrated tool for developing efficient CSO reduction projects. This effort is anticipated to be completed in conjunction with the Wet Weather Program.

2.2 Recommendations for Maintenance, Repair and Operation of the Water, Wastewater, and Stormwater Systems during the 2022 Fiscal Year

As Consulting Engineer for the PWSA, Mott MacDonald recommends the PWSA advance the 5-year CIP, approved on September 24, 2021. The majority of the maintenance and operational issues previously identified are being addressed as separate tasks. In addition, this section contains suggestions and recommendations to be undertaken (or continued) during 2022 to improve the PWSA's ability to provide a reliable source of potable water to its customers, provide reliable sewer system operations, and achieve compliance with current Consent Order requirements. Most of these recommendations are included in the CIP for 2022-2026.

Capital costs associated with these actions were estimated and used to assess the budget for the PWSA's CIP for 2022. Operational costs are shown in Figure 2.1 for the years from 2016 through 2020 (actual operations expenses) and for 2021 (forecast operations expenses), that the PWSA provided on October 26, 2021.

Figure 2.1: PWSA Historical (2016 through 2020) and Forecast (2021) Operations Expenses¹



¹ City Co-Op Payment and Non-City Subsidy and Other categories were eliminated after 2019.

In October of this year, the PWSA provided a rough estimate of the 2022 operations expenses as of October 14, 2021, and the operations categories are summarized in

Table 2.3. These amounts are estimates and have not been approved by the PWSA Board of Directors. The estimate indicates that the operations expenses may be higher than any previous year. The PWSA has indicated that the final PWSA operations budget for 2022 will not be available and approved until December 17, 2021.

Operating expense increases over the past five years are mostly attributable to increased hiring (salaries and benefits), direct operating costs, and general and administrative expenses. A greater amount of operations expenses is anticipated to be needed because of the upcoming negotiations (estimated to continue for another two years) to develop the consent decree for reduction of sewer overflows.

Table 2.3: PWSA's Estimated Operating Expenses for 2022¹

Salaries	\$28,374,975.04
Benefits	\$7,726,982.00
Direct Operating	\$35,218,773.31
Inventory	\$1,629,919.20
General and Administrative	\$31,636,273.45
ALCOSAN	\$74,824,704.32
TOTAL	\$179,411,627.32

¹ As of 10/14/21; not approved by the PWSA Board of Directors.

A significant increase in the number of employees is needed to effectively address the additional operations, monitoring, maintenance, environmental compliance, and project management actions required to implement the CIP and the maintenance and operational improvements identified herein. For example, additional operations staff seems to be needed to assist engineering staff with providing valuable input in the design stage and reviewing design plans, and staff experienced in supporting projects during the construction and commissioning phases of a project appear beneficial. The costs associated with the increased staff should be closely monitored during 2022 and beyond.

Active coordination and collaboration among departments, such as engineering and operations, engineering and compliance, operations and compliance, and engineering and finance, will be more important than ever to accomplish the work in the CIP and operations budgets, which in 2022 are both the highest in the PWSA's history, respectively. Especially for large projects, it is recommended that there is increased cohesiveness and coordination and clearer definitions of responsibilities throughout the critical path for each project.

It is recommended that the PWSA implements a program for conducting a comprehensive assessment of their vertical facilities at a minimum every three years. Facilities Assessments should include a review for compliance with the American with Disabilities Act, the presence of lead paint, and the presence of asbestos building materials.

Continued emphasis is recommended for tracking and achieving environmental and regulatory compliance; updating the water production Environmental Compliance Manual and the Wastewater System Compliance Manual; creating a Stormwater System Compliance Manual; updating Operation and Maintenance Manuals and Standard Operating Procedures (SOPs) to keep them current; and conducting training to keep staff current on the manuals and SOPs.

2.2.1 Water System Recommendations

2.2.1.1 New and Priority Recommendations for 2022

Designate a primary point of contact to lead a team from the operations staff to coordinate with compliance staff and to focus on system flushing, testing, monitoring, and tracking trends to optimize this work.

Designate a primary point of contact to lead a team from the operations staff to coordinate with engineering staff and to focus on system improvements such as valve isolations for future work, putting new systems into service, and coordinating with design and construction services.

2.2.1.2 On-going Recommendations

Continue the Water Quality Initiative Program and adjust the program as necessary, depending on regulatory requirements and testing results. These types of requirements include lead and copper testing program for residential customers, continued optimization at the WTP, continuing the lead service line replacement assistance, replacing the PWSA-owned lead service lines, and continuing the internal and public education programs.

Continue to track and control "lost and unaccounted for" water, for example, water loss from water main breaks, flushing, or taking reservoirs out of service, through increased leak detection efforts, large meter calibration and/or replacement, and installation of meters on unmetered uses.

Continue frequent visual inspections of the reservoir covers until they are replaced. The PWSA stated that they are conducting yearly maintenance of the covers, and there will be a maintenance contract out for bid in the near future.

Exercise distribution system valves and hydrants on a routine basis and implement a plan to exercise valves and sluice gates at the water treatment plant on a routine basis. Repair or replace non-operable valves and sluice gates at the water treatment plant and non-operable valves and hydrants in the system.

Perform inspections on the water storage tanks that are overdue or due as shown in Table 2.2.

Continue the routine maintenance program (in-house or through a third-party) to remove and prevent vine and vegetation growth from the vertical facilities and perform detailed inspections of roofs and rain conductor systems.

Continue planning and design of facilities to replace the Clearwell. Monitor and record the condition of the existing Clearwell related to cleaning, structural, and mechanical performance, and implement the Emergency Contingency Plan as necessary.

The PWSA conducted a comprehensive condition assessment at the WTP to identify the condition of the buildings, site, process equipment, electrical system, river intake, raw water pump station, high service pump station, clearwell, and support systems. The comprehensive condition assessment should be used to prioritize the capital improvements project for 2022-2026, which identifies 11 priority projects required to meet COA deadlines and upcoming federal regulations.

2.2.2 Lead Service Line Replacement Program

Pursuant to Paragraph 3.e.i of the November 17, 2017 COA issued by the PADEP, the PWSA was required to replace at least 1,341 public lead service lines in place within the system on or before June 30, 2018. To address the requirements of the COA and in support of full-service line replacements, the PWSA Board of Directors approved allocation of approximately \$44 million of the 2018 CIP budget to fund both the public and private side replacement for lead service lines in the PWSA's water service area. The public and private line replacements were performed by several contractors selected by an open public bid process.

The PWSA met the requirements of Paragraph 3.e.i of the PADEP's November 17, 2017 COA. By June 26, 2018, the PWSA had replaced 1,347 public lead service lines to meet the COA requirements. Of the 1,347 lead service line replacements, 634 replacements were conducted under the 2017 and 2018 Lead Service Line Replacement Program. All other replacements were conducted either by the PWSA's Field Operations crews or as part of water main relay projects.

Pursuant to Paragraph 3.e.i of the November 17, 2017 COA and as subsequently amended by the PADEP, the PWSA was required to replace an additional 855 public lead service lines by December 31, 2018. The PWSA exceeded that goal and replaced 1,366 lead service lines between June 27, 2018 and December 19, 2018.

The Lead Service Line Replacement program became part of the Small Diameter Water Main Replacement Program. As of October 20, 2021, the PENNVEST funds in 2021 were used for 579 public and 477 private service line replacements, completed by the PWSA and the selected contractors.

We recommend that the PWSA continue this very important and well-received program.

2.2.3 Wastewater System and Stormwater System Recommendations

2.2.3.1 New and Priority Recommendations for 2022

Review the Intermunicipal Agreements to assess opportunities to charge fees to upstream municipalities, where appropriate.

2.2.3.2 On-going Recommendations

Increase the cleaning and inspection frequency cycle for the wastewater and stormwater systems to improve on O&M knowledge to allow the PWSA to be proactive in responding to potential failures before they occur.

As part of the wet weather program, the PWSA is planning to perform a desktop risk-based assessment of the sewer mains and sewage pump stations using industry standards and best practices to prioritize inspection and rehabilitation. Conduct regular evaluations of repairs versus replacement of aging pump stations and needed solutions to abate wet weather overflows. Inspection and condition assessment of below-ground infrastructure and sewer pipelines should be conducted more frequently to complete an assessment of the entire system every five years.

Replace junctions throughout the wastewater and stormwater systems with traditional manholes wherever possible.

Evaluate the need for additional metering in the wastewater system.

Continue Adaptive Management approach for stormwater and CSO reduction and/or pollutant reduction in programs such as Saw Mill Run watershed and the 14 connected sewersheds for which it was found that the PWSA's existing collection system could not convey the typical year flows.

Continue to prioritize the regulatory requirements in the CSO NPDES permit, including compliance with the Nine Minimum Controls requirements.

Continue to evaluate and address the basement sewage backup issues that occur during intense wet weather events.

The PWSA should continue to coordinate with ALCOSAN regarding the wet weather improvements that each organization is embarking on in their respective wet weather programs.

Continue to maintain the stormwater system for optimal operation and in compliance with the MS4 requirements, including the six Minimum Control Measures. The PWSA should prioritize the regulatory obligations for the PWSA and the City in the five-year MS4 permit term, including the required reduction of sediment in three watersheds by June 30, 2025. In 2022, the PWSA

and the City should plan and design the stormwater best management practices to address the pollutant reduction regulatory requirements currently mandated before June 30, 2025 and plan for future pollutant reduction.

2.2.4 Information Management System Recommendations

2.2.4.1 New and Priority Recommendations for 2022

The PWSA should prioritize the process of implementing a new Enterprise Resource Planning (ERP) System and upgrading the current GIS. Both of these are expected to be completed in 2022 or early 2023. The PWSA is also in the beginning phases of implementing a new Computerized Maintenance Management System (CMMS). It is anticipated that the CMMS will be fully implemented in the coming years.

2.2.4.2 On-going Recommendations

Acquire, install, develop, and implement a CMMS, including training staff to assist with capital investment prioritization. CMMS is a software system that can be used to house, manage, and track all the various field inspection, relays, repairs, materials, equipment and labor costs, and other associated work for the PWSA's asset management program. The CMMS can be used by field and engineering staff to record, house, track, and identify short-term and long-term asset investment needs. A properly developed CMMS can identify efficiency improvements, increase levels of asset renewal, and reduce operation, maintenance, and capital costs. The CMMS should communicate with the GIS system and be able to coordinate with e-Builder software as well as the PWSA's finance system. Successful implementation of a system-wide CMMS will require significant organizational, operational, management, and capital changes to the PWSA's existing systems.

Add pipe material and installation date with hyperlinks to historical records and photographs to the existing GIS information. Operations and maintenance staff as well as construction inspectors and construction managers should add existing conditions and/or as-built information such as pipe material and installation date with hyperlinks to records and photographs to the existing GIS information. Continuous GIS improvements will reduce the costs of data management, increase the flow of technical information, decrease the costs of engineering activities, and allow more comprehensive coordination with agencies, utilities, and the PWSA operations. In addition, it will allow the PWSA to securely share and/or publish certain data to the public.

The water distribution modelling software, WaterGEMS, has been developed for the PWSA's system. WaterGEMS is the only hydraulic water model that has a separate input for hydrant data. Hydrant results from field investigations can easily be compared to modelled data to pinpoint possible problems in the system. It also can perform a criticality analysis, which can be integrated into the CMMS to develop a comprehensive main replacement program and help turn engineering decisions from a reactive process to a proactive process. The model that has been developed can be made more accurate as more accurate input data is obtained. It is our understanding that these activities were undertaken as part of the water system master planning effort during 2019. We recommend this effort continue and that this model is used to help plan each project.

We recommend that the sewer system model is updated and expanded to include buildout for all sewersheds, and as new and updated data is generated, use the model for various assessments and scenarios, such as to inform development and maintenance needs of the PWSA's collection system and to evaluate wet weather impacts in the PWSA's collection

system and its tributary areas. The PWSA should coordinate with ALCOSAN regarding the wet weather modeling that each organization will be updating and expanding for their respective wet weather programs.

3 Capital Improvement Program Projects

Sections 3.1, 3.2, and 3.3 are based on information in the PWSA fiscal years 2022-2026 Capital Improvement Plan, approved by the PWSA Board of Directors on September 24, 2021.

3.1 General

The PWSA considered the following criteria in evaluating and prioritizing capital projects:

- Safety: Potential health and safety risks to personnel and the public if action is not taken
- Regulatory Compliance: Regulatory compliance schedule and potential fines for non-compliance
- Reliability/Operational Flexibility: Location, age, and condition of infrastructure and risk if action is not taken
- Capacity: Meets community health needs and growth, as needed
- Operations and Maintenance Efficiency: Potential for operating cost savings
- Regional Cooperation/Stewardship: Coordination with external stakeholders and local communities
- Level of Service: Improvement to customer service
- Sustainability: Energy efficiency and “green” approach to improving water quality

The PWSA described a few constraints that sometimes occur that affect project schedules that the PWSA cannot control, such as a supply chain issue affecting pipe availability, a winter moratorium on right-of-way construction work in the City, or a lengthy permit application review period by a regulatory agency. The PWSA has had to adjust the timing of projects for reasons such as these and has kept this in mind as they developed the CIP.

3.2 Funding Sources

3.2.1 Primary Sources

The PWSA Capital Improvement Program is funded through several primary sources to which specific programs and projects are allocated. The CIP funding sources for each of the five years are as follows:

- FY 2022: Debt (revenue bonds), Distribution System Improvement Charge (DSIC) – water, DSIC – wastewater, and PENNVEST.
- FY 2023: Debt (revenue bonds), DSIC – water, DSIC – wastewater, PENNVEST, and Water Infrastructure Finance and Innovation Act (WIFIA).
- FY 2024: Debt (revenue bonds), DSIC – water, DSIC – wastewater, PENNVEST, and WIFIA.
- FY 2025: Debt (revenue bonds), DSIC – water, DSIC – wastewater, and WIFIA.
- FY 2026: Debt (revenue bonds), DSIC – water, DSIC – wastewater, and WIFIA.

3.2.2 Proposed Stormwater Fee

In April 2021, the PWSA submitted a request to the PUC to change how the PWSA bills for stormwater services. Then, on September 7, 2021, the PWSA announced that it filed a proposed settlement with the PUC regarding its 2022 and 2023 water, wastewater conveyance,

and stormwater rate proposal. The settlement was reviewed by the presiding PUC administrative law judge. The next step is review by the full Commission, with a final decision expected on or before December 16, 2021. Rate increases for water usage are proposed for 2022 and 2023. A new stormwater fee is proposed to provide an additional funding source. If the stormwater fee is approved, it will assist the PWSA with implementing capital and operations projects, including stormwater management projects.

3.3 Current Capital Improvement Plan

Table 3.1 presents the fiscal years 2022 through 2026 CIP that was approved by the PWSA Board of Directors on September 24, 2021. Figure 3.1 provides an illustration of the CIP for fiscal years 2022 through 2026, and Figure 3.2 shows a chart to highlight the capital budget for fiscal year 2022. The CIP is divided into six project classes: water treatment plant, water pumping and storage, water distribution system, wastewater system, stormwater system, and miscellaneous.

Table 3.1: PWSA 2022-2026 Capital Improvement Plan

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Total Water Treatment Plant	\$193,736,322	\$6,253,411	\$40,203,269	\$147,279,642
Total Water Pumping and Storage	\$335,121,843	\$55,208,438	\$116,218,583	\$163,694,822
Total Water Distribution System	\$548,090,057	\$56,341,652	\$38,235,780	\$453,512,625
Total Wastewater System	\$190,448,059	\$41,130,789	\$39,817,206	\$109,500,064
Total Stormwater System	\$134,448,077	\$21,424,273	\$31,199,088	\$81,824,716
Total Miscellaneous	\$2,500,000	\$500,000	\$500,000	\$1,500,000
TOTAL SYSTEMWIDE CIP	\$1,404,344,358	\$180,858,563	\$266,173,926	\$957,311,869

Figure 3.1: PWSA Annual Projected Capital Budgets by Project Class

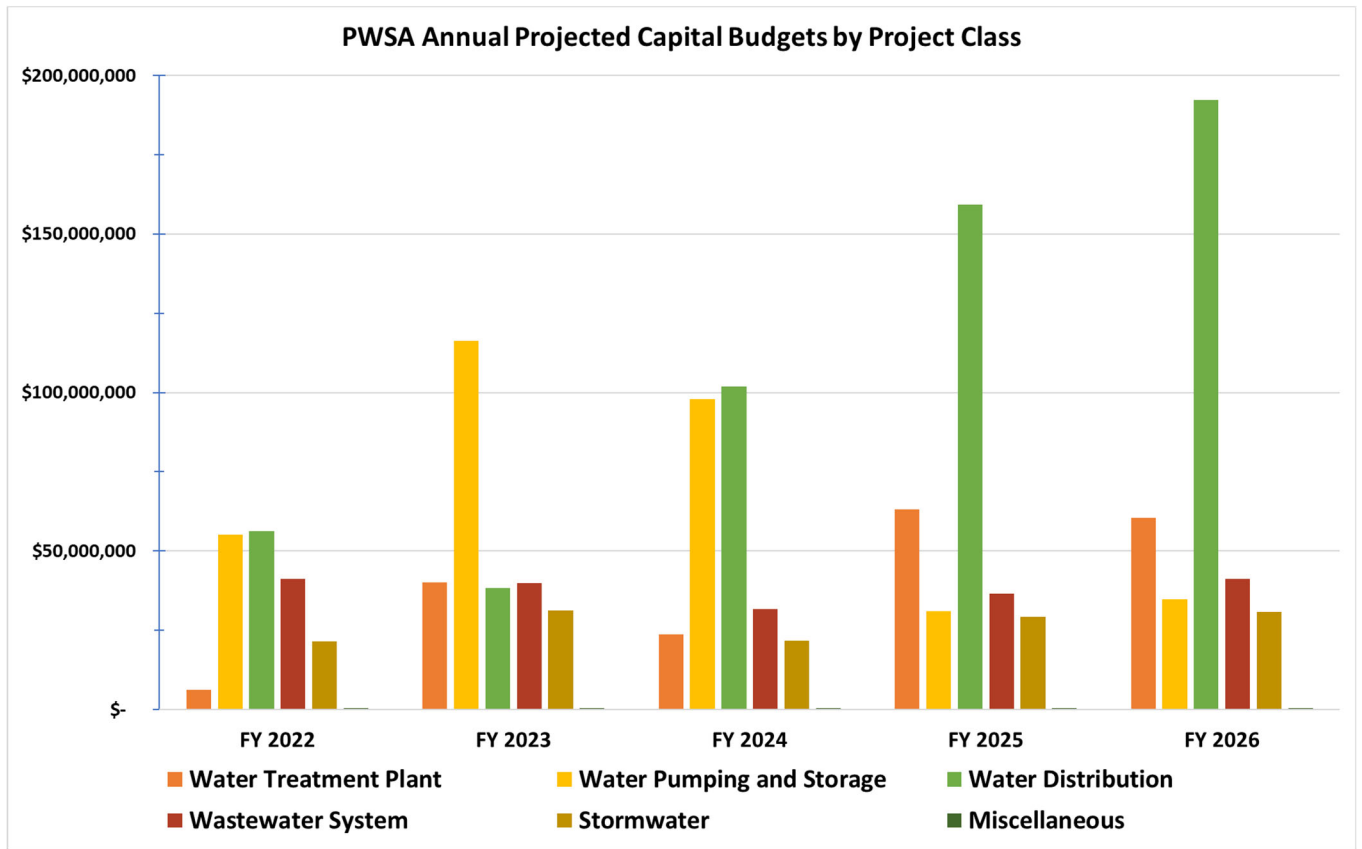


Figure 3.2: PWSA Fiscal Year 2022 Projected Capital Budgets by Project Class

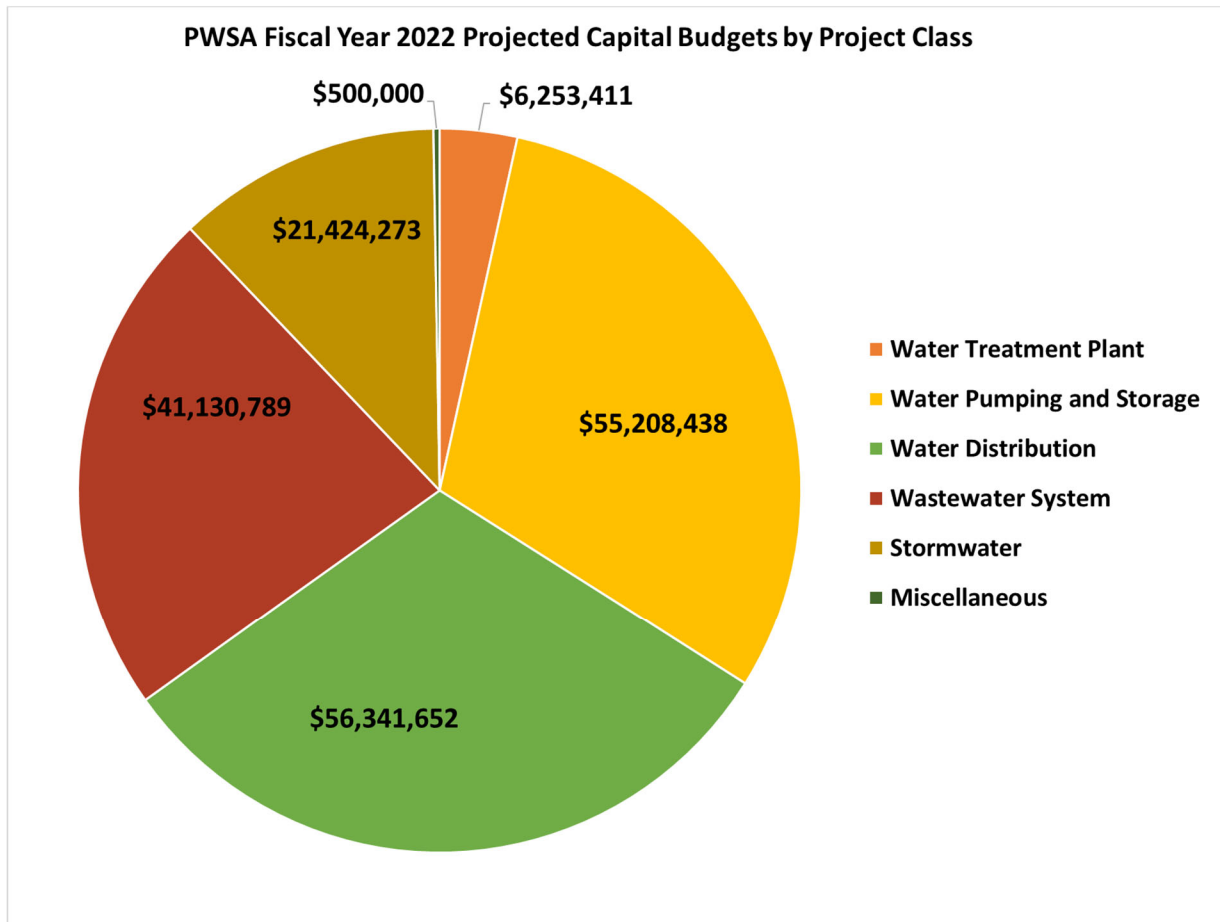


Figure 3.3 illustrates the annual water system capital budgets. Table 3.2, Table 3.3, and Table 3.4 outline the water system capital budgets and the planned projects for fiscal years 2022 through 2026, for the water treatment plant, water pumping and storage, and water distribution system improvements, respectively. Some of the projects associated with the clearwell improvements program were delayed because of the regulatory agency review period. The PADEP has adjusted the construction deadlines accordingly. The CIP shows that 2023 and 2024 will be the peak years for water pumping and storage work, with most of the work related to the clearwell improvements program.

Figure 3.3: PWSA Annual Projected Water System Capital Budgets

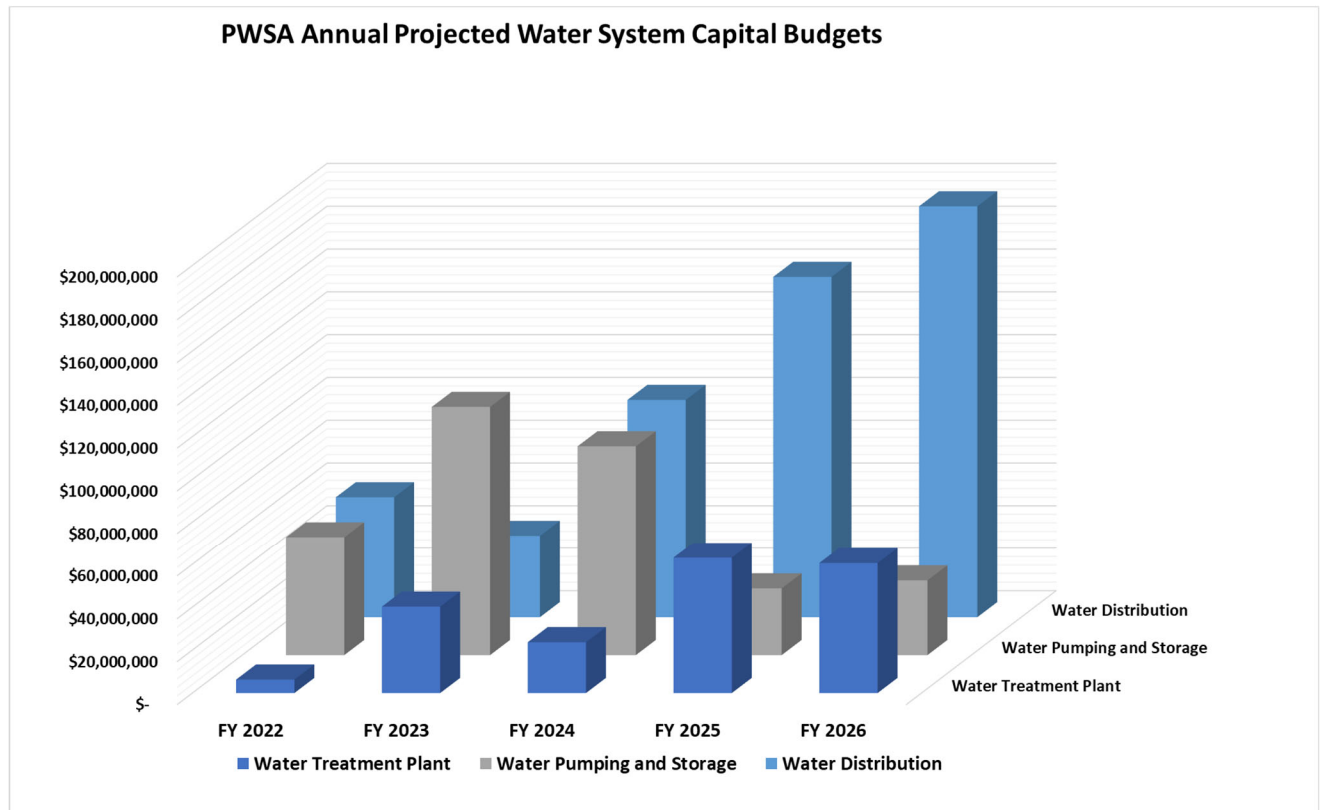


Table 3.2: Water Treatment Plant Improvements

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Aspinwall Treatment Plant Pretreatment Chemical System and Clarification Improvements	\$30,000	\$30,000 (payment for remainder of project)	-	-
Aspinwall Utility Water Improvements – Electrical/General/Mechanical	\$521,923	\$521,923	-	-
Aspinwall Water Treatment Plant Electrical and Backup Power Improvements	\$23,213,440	\$168,365	\$1,010,185	\$22,034,890
Aspinwall Water Treatment Plant Filter Improvements	\$2,750,000	\$168,582	\$1,369,732	\$1,211,686
Aspinwall Water Treatment Plant Filter Building Sodium Hypochlorite Improvements	\$3,791,608	\$2,233,047	\$1,558,561	-
Aspinwall Water Treatment Plant Raw Water Intakes	\$19,575,001	-	\$357,996	\$19,217,005

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Aspinwall Water Treatment Plant Raw Water Intakes - East Intake	\$4,427,480	-	-	\$4,427,480
Clearwell Emergency Response Project	\$27,417,764	\$264,633	\$24,892,208	\$2,260,923
Clearwell Improvements	\$57,009,492	-	\$4,371,917	\$52,637,575
Chemical Feed Modernization Project	\$18,500,000	\$817,860	\$1,387,333	\$16,294,807
Corrosion Control Chemical Storage & Feed Systems	\$90,618	\$90,618	-	-
Highland Park Microfiltration Plant Improvements Project	\$444,500	\$444,500	-	-
Hydraulic Valve Replacement Program	\$3,250,000	-	\$179,885	\$3,070,115
Instrumentation Upgrade	\$1,040,000	\$693,333	\$346,667	-
Lime Slurry System Improvements	\$2,102,400	\$514,036	\$1,588,364	-
Phase 1 Sedimentation Basin Rehabilitation and Water Treatment Plant Gate Valve and 84-inch Coupling Project	\$4,999,999	\$306,513	\$2,490,421	\$2,203,065
Phase 2 Sedimentation Basin Rehabilitation Project	\$790,230	-	-	\$790,230
Post-Filter Chemical System Improvements	\$827,586	-	-	\$827,586
Rapid Mix and Clarifier Improvements Project	\$22,954,280	-	\$650,000	\$22,304,280
TOTAL WATER TREATMENT PLANT	\$193,736,321	\$6,253,410	\$40,203,269	\$147,279,642

Table 3.3: Water Pumping and Storage Improvements

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Aspinwall Pump Station Improvements	\$29,404,285	\$207,410	\$10,981,236	\$18,215,909
Aspinwall Pump Station to Lanpher Reservoir Rising Main	\$92,870,240	\$19,516,813	\$46,342,177	\$27,011,250

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Aspinwall Water Treatment Plant Chemical Unloading Improvements	\$690,969	\$134,466	\$556,503	-
Bruecken Pump Station Improvements	\$55,883,478	\$351,519	\$25,468,015	\$30,063,944
Facility Underground Storage Tank Removal and Replacement	\$690,969	\$134,466	\$556,503	-
Chlorine Booster Station Improvements	\$9,180,887	\$584,615	\$5,051,280	\$3,544,992
Disinfection By-Products Mitigation	\$2,452,887	\$1,293,960	\$969,835	\$189,092
Garfield Tank Improvements	\$2,411,290	-	\$122,198	\$2,289,092
Herron Hill Pump Station Improvements	\$10,960,001	-	\$602,429	\$10,357,572
Herron Hill Reservoir Improvements	\$36,846	\$36,846 (close-out costs; project is complete)	-	-
Herron Hill Reservoir Improvements - Sodium Hypochlorite Building	\$2,423,993	\$2,423,993	-	-
Herron Hill Tank Pump Station Improvements	\$1,109,999	-	\$61,012	\$1,048,987
Highland 1 Reservoir Liner	\$704,981	-	-	\$704,981
Highland No. 2 Reservoir Improvements	\$24,713,889	\$22,052,489	\$2,661,400	-
Highland Reservoir Pump Station and Rising Main	\$10,468,295	\$4,890,823	\$13,598,197	\$14,731,380
Howard Pump Station Improvements	\$10,468,295	-	-	\$10,468,295
Inline Pump Station (Coral and Pacific) Improvements	\$600,000	-	-	\$600,000
Lanpher Reservoir Improvements	\$11,726,984	\$2,416,588	\$6,572,044	\$2,738,352
Lincoln Pump Station: Bypass Pump Station Project	\$792,528	\$433,867	\$295,661	-
Lincoln Pump Station Improvements	\$1,305,000	-	\$60,577	\$1,244,423

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Lincoln Tank Improvements	\$4,195,000	\$230,583	\$275,710	\$3,688,707
Mission Pump Station Improvements	\$16,865,000	-	\$927,003	\$15,937,997
Pump Station Architectural	\$2,500,000	-	-	\$2,500,000
Pump Station Security	\$3,181,506	-	-	\$3,181,506
Ross Pump Station	\$5,035,396	-	-	\$5,035,396
Saline Pump Station Improvements	\$1,055,611	-	-	\$1,055,611
Spring Hill Tank Improvements	\$2,125,001	-	\$116,803	\$2,008,198
Tank Reservoir Security	\$8,579,408	\$500,000	\$1,000,000	\$7,079,408
TOTAL WATER PUMPING AND STORAGE	\$335,121,843	\$55,208,438	\$116,218,583	\$163,694,822

Table 3.4: Water Distribution System Improvements

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Bus Rapid Transit Water Distribution	\$4,299,135	\$4,299,135	-	-
District Metering Program	\$4,136,923	-	-	\$4,136,923
Duck Hollow Main Replacement	\$2,964,458	\$326,289	\$2,418,432	\$219,737
Herron Hill - Squirrel Hill Boundary Adjustments	\$408,116	-	-	\$408,116
Inoperable Curb Stop Repair and Replacement Program	\$2,500,000	\$500,000	\$500,000	\$1,500,000
Intermediate Diameter Water Main Replacement Program	\$26,015,448	-	-	\$26,015,448
Intermediate Meter Replacement Program	\$462,129	\$122,296	\$81,666	\$258,167
Large Diameter Water Main Replacement Program	\$83,864,069	\$15,030,564	\$15,066,385	\$53,767,120
Large Meter Replacement Program	\$4,116,288	\$1,571,313	\$1,362,979	\$1,181,996
Lead Service Identification Program	500,000	\$500,000	-	-
Low Pressure Area Remediation	\$1,393,833	-	-	\$1,393,833

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Neighborhood Lead Service Line Replacement Program	\$111,170,000	-	-	\$111,170,000
North Side Boundary Adjustments	\$612,173	-	-	\$612,173
Private Lead Service Line Reimbursement Program	\$5,274,537	\$1,274,537	\$1,000,000	\$3,000,000
Regulator Valve and Vault Replacement Program	\$9,559,529	\$232,420	\$1,321,957	\$8,005,152
Small Diameter Water Main Replacement Program	\$254,740,675	\$23,802,324	\$9,235,175	\$221,703,176
Small Meter Replacement Program	\$5,817,247	\$2,114,155	\$1,713,417	\$1,989,675
South Side Slopes Boundary Adjustments	\$612,173	-	-	\$612,173
Unmetered and Flat Rate Properties	\$962,500	\$462,500	\$500,000	-
Urgent Lead Service Line Replacement	\$5,706,000	\$1,399,500	\$1,170,000	\$3,136,500
Valve Replacement Program	\$11,756,741	\$1,228,536	\$1,930,769	\$8,597,436
Water Relay Program	\$9,718,083	\$1,978,083	\$1,935,000	\$5,805,000
Water and Wastewater Safety and Security Improvements	\$1,500,000	\$1,500,000	-	-
TOTAL WATER DISTRIBUTION SYSTEM	\$548,090,057	\$56,341,652	\$38,235,780	\$453,512,625

Figure 3.4 illustrates the annual wastewater system capital budgets. Table 3.6 outlines the wastewater system capital budgets and the planned projects for fiscal years 2022 through 2026.

Figure 3.4: PWSA Annual Projected Wastewater System Capital Budgets

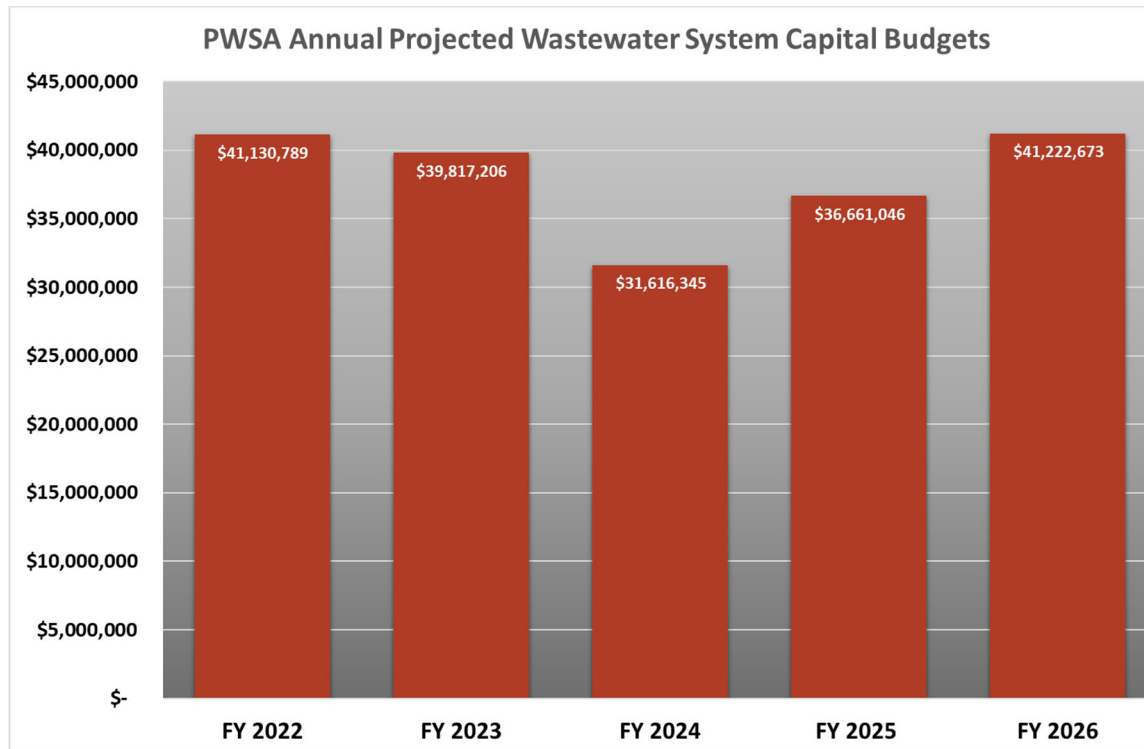


Table 3.5: Wastewater System Improvements

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
31st Ward Pump Station and Appurtenances - Phase 2	\$14,059,438	\$110,521	\$1,090,000	\$12,858,917
Browns Hill Road Sewer Pump Station Replacement	\$1,700,000	\$248,000	\$370,100	\$1,081,900
Large Diameter Sewer Rehabilitation Program	\$24,078,364	\$5,700,224	\$4,993,711	\$13,384,429
Maytide Storm and Sanitary Sewer System Improvements	\$5,076,866	\$82,584	\$3,921,723	\$1,072,559
M-29 Outfall Improvements	\$1,804,376	\$1,804,376	-	-
Queenston Sewer Improvements	\$2,145,050	\$1,931,853	\$213,197	-
Sewer Reconstruction Program	\$10,708,016	\$3,201,777	\$1,999,781	\$5,506,458
Sewers Under Structures Program	\$20,209,693	\$3,253,531	\$7,551,477	\$9,404,685

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Small Diameter Sewer Rehabilitation Program	\$110,666,256	\$24,797,923	\$19,677,217	\$66,191,116
TOTAL WASTEWATER SYSTEM	\$190,448,059	\$41,130,789	\$39,817,206	\$109,500,064

Figure 3.5 illustrates the annual stormwater system capital budgets. Table 3.6 outlines the stormwater system capital budgets and the planned projects for fiscal years 2022 through 2026.

Figure 3.5: PWSA Annual Projected Stormwater System Capital Budgets

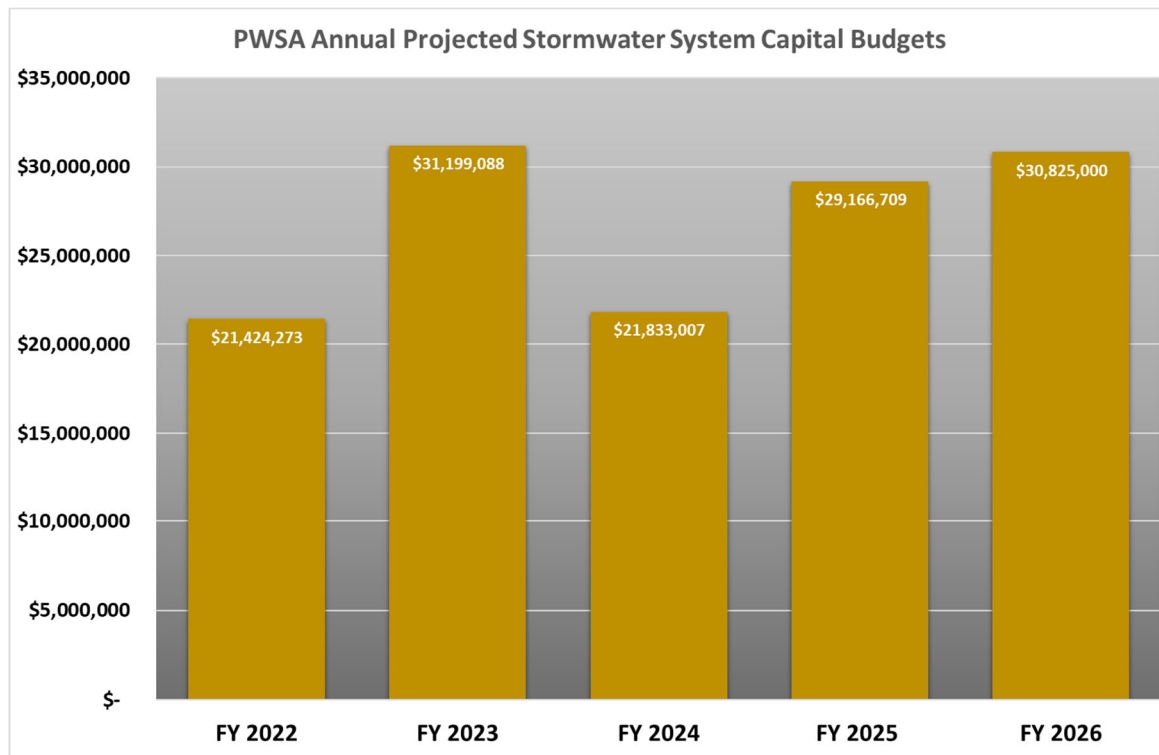


Table 3.6: Stormwater System Improvements

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Braywood Stormwater Improvements	\$909,000	\$105,000	\$804,000	-
Bus Rapid Transit Stormwater Infrastructure Improvements	\$1,520,059	\$1,039,288	\$480,771	-
Catch Basin and Inlet Replacement Program	\$35,878,472	\$4,238,472	\$7,113,750	\$24,526,250
Dragoon Way Stormwater Improvements	\$1,163,000	\$135,000	\$1,028,000	-

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Fleury Way Stormwater Infrastructure Improvements	\$601,468	\$601,468	-	-
Four Mile Run Stormwater Infrastructure Improvements	\$16,357,044	\$3,333,541	\$7,272,993	\$5,750,510
Haverhill Street Improvements Project	\$700,000	\$115,000	\$585,000	-
Lawn and Ophelia	\$756,249	\$756,249	-	-
Martin Luther King Field Stormwater Infrastructure Improvements	\$4,352,233	\$539,936	\$3,812,297	-
Maryland Avenue Stormwater Infrastructure Improvements	\$1,795,488	\$1,795,488	-	-
Nobles Lane Stormsystems Improvements	\$158,916	\$158,916	-	-
Saw Mill Run Municipal Separate Storm Sewer System Compliance	\$3,500,000	-	-	\$3,500,000
Saw Mill Run Watershed Improvements	\$1,000,000	\$200,000	\$500,000	\$300,000
Southside Flats Sewer Separation	\$3,527,000	\$513,000	\$2,383,194	\$630,806
Southside Stormwater Infrastructure Improvements	\$4,359,951	\$1,114,451	\$2,842,000	\$403,500
Stewart Avenue Stormwater Infrastructure Project	\$3,104,000	\$299,400	\$1,910,156	\$894,444
Thomas and McPherson Stormwater Infrastructure Improvements	\$4,523,030	\$4,060,230	\$462,800	-
Volunteer's Field Stormwater Infrastructure Improvements	\$937,109	\$853,776	\$83,333	-
Wet Weather Program Projects	\$45,000,000	-	-	\$45,000,000
Wightman Park Stormwater Infrastructure Improvements (Phase 1 & 2)	\$424,789	\$424,789	-	-
Winchester Drive at Grovemount Stormsystem Improvements	\$201,597	\$201,597	-	-
Woodland Road Stormwater Infrastructure Improvements	\$577,528	\$577,528	-	-

PWSA 2022-2026 Capital Improvement Program	Total 5-Year Commitment (Budget)	FY 2022	FY 2023	FY 2024-FY 2026
Woods Run Stream Removal Stormwater Infrastructure Improvements	\$3,101,144	\$361,144	\$1,920,794	\$819,206
TOTAL STORMWATER SYSTEM	\$134,448,077	\$21,424,273	\$31,199,088	\$81,824,716

4 Public Utilities Commission Act 65 and Act 70

4.1 Public Utility Commission Regulatory Background

4.1.1 Overview

On December 21, 2017, Pennsylvania Governor Wolf signed Act 65 of 2017 (Act) into law amending the Pennsylvania Public Utility Code which, among other things, added a new Chapter 32 (Sections 3201 – 3209) addressing the Pennsylvania Public Utility Commission's (Commission or PUC) jurisdiction over the provision of utility water, wastewater, and stormwater service by entities created by Pennsylvania cities of the second class under the Municipality Authorities Act. As the City is the only city of the second class in the Commonwealth, the Commission now has jurisdiction over the PWSA. Effective April 1, 2018, pursuant to 66 Pa.C.S. §§ 3201-3209, Act 65 of 2017, the PUC was granted jurisdiction over the PWSA. The PWSA is the first municipal water authority to be regulated by the Commission.

The Commission approved the initial water and wastewater tariffs of the PWSA effective March 1, 2019 as part of the PWSA's first base rate filing at Docket Numbers R-2018-3002645 and R-2018-3002647. On September 30, 2020, the Authority filed a proposed settlement with the PUC regarding its 2021 water and wastewater rate proposal, and the PUC approved a settlement for approximately half of the proposed service rate increase, which went into effect on January 14, 2021.

The PWSA submitted materials to the Commission in April 2021 to support a request for a rate increase, and a proposed stormwater fee was included in this request. The PUC's decision about the request is expected in December 2021.

4.1.2 Long-Term Infrastructure Improvement Plan

Under Act 65, the PWSA was requested to file a Long-Term Infrastructure Improvement Plan (LTIIP) (66 Pa C.S. §3202 (6)) by September 28, 2018. The Commission normally requires that a LTIIP be submitted to support a Distribution System Improvement Charge (DSIC). A DSIC is a separate charge from the tariff and supports the accelerated replacement of aging infrastructure.

The requirements for the development and submission of an LTIIP are outlined in PA code Chapter 121 §121.3 as follows:

- Identification of the types and age of eligible property owned and operated by the utility
- An initial schedule for planned repair and replacement of eligible property
- A general description of the location of eligible property
- A reasonable estimate of the quantity of eligible property to be improved or repaired
- Projected annual expenditures and means to finance the expenditures
- A description of the way infrastructure replacements will be accelerated and how repair, improvement or replacement will ensure and maintain adequate, efficient, safe, reliable and reasonable service to customers
- A workforce management and training program designed to ensure that the utility will have access to a qualified workforce to perform work in a cost-effective, safe and reliable manner

- A description of the utility's outreach and coordination activities with other utilities, Department of Transportation and local governments regarding the planned maintenance/construction projects and roadways that may be impacted by the LTIIP

The PWSA submitted their LTIIP to the Commission on September 28, 2018. An update to the LTIIP was finalized in August and September 2019 after consideration of input from interested parties and stakeholders. The Authority's LTIIP for water and wastewater was approved by the PUC on August 27, 2020.

4.1.3 Compliance Plan

On December 21, 2017, the Pennsylvania legislature enacted Act 65 of 2017 (Act 65), placing the Authority under the jurisdiction of the PUC pursuant to the Pennsylvania Public Utility Code. Act 65 applies most of the provisions of the Public Utility Code to the Authority in the same manner as a "public utility," resulting in regulation of the Authority's rate making, its operating effectiveness, debt issuances and other aspects of conducting its business similar to the way the PUC regulates investor-owned utilities. Act 65 includes provisions that allow the Authority to impose, charge or collect rates or charges as necessary to permit the Authority to comply with its covenants with the holders of any bonds or other financial obligations of the Authority, and prohibits the PUC from requiring the Authority to take any action that would cause the interest on the Authority's financial obligations to be includible in gross income of the holders of such obligations for federal income tax purposes.

On January 18, 2018, the PUC issued a Tentative Implementation Order (TIO) which included methods by which the PUC and affected entities may carry out the tariff approval, ratemaking, compliance plan and assessment provision of Act 65. The PUC issued a Final Implementation Order (FIO) on March 15, 2018 which, *inter alia*, directed (1) the filing of water and wastewater tariff filings no later than July 2, 2018; and, (2) a compliance plan to the PUC no later than September 28, 2018 to address how it will achieve full regulatory compliance including provisions to bring the Authority's existing information technology, accounting, billing, collections, and other operating systems and procedures into compliance with the requirements applicable to jurisdictional water and wastewater utilities. The Authority complied with both of these requirements and received approval of its Initial PUC Tariffs effective March 1, 2019. The PWSA's Compliance Plan was filed on September 28, 2018 and supplemented on February 1, 2019. The PUC elected to stage its review of the Authority's Compliance Plan and Stage 1 was directed to urgent infrastructure remediation and improvement and the revenue and forecasting requirements of maintaining service that support public health and safety. The PUC issued Orders regarding Stage 1 on March 26, 2020 and June 18, 2020. The Orders resolved a significant number of issues in the proceeding by approving a partial settlement. Some issues related to lead service line remediation, however, remain outstanding and two subsequent appeals of the Stage 1 Orders are pending. Compliance Plan Stage 2 will address stormwater and customer service issues and is to begin upon entry of a final unappealable order regarding Stage 1.

4.2 Act 70 and the Cooperative Agreement

On July 23, 2020, the General Assembly of Pennsylvania enacted Act 70, which is now state law. It indicates that the Cooperative Agreement executed in October 2019 supersedes portions of the PWSA's requirements that have been controlled by the Public Utility Commission regulations since April 1, 2018 when the Public Utility Commission began jurisdiction over the PWSA. The change in requirements is with respect to issues involved with the PWSA and the City. Act 70's Article XXVIII-G, Water and Sewer Authorities in Cities of the Second Class (Pittsburgh is the only second-class city in the Commonwealth), refers to the Cooperation

Agreement entered into between the City and the Authority on October 3, 2019. It states the Cooperation Agreement shall have the force and effect of law until January 1, 2025, or an earlier termination date to which the City and Authority mutually agree, and the Cooperation Agreement shall govern:

- Changes in the City and Authority's rights and obligations resulting from the enactment of the Act of December 21, 2017 (P.L. 1208, No.65), entitled "An Act amending Title 66 (Public Utilities) of the Pennsylvania Consolidated Statutes, in rates and distribution systems, further providing for rates to be just and reasonable; and providing for water and sewer authorities in cities of the second class," including rates paid by the City to the Authority for public utility service.
- The division of services related to the system.
- Payments by the City and Authority to the other based on actual, verifiable, direct expenses and in accordance with customary utility practices under 66 PA.C.S Pt. 1 (relating to public utility code).
- Payments by the Authority to the City that shall be subordinate to each debt obligation of the Authority.
- Cooperation by the City and Authority in their respective capital projects which may impact each other.
- Responsibilities of the Authority with respect to City parks and other City properties. (City parks are defined as 50 acres or larger.)
- Ownership of the system.
- Roles and responsibilities of the City and Authority with respect to the system.

Therefore, since July 23, 2020, the PWSA is abiding by both the Act 70 requirements and the Public Utility Commission regulations, metrics, and reporting.

5 Conclusion

The PWSA has made progress during 2021. A few of the key progress points are:

- Advanced the CIP to address requirements of the water treatment and distribution system Consent Orders, and improved the water, sewer, and stormwater systems.
- Made organization changes to broaden the management team and increase attention to environmental and regulatory compliance, including the appointment of a Chief Environmental Compliance and Ethics Officer.
- Increased the number of staff.
- Made positive strides to improve maintenance and operation within the system.
- Improved compliance with regulations and Orders regarding abatement of lead, system resiliency, and overall water treatment and quality.
- Acted to improve the aging sewer system with repairs and maintenance.
- Continuing compliance activities related to the water treatment plant and stormwater system, emphasizing a culture of compliance, and creating a new Environmental Compliance Manual for the water production system.
- Successfully developed and obtained Board approval for a robust PWSA 2022 – 2026 Capital Improvement Plan.

Based upon our review of the operation and maintenance expenditures during 2021 and the planned expenditures during 2022 (draft only); financial summaries of the CIP expenditures during 2021; review of progress made on the CIP; review of the Board approved CIP for 2022-2026; recommendations from the PUC, the PADEP, the third party corporate monitor, and the USEPA; facility reviews Mott MacDonald has conducted during 2021; and, through interviews with key staff; it is the Consulting Engineer's opinion that the PWSA is managing their systems, organization, and finances to move the utility forward toward their goal of providing improved water and sewer service to their customers.

6 Acknowledgement

Mott MacDonald would like to take this opportunity to express sincere thanks to the staff of the Pittsburgh Water and Sewer Authority for their valuable contributions to this report. Specifically, we want to acknowledge Will Pickering, Jennifer Presutti, Barry King, Ed Barca, Kate Mechler, Sarah Bolenbaugh, Tony Igwe, Faith Wydra, Frank Sidari, B.J. McFaddin, and John Potanko, for their time and informed insights shared during the preparation of this 2021 Consulting Engineer's Annual Report.

Appendix A – Duties of the Consulting Engineer

The duties of the Consulting Engineer are many and vary depending on the needs of the Authority and the provisions of the Trust Indenture. Those duties beyond the provisions of the Trust Indenture are addressed elsewhere. Per the Amended and Restated Trust Indenture between the Pittsburgh Water and Sewer Authority and the Bank of New York Mellon Trust Company, NA originally dated October 15, 1993 and restated in the 2019 Senior Indenture and Subordinate Indenture, the Pittsburgh Water and Sewer Authority must engage a Consulting Engineer to perform such duties as are imposed by the provisions of the Trust Indenture. Those provisions from the Trust Indenture pertinent to the activities of the Consulting Engineer are provided below for reference.

Per ARTICLE I – DEFINITIONS AND GENERAL INDENTURE MATTERS

Section 1.01 – Definitions: Qualified Independent Consultant

“The term “Qualified Independent Consultant” shall mean an independent professional consultant having the skill and experience necessary to provide the particular certificate, report, or approval required by the provision of this Indenture or any Supplemental Indenture in which such requirement appears, including without limitation a Consulting Engineer and an Independent Auditor.”

Per ARTICLE V – CONSTRUCTION FUND

Section 5.01 Construction Fund

“There is hereby created a special fund known as the “Construction Fund,” which shall be held in trust by the Trustee. Money shall be deposited to the Construction Fund pursuant to the provisions of Article II and from any other sources identified by the Authority. To the extent Costs of a Construction Project are paid for from Bonds, the Authority must deposit the construction proceeds of the Bonds in the Construction Fund and must follow the provisions of this Article V. To the extent the Authority is self-funding Costs from other than proceeds of Bonds, the Authority may use moneys in the Revenue Fund and the Operating Fund to pay such costs, and the Authority need not use the Construction Fund or follow the provisions of the Article V...”

“(b) Except to the extent to which a requisition relates to financing costs, a certificate signed by the Consulting Engineer approving such requisition and certifying that each item to be paid as set forth in such requisition constitutes an obligation which has been properly incurred as part of the Cost of the Construction Project and is then due and unpaid.

Upon receipt of each such requisition and the accompanying certificate, the Trustee shall pay to the persons named in such requisition, the respective amounts stated therein to be due to such persons ...”

Section 5.02 Amendment of Construction Project

“The Authority may from time to time amend or revise a construction project with the approval of the Consulting Engineer, but only if the Authority shall have first delivered to the Trustee:

(i) a written statement describing the proposed amendments and revisions.

(ii) a Resolution of the Board approving the proposed amendments and revisions.

(iii) a certificate signed by the Consulting Engineer setting forth the general effect of such proposed amendments and revisions and certifying in his opinion that such proposed amendments and revisions are in the best interests of the Authority.

(iv) an opinion of Bond Counsel that such amendment or revision in and of itself will not adversely affect the exclusion from gross incoming of interest on the Series of Bonds issued to fund such construction project.”

Section 5.03 Contract Security

“All contracts which provide for the furnishing of material or the doing of work with regard to a Construction Project shall be in compliance with all federal and state statutes, rules, and regulations and shall be subject to the approval of the Consulting Engineer. The Authority will require each person with whom it may contract for construction to furnish a performance security and a labor and materialmen’s security each for not less than 100 percent of the full amount of the contract entered into with such person or such greater or lesser amount as may be required by applicable law, and to carry such insurance as may be required by law and as may be recommended by the Consulting Engineer. The proceeds of any such performance security shall forthwith, upon the receipt thereof by the Authority, be deposited to the credit of the applicable Construction Fund or account therein and applied toward the completion of the construction covered by the contract in connection with which such performance security shall have been furnished except that any such proceeds as shall constitute liquidated damages for delay shall be deposited to the credit of the Revenue Fund.”

Per ARTICLE VII – RATE COVENANT AND PARTICULAR COVENANTS

Section 7.07 Liens; Sale of Assets

“So long as any of the Bonds secured hereby are Outstanding, none of the Revenues shall be used for any purpose other than as provided in this Indenture, and no contract or contracts will be entered into or any action taken by which the rights of the Trustee or of the Bondholders might be impaired or diminished.”

“The Authority will not voluntarily create or permit to be created any debit, lien, or charge on a parity with (except pursuant to Section 3.03 hereof) or having priority over the lien of this Indenture upon any of the Revenues pledged hereby or any other revenues or other amounts at any time pledged for the payment of the Bonds. The Authority will not sell or otherwise dispose of or encumber the System or any part thereof except as herein otherwise having provided. No sale or other disposition of fixed properties having a fair market value in excess of One Million Dollars (\$1,000,000) shall be made unless the Consulting Engineer shall first have filed his certificate with the Authority and the trustee recommending such sale or other disposition of said fixed properties and shall have stated in such certificate that the sale or other disposition of said properties is in the best interests of the Authority and will not impair the security of the Bonds and the retention of said properties is not necessary for the efficient operation of the system. If, after receiving the certificate of the Consulting Engineer, the Authority determines to sell or otherwise dispose of said fixed properties, it shall by Resolution of the Authority adopted by a majority vote of a quorum of the Board, authorize such sale or other disposition and shall file a certified copy of such Resolution of the Authority with the Trustee...”

Section 7.10 Damage, Destruction or Condemnation of System: Application of Proceeds

“In the event of any damage to the System covered by insurance or condemnation or taking by eminent domain of any part of the System for which the cost of repair or replacement shall

exceed \$5,000,000, the proceed shall be deposited in the Revenue Fund and the Authority shall promptly notify the Trustee and file with the Trustee a Consulting Engineer's certificate stating whether, in the signer's opinion, it is practicable and advantageous to repair the damaged or condemned property, If the certificate states that the repair or replacement is practicable and advantageous, the Consulting Engineer shall, if appropriate, prepare and file with the Trustee plans and specifications therefor with an estimate of the cost thereof, and the insurance of condemnation proceeds, if any, shall be transferred to the Operating Fund and allied thereto. If the certificate states that the repair or replacement is not practical and advantageous, the proceeds shall be remain deposited in the Revenue Fund or, at the option of the Authority be transferred to the Redemption Fund for the extraordinary redemption of Bonds as hereinafter provided."

"The Bonds are subject to redemption without premium at any time, in whole or in part, within a maturity by lot, by the Authority upon the occurrence of any condemnation of taking or damage or injury of the nature set forth in the Article, from the proceeds collected as the result of such damage, injury or taking. In all cases of redemption of equipment, the Authority shall cause to be filed with the Trustee the certificate of the Consulting Engineer referred to above, determining that repair, reconstruction or replacement is not practicable, desirable or financially feasible. In the event that less than all of the Bonds outstanding are to be redeemed, the Authority shall furnish to the Trustee a Consulting Engineer's Certificate stating (i) that the property forming a part of the System that was damaged or injured or taken by such condemnation proceedings is not essential to the operation of the System and that the continued operation of the remaining System will not, in the signer's opinion, adversely affect the security of the Bonds remaining outstanding after such redemption, or (ii) that the System has been restored to a condition substantially equivalent to its condition prior to the occurrence of such damage, injury, or condemnation, and that continued operation of the System will not, in the signer's opinion, adversely affect the security of the Bonds remaining outstanding after such redemption. For purposes of this Section 7.10, the term Consulting Engineer shall also include an employee of the City or the Authority who is otherwise qualified to act as Consulting Engineer under this Indenture."

Section 7.11 Employment of Consulting Engineer; Reports

"The Authority will employ a Consulting Engineer to perform such duties as are imposed on the Consulting Engineer by the provisions of the Indentures.

It shall be the duty of the Consulting Engineer, in addition to the other duties prescribed elsewhere in this in this Indenture, to prepare and file with the PWSA and with the Trustee on or before 30 days prior to the beginning of each fiscal year thereafter, a report setting forth the following:

- (a) Advice and recommendations as to the proper maintenance, repair, and operation of the system during the next fiscal year and an estimate of the amounts of money that should be expended for such purposes.
- (b) Advice and recommendations as to the Capital Additions that should be made during the next fiscal year, and an estimate of the amount of money that is recommended for such purposes.
- (c) Whether the properties of the System have been maintained in good repair and sound operating condition of the Consulting Engineer's estimate of the amount, if any, required to place such properties in such condition and the details of such expenditures and the approximate time required therefor."

Appendix B – History of Bond Issues and Refunding (1984 – 2013)

The PWSA has employed various funding mechanisms since 1984 to fund their annual Capital Improvement Plans. Appendix B provides the history of the bond issuances and refunding from 1984 through 2013. Funding mechanisms from 2016 to the present are outlined in Section 1.3 of this report.

B.1 First Bond Issue

On April 19, 1984, the PWSA Board adopted a major CIP by Resolution No. 19 of 1984. The Program was designed to maintain a satisfactory level of service to the water and sewer systems current users, to improve operating efficiency, and to address future user requirements. In July 1984, the PWSA issued \$93,600,000 Daily Adjustable Demand Water and Sewer Systems Revenue Bonds, Series of 1984, to implement the initial phase of the Program. From proceeds of this Bond Issue, \$78,777,000 was deposited into the Construction Fund for the initial phase of the CIP. In June 1986, the PWSA issued an additional \$134,700,000 Adjustable Rate Tender Revenue Bonds, Series of 1986. From the 1986 Bond Issue, \$115,000,000 was available to continue the Program.

Additionally, the initial Bond Issue of the PWSA created the “Renewal and Replacement Fund” to be held in trust by the Trustee to be used by the PWSA for extraordinary maintenance and repair of the water and sewer systems or to pay the cost of capital additions. The Trust Indenture provides, so long as the aggregate amount of funds on deposit in the Construction Fund(s) is not less than \$7,000,000, the PWSA is not required to make any deposits into the Renewal and Replacement Fund. It is further required that if this aggregate amount is less than \$7,000,000, the PWSA shall transfer, on or before the first day of each month, a sum of \$100,000 from the Revenue Fund to the Renewal and Replacement Fund until the aggregate amount equals \$7,000,000. In addition, if the aggregate amount on deposit in these two funds is less than \$5,000,000, the PWSA shall, on each September 1st, transfer to the Renewal and Replacement Fund all surplus moneys remaining in the Revenue Fund after all payments required to be made on such September 1st have been made until such time as the aggregate amount on deposit in these funds are equal to not less than \$5,000,000.

B.2 1993 Bond Issue and Refunding

In November 1993, the PWSA issued two series of Water and Sewer System Bonds to advance refund all the outstanding previously issued bonds, provide additional funds for capital improvements to the water and sewer systems, and pay all fees and expenses incurred in connection with issuance of the 1993 Bonds. Series A of the 1993 Bonds, in the aggregate principal amount of \$278,970,000, was for the advanced refunding of outstanding bonds. Series B of the 1993 Bonds, in the aggregate principal amount of \$10,785,000, was to finance additional capital improvements.

The new Trust Indenture, dated October 15, 1993 and applicable to the Series A and B of the 1993 Bond Issues, eliminated the requirements for a fund balance, as described in the previous Section, to be maintained in the “Renewal and Replacement Fund” unless determined necessary annually by the Consulting Engineer. Therefore, the \$2,009,523 which was being maintained in the Fund under the previous Trust Indenture was transferred to the “Prior Bonds

Construction Fund” for use for capital improvements. From the Series B of the 1993 Bond Issue, \$9,990,477 was deposited into the 1993 Bond Construction Fund for additional capital improvements.

B.3 1995 Bond Issue

In 1995, the PWSA recognized that the funding for the CIP implemented in 1984 was almost depleted. To ensure a continued supply of safe drinking water and proper sewer service to the PWSA's current and future users and to address future demands on the water and sewer systems, a new CIP was developed and adopted in 1995.

The PWSA also negotiated a Capital Lease Agreement with the City, which terminated the Lease and Management Agreement and provided for the PWSA to acquire the water and sewer systems from the City in 2025.

The PWSA issued additional bonds in 1995 to fund the 1995 CIP and to pay certain obligations of the PWSA to the City under the Capital Lease Agreement. On July 15, 1995, the PWSA issued Water and Sewer System First Lien Revenue Bonds, Series A of 1995, to pay for the capital improvements identified in the new CIP and Water and Sewer System Subordinate Revenue Bonds, Series B of 1995, to pay the obligation of the PWSA to the City under the Capital Lease Agreement in the aggregate principal amounts of \$89,850,000 and \$103,020,000, respectively. From the Series A of 1995 Bonds, \$80,000,000 was deposited into the Series A of 1995 Capital Project Fund to fund the 1995 CIP of the PWSA.

B.4 1998 Bond Issue and Refunding

Early in 1998, additions to the CIP were proposed that addressed future needs of the PWSA, which included covering Highland Reservoir No. 1, City and Urban Redevelopment Authority Projects, and improvements to the water distribution and sewerage systems.

On March 2, 1998, the PWSA issued Water and Sewer System First Lien Revenue Bonds, Series A of 1998, to provide for the refunding of the PWSA's outstanding Series A of 1995 Bonds; Water and Sewer System First Lien Revenue Bonds, Series B of 1998, to fund additions to the CIP; and Water and Sewer System Subordinate Revenue Bonds, Series C of 1998, and to refund the PWSA's outstanding Series B of 1995 Bonds. The Series B of 1998 Bonds enabled \$36,001,908 to be deposited into the 1998 Capital Projects Fund, funding the CIP into the year 2000.

B.5 2002 Bond Issue

At the end of 2000, the Capital Project Funds of the PWSA were largely spent with approximately \$345,000 in reserve for construction and capital projects. The PWSA had anticipated this drawdown of funds and had begun work to issue additional bonds in early 2002. The Capital Projects Fund, through this issue, provided \$90,494,400 for the construction of capital projects and to meet the needs of emergencies that may require the use of capital funds.

B.6 2003 Bond Refunding

On September 23, 2003, the PWSA issued \$167,390,000 of Water and Sewer System Revenue Refunding Bonds, 2003 Bonds, to partially refund the 1993 Bond Series. The 2003 Bonds, with an average yield of 3.8 percent, generated a reduction in annual debt service payments of approximately \$4,000,000 for 2004. The 2003 Bonds were refunded by a portion of the 2013 Series A Bonds discussed below.

B.7 2005 Bond Issue

In June of 2005, the PWSA issued First Lien Revenue Bonds, 2005 Bonds, in the amount of \$50,385,000 to provide for continuation of the CIP and to meet the needs of emergencies that may require the use of capital funds. The 2005 Bonds, with an average yield of 4.23 percent, created an increase in annual debt service payments of approximately \$32 million for the first 12 years. The Capital Projects Fund, through this issue, provided \$49,799,037 for capital projects.

B.8 2007 Bond Advance Refunding

In March of 2007 and pursuant to Resolution No. 23 of 2007, adopted on February 9, 2007, the PWSA issued \$158,895,000 of First Lien Water and Sewer System Revenue Refunding Bonds: \$43,720,000 Series A of 2007 (fixed rate), \$57,585,000 Series B-1 of 2007 (variable rate demand), and \$57,590,000 Series B-2 of 2007 (variable rate demand). The 2007 Bond Issue refunded the 2002 and 2005 Bonds. The 2007 Bond Advance Refunding also resulted in the deposit of \$6,319,014 into the 2007 Depository Agreement Fund. These funds were available for capital projects and were exhausted in 2009. The final amount deposited was \$7,503,881. Series B of 2007 Bonds are being refunded by the Series A of 2013 Bonds discussed below.

Pursuant to Resolution No. 23 of 2007, adopted on February 9, 2007, an additional \$7,000,000 was made available for capital improvements. These additional funds were provided through a transfer from the Debt Service Reserve Fund in accordance with Section 6.04 of the Trust Indenture, which provided for the required funds for Debt Service Reserve Fund to be in the form of cash, a letter of credit or other credit instrument, a surety bond, or a combination thereof. The PWSA Board elected to replace the monies in the fund with a surety bond. As a result, \$7,000,000 was transferred to the Construction Fund for capital improvements, and the balance of the monies were transferred to the Debt Service Fund.

B.9 2008 Bond Advance Refunded

In June 2008 and pursuant to Resolution No. 54 of 2008, adopted on April 11, 2008, the PWSA issued the following bonds:

- \$145,495,000 (variable rate demand) Water and Sewer System First Lien Revenue Bonds, Series B of 2008
- \$71,225,000 (variable rate demand) Water and Sewer System First Lien Revenue Bonds, Series D-2 of 2008
- \$51,910,000 (variable rate demand) Water and Sewer System Subordinate Revenue Refunding Bonds, Series C-1 of 2008
- \$51,885,000 (variable rate demand) Water and Sewer System Subordinate Revenue Refunding Bonds, Series C-2 of 2008
- \$68,970,000 (fixed rate) Water and Sewer System First Lien Revenue Refunding Bonds, Series A of 2008 Taxable
- \$24,665,000 (fixed rate) Water and Sewer System First Lien Revenue Refunding Bonds, Series D-1 of 2008 Taxable

Proceeds of the 2008 Bonds refunded the PWSA's Series A of 1998 Bonds, Series C of 1998 Bonds, certain maturities of the Series B-1 and B-2 of 2007 Bonds, advance refunded certain maturities of the Series B of 1998 Bonds, and provided \$98,442,194 for the continuation of the CIP and to meet the needs of emergencies that may require the use of capital funds.

The issuance of the 2008 Bonds resulted in no rate increase and initially levelled the PWSA's debt service requirements at approximately \$42,000,000 until 2040. Due to the crisis that hit the

financial sector in the last quarter of 2008, the debt service for 2009 increased to \$51,716,888. The debt service was \$49,803,245 in 2010 and \$46,507,900 in 2011.

In 2011, Resolution No. 59 of 2011 extended liquidity facilities for \$71,225,000 (variable rate demand) Water and Sewer System First Lien Revenue Bonds, Series D-2 of 2008. Also, Resolution No. 77 of 2011 and Resolution No. 78 of 2011 extended credit facilities for \$72,750,000 (variable rate demand) Water and Sewer System First Lien Revenue Bonds, Series B-2 of 2008 and \$72,745,000 (variable rate demand) Water and Sewer System First Lien Revenue Bonds, Series B-2 of 2008, respectively.

In 2012, Resolution No. 64 of 2012 and Resolution No. 65 of 2012 extended liquidity facilities for the 2008 Series C-1-A, B, and C Bonds and the 2008 Series C-1D Bonds, respectively.

B.10 2013 Bond Issue

In December of 2013 and pursuant to Resolution No. 101 of 2013, the PWSA issued \$86,695,000 (fixed rate) of Water and Sewer System First Lien Revenue Bonds, Series B of 2013, to provide for continuation of the CIP and to meet the needs of emergencies that may require the use of capital funds. Additionally, \$8,941,131 of the Series B of 2013 Bonds was utilized to reimburse the PWSA's Operations Fund for funds that were used by the PWSA to construct CIP projects in 2013. The Capital Projects Fund, through this issue, provided \$75,000,000 for capital projects. These Bonds are expected to carry interest at approximately 5.16 percent maturing in 2043. The PWSA also issued \$130,215 (fixed rate) of Water and Sewer System First Lien Revenue Refunding Bonds, Series A of 2013, to refund the Series 2003 and Series 2007 B-1 and B-2 Bonds.

