



THE PITTSBURGH WATER & SEWER AUTHORITY

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2022 Consulting Engineer's Annual Report

December 2022

PITTSBURGH WATER AND SEWER AUTHORITY
(Allegheny County, Pennsylvania)

2022 CONSULTING ENGINEER'S ANNUAL

REPORT CERTIFICATE OF ENGINEER

I am a Professional Engineer registered in the Commonwealth of Pennsylvania and am employed by ms consultants, inc. 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 21, 2022.

IN WITNESS WHEREOF, I have executed this document on behalf of ms consultants, inc. on December 9, 2022.



By:
Charles J. Jordan, PE

ISSUE AND REVISION RECORD

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APPENDIX A – DUTIES OF THE CONSULTING ENGINEERS

APPENDIX B – HISTORY OF BOND ISSUE AND REFUNDING (1984-2020)

EXECUTIVE SUMMARY

The Pittsburgh Water and Sewer Authority (PWSA) retained ms consultants, inc. to prepare the 2022 Annual Report of the Consulting Engineer on February 28, 2022. The Annual Report is required under Article VII, Section 7.11 of the 2017 Amended and Restated Trust Indenture and Article VII, Section 7.10 of the 2019 Amended and Restated Subordinate Trust Indenture. There are several sections in the 2017 Trust Indenture and 2019 Subordinate Indenture referring to the duties of the Consulting Engineer, (see Appendix A of this report). In accordance with the 2017 Trust Indenture and 2019 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.

The duties of the Consulting Engineer mentioned in Article VII, Section 7.11 of the 2017 Senior Indenture and Article VII, Section 7.10 of the 2019 Subordinate Indenture, including the following Consulting Engineers' services:

- a. 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 System 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 thereof.

The following sections of the 2017 Senior Indenture and 2019 Subordinate Indenture discuss duties of the Consulting Engineer not included in this Annual Report:

Article I, Section 1.01 (2017 Senior Indenture and 2019 Subordinate Indenture); Article V, Sections 5.01 and 5.03 (2017 Senior Indenture and 2019 Subordinate Indenture; and Article VII, Sections 7.07 and 7.10 (2017 Senior Indenture) Section 7.06 and 7.09 (2019 Subordinate Indenture).

In this 2022 Consulting Engineer's Annual Report, the Consulting Engineer acknowledges that the water, sewer, and stormwater systems are functional but are currently subject to Administrative and Consent Orders and Agreements from State and Federal regulatory agencies to address numerous regulatory standards and other compliance requirements.

The water, sewer, and stormwater systems require upgrades to address end of useful life conditions and updates to current operational, regulatory, and safety standards. The PWSA's water 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 Water Reliability Plan (WRP) is Pittsburgh's blueprint for high quality water infrastructure. The projects that make up the WRP will happen sequentially and work together to fortify the water system so it is ready to supply continuous water service during the final, and biggest project – the complete restoration of the Clearwell.

PWSA continues to make great strides on most of the necessary upgrades and updates for these critical facilities. Highlights of PWSA's work in 2022 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. PWSA has increased staffing levels and implemented some industry best practices in the past couple years to help improve operations and system reliability in the water system. Already this has made an impact on recovering non-revenue water, specifically where PWSA has seen the average daily pumpage decreased over that past couple years due to finding and addressing non-surfacing leaks. Though there is a long road ahead, these efforts reflect PWSA's commitment to continue to improve and better manage their assets.

In the Cooperative Agreement executed on October 3, 2019, 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 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 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.

On January 7, 2022 an agreement between PWSA and the City of Pittsburgh was executed establishing roles and responsibilities as they relate to MS4 Compliance within the City. The agreement specifies that the primary roles and responsibilities of PWSA's Stormwater Division include the planning, design, implementation, and maintenance of stormwater related Capital Projects that may reduce localized flooding and Combined Sewer System overflows at the rivers while improving the water quality health of streams and waterways. February 11th, 2022 the Public Utility Commission (PUC) indicated that the agreement dated January 7th, 2022 was accepted certified. It was certified as filed.

Water System

PWSA's water treatment plant (drinking water) has the permitted capacity to provide 100 million gallons per day (MGD). PWSA's average water treatment plant daily production has decreased from over 70 MGD to 62-65 MGD in 2022. The water system has the capacity to deliver adequate water supply to meet the demands of the customers into the foreseeable future, assuming PWSA continues the rehabilitation and replacement program provided for in its ongoing Capital Improvement Program (CIP). 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, 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, 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 PWSA's success stories for 2022, as it was in 2018, 2019, 2020 and 2021.

As of November 11, 2022, the PWSA has completed 737 public lead service line replacements and 729 private lead line replacements in 2022.

Since July 1, 2016, as of November 11, 2022, PWSA has replaced a total of 9,745 public lead service lines and 6,628 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 United States Environmental Protection Agency (USEPA) and the PADEP regulatory standards. In its 2021 Annual Drinking Water Quality Report, the PWSA reported a 90th percentile value lead concentration from 136 sites sampled in the water distribution system as 7.05 parts ppb for 2021, 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 2022. The January to June 2022 sampling round reported a 90th percentile value of 4.04 ppb, which was the fourth event below the 15 ppb action level

Starting in 2020, the lead service line replacement program was merged with the Small Diameter Water Main Replacement (SDWMR) Program in order to more cost effectively replace lead lines as the small diameter mains are replaced. The SDWMR program has continued in 2021.

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 four years. In April 2022, PWSA engaged a consultant to perform a top down review of the orthophosphate program and provide recommendations as to how to move forward. In June of 2022, PWSA received approval from the DEP to adjust the orthophosphate dosage. This permit requires PWSA to perform two six-month sampling periods in order to submit water quality parameters to the DEP. The first of these two sampling periods, 2022b, started and will continue to the end of 2022

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 2022, PWSA awarded construction contracts for the Highland Reservoir Pump Station Supply and Rising Main, an engineering contract for the Aspinwall Pump Station Improvements, and an engineering contract for the Clearwell Bypass System – Permitting, Implementation and SOP's.

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. 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. PWSA's sewer system overflows were the subject of a 2004 Consent Order issued by the PADEP. The 2004 Consent Order has expired but PWSA began negotiations in 2021 for a new Consent Decree with the PADEP, the USEPA and the U.S. Department of Justice (DOJ) to require PWSA to continue to address these issues. Negotiations are underway and will continue in 2023.

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 Capital Improvement Program (CIP) to correct existing deficiencies and repair, rehabilitate, and upgrade the system to meet regulatory requirements and reduce the potential for localized backups. If the CIP 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 2022, PWSA continued to make progress on being a more compliant, sustainable and reliable utility. Areas that specifically shows their commitment to this effort are:

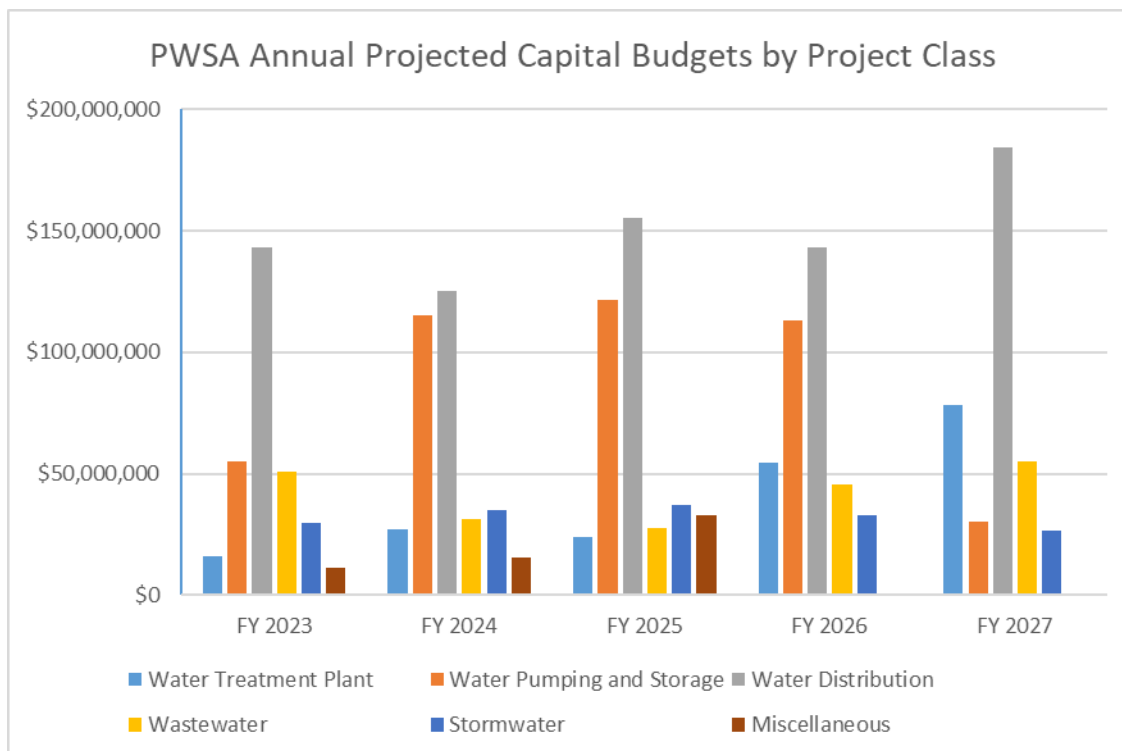
- Developed a CIP to address requirements of the water treatment and distribution system Consent Orders, and improve the water, sewer, and stormwater systems.
- Moved forward with the Water Reliability Plan
- Broadened the Executive Leadership Team and added employees to the Environmental Compliance and Safety groups.
- Continue to strategically increase the number of staff.
- Started to implement some industry best practices to track and improve the maintenance and operation of their system.
- Improved compliance with regulations and Orders regarding abatement of lead, system resiliency, and overall water treatment and quality.

- Continuing 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.
- Successfully developed and obtained Board approval for an aggressive PWSA 2023 – 2027 Capital Improvement Plan.

Capital Improvement Plan

Figure ES.1 presents an illustration of the CIP for the fiscal years 2023 through 2027 that was approved by the PWSA Board of Directors on October 28, 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.

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



ms consultants was authorized to begin preparation of the Annual Report of the Consulting Engineer on February 28, 2022. 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.

Review of both the FY 2023-2027 capital program and proposed 2023 draft operational budget reflect significant increases from the previous year. Some of this increase can be attributed to increase cost for services and supplies and materials due to supply chain issues and inflation. Additionally it should be noted that while almost 58% of the current 5 year CIP in wastewater is devoted to the small diameter rehabilitation program, it is anticipated that once the consent order is negotiated, the wastewater CIP will significantly increase. With all this said, while PWSA has made concerted effort to obtain and secure capital funding to

invest in their infrastructure, they need to ensure that they have sufficient staff and resources to execute their capital program otherwise those efforts are futile.

Based upon our review PWSA financial commitment both in the past couple years and for the future shown in the recent Board approved CIP for 2023- 2027, along with continued organizational and operational improvements, it is apparent PWSA is committed to investing in upgrading their infrastructure and becoming a well-run utility. Through interviews with key staff it is evident PWSA is starting to implement some industry best practices such as focused regulatory compliance and safety program, tracking and addressing non-revenue water and water valve exercising and replacement program. Though some of these initiatives are in their infancy they already have made an impact. Therefore in summary, it is the Consulting Engineer's opinion that PWSA is managing their organization, water, sewer, and stormwater systems and committing the financial resources to continue to move the utility forward towards maintaining a regulatory compliant organization that provides reliable service to their customers.

1.0 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

In 1984, pursuant to a Lease and Management Agreement between the City and the Authority (the "**Lease and Management Agreement**"), the Authority leased the Water and Sewer System from the City and assumed responsibility for establishing and collecting user fees and charges and for maintaining and improving the System. This agreement further provided that the System was to be operated and maintained for the Authority by the City, subject to the general supervision of the Authority. In 1995, the Authority and the City terminated the Lease and Management Agreement. On June 15, 1995 the Authority and City entered into a Capital Lease Agreement (the "**Capital Lease Agreement**") whereby the City is leasing to the Authority the "Leased Property" which includes the "System", the "Real Property" and the "Equipment", as each term is defined in the Capital Lease Agreement. The Capital Lease Agreement, which has a term of thirty (30) years, provides for lease payments totaling \$101,416,974.60, which payments were made to the City during the initial three (3) years of the agreement and further provides that on September 1, 2025, upon payment of \$1.00, the Authority has the option to acquire title to the Leased Property. The Authority intends to exercise its option to purchase the Leased Property as of September 1, 2025.

Concurrently with entering into the Capital Lease Agreement, the City and the Authority entered into a Cooperation Agreement, dated as of June 15, 1995 and effective January 1, 1995, as amended by a First Amendment to Cooperation Agreement dated March 21, 2011 (collectively the "**Cooperation Agreement**"). The Cooperation Agreement may be terminated by the Authority upon 90 days written notice. Pursuant to the Cooperation Agreement, the City is to provide certain services to the Authority including telephone and data services, vehicle fuel and repair, legal aid, computer services, payroll services and administration of benefit programs. In exchange, the Authority is required, among other things, to (i) provide the City with up to 600 million gallons of water each year (at no cost to the City) to certain properties formerly owned by the City, such as the Pittsburgh Zoo and the Phipps Conservatory, (ii) reimburse the City's direct expense and overhead expense for services provided by the City to the Authority, and (iii) subsidize the water rates paid by certain residents of the City who are not Authority customers (the "**PAW Subsidy**").

On February 4, 2019, the Board of the Authority voted to terminate the Cooperation Agreement. On February 5, 2019, the Chairman of the Authority provided written notice to the Mayor of the City that, pursuant to the terms of the Cooperation Agreement, the Authority was exercising its right to terminate the Cooperation Agreement by providing the required 90-day notice of such termination. On April 26, 2019, the Board of the Authority voted to extend the notice period of the termination until July 5, 2019. On October 3, 2019, the City and Authority entered into a new Cooperation Agreement that, among other things, (i) reflects changes in their respective rights and obligations, (ii) accurately reflects the division of services related to the System, (iii) provides for payments between the City and the Authority to be based upon actual, verifiable, direct expenses, and in accordance with customary utility practices under the Pennsylvania Public Utility Code, (iv) confirms that payments by the Authority to the City will continue to be subordinate to all debt obligations of the Authority, (v) provides for cooperation by the City and the Authority in their respective capital projects which may impact each other, (vi) provides for clarification of the responsibilities of the Authority with respect to City Regional Parks and other City properties, (vii) confirms that the System will remain under public ownership, and (viii) sets forth certain other provisions relating to the roles and responsibilities of the City and the Authority with respect to the System.

On July 23, 2020, Pennsylvania Act 70 (“**Act 70**”) was signed into law. Act 70 provides that 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 the Authority mutually agree. Act 70 also provides that the Cooperation Agreement shall govern, among other things, payments by the Authority to the City under the Cooperation Agreement shall be subordinate to each debt obligation of the Authority. Under Act 70, notwithstanding Act 65 and the Public Utility Code, each defined below, the Cooperation Agreement supersedes, during the term of the Cooperation Agreement, any provision of the Public Utility Code, a PUC, defined below, regulation, policy statement, order and regulatory proceeding as they pertain to issues covered by the Cooperation Agreement, including the Authority’s rates, terms and conditions of service rendered to the City and the respective rights and duties between the Authority and the City. Finally, Act 70 provides that the Cooperation Agreement is subject to the home rule charter of the City.

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 (the “**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. The PUC rate-setting process can last a maximum of 270 days (or about 9 months) unless all parties agree on a joint settlement sooner.

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 Authority'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, June 18, 2020 and February 14, 2021. The Orders resolved a significant number of issues in the proceeding by approving a partial settlement.

Compliance Plan Stage 2 was initiated on January 24, 2020 to address stormwater and customer service issues. Regarding stormwater, the PUC approved the Authority's Stormwater Tariff on November 18, 2021 and a full settlement of the Stage 2 Compliance Plan - Stormwater on August 25, 2022. Regarding customer service issues, the PUC approved a full settlement of the Stage 2 Compliance Plan – Customer Service on July 14, 2022. The Authority filed an updated Compliance Plan and proposed Compliance Tariffs on September 12, 2022 regarding customer service issues. Similar filings regarding Stormwater are to be filed on November 4, 2022.

Under Act 65, the Authority is also required to submit a long-term infrastructure improvement plan (“**LTIIIP**”). The Authority met this requirement by filing the LTIIIP with the PUC on September 28, 2018. The LTIIIP includes information on how the Authority intends to replace and/or upgrade targeted eligible property to improve system reliability and safety, and it includes metrics that the Authority uses to track and evaluate the effectiveness of infrastructure improvements. The LTIIIP provides the rationale used to select and target eligible programs and property for planning consideration, and projection of annual capital expenses to ensure that the LTIIIP is cost-effective. The Authority's LTIIIP for water and LTIIIP for wastewater were approved by the PUC on August 27, 2020. The Authority received approval from the PUC on December 3, 2020 to implement a Distribution System Improvement Charge (“**DSIC**”) to recover some of the costs of the LTIIIP through a separate surcharge assessed to ratepayers. The Authority files quarterly reports to the PUC regarding its DSIC and an annual report regarding its LTIIIP. The Authority filed a revised LTIIIP with the PUC in October 2022 for the purpose of providing updated budget information for projects included within the plan. The revised LTIIIP is pending final approval while under review by the PUC.

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 2020. Current funding mechanisms are outlined as follows:

1.3.1 REVOLVING LINE OF CREDIT IN 2016, 2018, 2020 AND 2022

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.

In April 2022 and pursuant to Resolution 54 of 2022, the PWSA approved an amendment for replacement of the PNC Bank National Association Line of Credit in an amount not-to-exceed \$150,000,000 with a maturity date of June 23, 2025.

1.3.2 2022 BOND ISSUE

In October 2022, and pursuant to Resolution No. 117 of 2022, the PWSA issued \$44,550,000 Water and Sewer System First Lien Revenue Bonds, Series A of 2022. The proceeds from 2022 Bond Issue will be used to pay down a portion of the outstanding principal amount under a capital line of Credit revenue note Series of 2022 in favor of PNC Bank National Association and pay the costs of issuance and insurance for a portion of the 2022 Bonds, thereby providing long term financing for PWSA's Capital Improvement Program.

1.3.3 S & P GLOBAL RATINGS

On October 12, 2022, S&P Global Ratings raised its rating on PWSA's first-lien revenue bonds to 'A+' while simultaneously increasing its rating on subordinate-lien revenue bonds to 'A.' This upgrade moves PWSA's rating to the highest level attainable in the upper medium investment grade category with the first-lien revenue bonds rated 'A+.' This is the first credit upgrade PWSA has received in over ten years.

1.3.4 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 or 30-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 2.4.2.

In 2022, there were five PENNVEST low-interest loan awards and one PENNVEST grant award to the PWSA. These awards will become active once closing occurs in late 2022 or early 2023. The details of the awards are as follows:

1. On July 20, 2022, PWSA received a \$209,005,329 loan to replace a 114-year old Clearwell. This project is part of the Water Reliability Plan (WRP).

2. On October 20, 2022, PWSA received a \$1,349,427 loan and a \$6,486,969 grant to replace lead service lines that will affect 752 residential customers in areas where leaking, undersized water mains will also be replaced.
3. On October 20, 2022, PWSA received a \$75,529,516 loan to replace approximately 63,000 feet of water lines throughout the distribution system.
4. On October 20, 2022, PWSA received a \$9,978,156 loan to install security upgrades consistent with a recent U.S., Department of Homeland Security risk assessment, including cameras, electronic access controls, emergency alarms and notification systems, and fencing replacement at multiple sites.
5. On October 20, 2022, PWSA received a \$46,054,410 loan to replace approximately 3,600 inlets and catch basins.

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

| Project Name | Project Type | Loan Approval Date | Status | Loan Amount |
|--|--------------|--------------------|----------|-----------------|
| Railside Street Sanitary Sewer Ext. | Wastewater | 11/15/2000 | Complete | \$158,399.23 |
| Ollie Street & Overbrook Blvd. Storm Sewer | Storm | 11/15/2000 | Complete | \$800,963.48 |
| Water System Improvements No. 1 | Water | 3/21/2001 | Complete | \$3,940,113.91 |
| Streets Run Interceptor | Wastewater | 7/18/2001 | Complete | \$1,928,470.44 |
| Water System Improvements No. 2 | Water | 3/20/2002 | Complete | \$5,112,263.50 |
| Water System Improvements No. 3 | Water | 7/17/2002 | Complete | \$4,821,500.00 |
| Sewer System Improvements – Phase I | Wastewater | 10/27/2008 | Complete | \$4,672,410.00 |
| Sewer System Improvements – Phase II | Wastewater | 4/20/2009 | Complete | \$10,264,250.00 |
| Sewer System Improvements – Phase III | Wastewater | 7/21/2009 | Complete | \$4,865,613.00 |
| Water System Improvements – Phase V | Water | 4/20/2009 | Complete | \$8,613,546.00 |
| Water System Improvements – Phase VI | Water | 7/21/2009 | Complete | \$8,393,478.00 |
| Sewer System Improvements – Phase IV | Wastewater | 1/22/2013 | Complete | \$3,275,316.00 |
| Water System Improvements – Phase VII | Water | 1/22/2013 | Complete | \$2,713,065.00 |
| Water System Improvements – Phase VIII | Water | 4/24/2013 | Complete | \$3,813,561.00 |
| Lower Hill Sewer Infrastructure Project Phase 1A | Wastewater | 10/23/2013 | Complete | \$1,712,506.00 |
| COA Storm Sewer Separation Project 2013 | Storm | 10/23/2013 | Complete | \$2,361,405.00 |
| Lead Service Line Replacements | Water | 10/17/2018 | Complete | \$35,441,231.00 |
| Small Diameter Water Main Replacement Program | Water | 1/29/2020 | Complete | \$65,220,000.00 |

| | | | | |
|---|------------|------------|---------|------------------|
| Sewer Rehabilitation in Brighton Heights, South Side Slopes, & Hazelwood | Wastewater | 1/20/2021 | Active | \$7,750,000.00 |
| Water Distribution and Lead Service Line Replacements | Water | 4/21/2021 | Active | \$35,573,550.00 |
| Sewer Repair & Rehabilitation in Homewood, Squirrel Hill, Marshall-Shadeland, Spring Garden, Highland Park, & Carrick | Wastewater | 7/26/2021 | Active | \$23,970,000.00 |
| Lead Service Line Replacements | Water | 10/20/2021 | Active | \$1,830,833.00 |
| Large Diameter and Small Diameter Sewer Rehabilitation | Wastewater | 10/20/2021 | Active | \$36,277,000.00 |
| Clearwell Replacement | Water | 7/20/2022 | Active | \$209,005,329.00 |
| Water Distribution and Lead Service Line Replacements | Water | 10/20/2022 | Closing | \$1,349,427.00 |
| 2022 Water Main Replacement Program | Water | 10/20/2022 | Closing | \$75,529,516.00 |
| Security Upgrades | Water | 10/20/2022 | Closing | \$9,978,156.00 |
| Catch Basin Replacements | Wastewater | 10/20/2022 | Closing | \$46,054,410.00 |

TOTAL PENNVEST LOANS**\$615,426,312.56**

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.

1.3.5 WATER INFRASTRUCTURE FINANCE AND INNOVATION ACT (WIFIA) 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) loan. The application was submitted in spring 2021. In March of 2022, the PWSA Board authorized the Issuance of debt for \$225,000,000. This funding will be used for a portion of the projects associated with the Water Reliability Plan (WRP). The amount of the authorization was amended in April 2022 to a not-to-exceed amount of \$280,000,000.

1.3.6 GREEN REVITALIZATION OF OUR WATERWAYS (GROW) GRANTS

The PWSA applied to the Allegheny County Sanitary Authority's (ALCOSAN) GROW Grant Program during 2022 Cycle 7 for the Maytide Phase III project. This project is part of the Authority's 2022 Small Diameter Sewer Rehabilitation (SDSR) Contract 2 and involved the lining of approximately 10,570 feet of sanitary sewer near Queenston Street. The PWSA was awarded a total grant amount of \$304,400.

PWSA also submitted their South Side Flats project in Cycle 7 however it wasn't selected for award. This was a result of a significant change in the selection and award of GROW dollars as ALCOSAN updated their criteria to weigh less heavily on sheds that are tributary to their proposed tunnel system and more favorably on sheds where the tunnel system will not reach.

1.3.7 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.

1.3.8 RATE REQUEST TO PENNSYLVANIA PUBLIC UTILITY COMMISSION

The Pittsburgh Water and Sewer Authority filed a proposed settlement with the Pennsylvania Public Utility Commission (“PUC”) regarding its 2022 and 2023 water, wastewater and stormwater rate proposal, which was approved by the PUC in November 2021 and went into effect on January 12, 2022. The settlement established a new stormwater fee and included a 10.98% total increase in water, wastewater and stormwater charges that will be phased in over 2022 and 2023. The rate increases and additional changes approved in the settlement are expected to result in an estimated annual revenue increase of \$17,000,000 in 2022 and \$4,000,000 in 2023 for a total amount of \$21,000,000.

1.4 WATER SYSTEM BACKGROUND

The Allegheny River provides the sole source of water for the PWSA’s Water 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 400,000 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, Borough of Millvale, 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 964 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.

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 Wilksburg-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.

1.4.1 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 four years. In April 2022, PWSA engaged a consultant to perform a top down review of the orthophosphate program and provide recommendations as to how to move forward. In June of 2022, PWSA received approval from the DEP to adjust the orthophosphate dosage. This permit requires PWSA to perform two six-month sampling periods in order to submit water quality parameters to the DEP. The first of these two sampling periods, 2022a, started and will continue to the end of 2022. More on this topic is discussed as part of the Lead Service Line Replacement (LSLR) program in Section 2.4.2.

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 2021 Annual Drinking Water Quality Report, the PWSA reported a 90th percentile value lead concentration from 136 sites sampled in the water distribution system as 7.05 parts ppb for 2021, 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 2022. The January to June 2022 sampling round reported a 90th percentile value of 4.04 ppb, which was the fourth event below the 15 ppb action level.

The lead line inventory, tracking, and mapping has continued in 2022. 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. PWSA is on track with these requirements and should meet the submittal deadline of December 31, 2022.

1.4.2 SEPTEMBER 6, 2019 CONSENT ORDER AND AGREEMENT (COA), MAY 13, 2020 COVID-19 EXTENSION, THE MAY 7, 2021 FIRST AMENDMENT, AND THE AUGUST 4, 2022 SECOND 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.

In accordance with terms and conditions of Public Water Supply Permit No. 0220523MA, a final draft of the second amendment to the September 6, 2019 COA was completed July 6, 2022 and later executed as final on August 4, 2022. This Amendment extended the construction deadlines for the Highland No. 2 Reservoir (Liner and cover Replacement) and the Rising Main No. 3 project to the end of 2022 for completion. PWSA also received extensions on the construction permits through the end of 2022. PWSA is on track to complete the compliance deadline for the Second Amendment.

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, the First Amendment, and the Second 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.

Table 1.2: Subject and Location of COA Requirements - Water Reliability Plan (9/6/19 Original Signed COA)

| 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 - December 31, 2022. | #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 - December 31, 2022. | #3i & #3j |
| 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 |
| 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 |
|---|-------------------|-----------------|----------------------------|----------------------------|-----------------------|
| Projects Specifically Stated in COA | | | | | |
| 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 | TBD | TBD |
| Aspinwall Pump Station Improvements | 7/26/2020 | 1/27/2022 | 9/30/2021 | TBD | TBD |
| Bruecken Pump Station Improvements | 7/26/2020 | 1/27/2022 | 9/30/2021 | TBD | TBD |
| Aspinwall WTP Clearwell Bypass (Emergency Response) | 7/26/2020 | 1/27/2022 | 9/30/2021 | TBD | TBD |
| Aspinwall WTP Clearwell Improvements (Replacement) | 1/2/2023 | 3/1/2024 | 1/1/2024 | TBD | TBD |
| The PWSA-Identified Projects Necessary To Support Coa Projects (Not Stated In COA) | | | | | |
| 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 | TBD |
| Lanpher Reservoir Improvements - Booster Chlorination System | 1/22/2021 | 10/18/2021 | 5/18/2021 | TBD | TBD |

1.4.3 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 seven identified meter and valve pits and semi-annual monitoring of all other interconnect 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 status of the above corrective actions are as follows. The PWSA has submitted the requirements of No.'s 1, 2, 6, and 7 to the PADEP by the due dates listed above. The PWSA is behind on the implementation of designs under the CAP No. 1 by over a year. A revised CAP was submitted and approved and design is in progress. Even considering the schedule underperformance, PWSA does have acceptance from PADEP. The PWSA is continuing the work for No. 3 and has completed the work for No. 4.

In September 2022, PWSA awarded an engineering contract to address removal of stormwater from the vaults as required under the revised Corrective Action Plan accepted by DEP.

1.4.4 COA ON AUGUST 3, 2022

As part of implementing PWSA's Environmental Compliance Manual, the Authority self-identified to DEP several above ground storage tanks which required registration under PA DEP regulations. Three of these storage tanks locates associated with chlorine booster systems did not have sufficient secondary or emergency containment. Required work under this Agreement includes:

- Remote SCADA monitoring and loss of level alarms for the three tank systems (complete)
- Daily visual inspection and submittal of documentation of the three tank systems (in-progress)
- Herron Hill Reservoir:
 - Completion of capital project to replace the tank system (in-progress)
- Lanpher Reservoir:
 - Installation of a flood panel across the door to help use the room for emergency containment (complete)
 - Submit the permit for construction of a new tank system by July 30th (complete)
 - Construction of a new tank system (waiting on DEP permitting)
- Highland No. 2 Reservoir:
 - While the Highland No. 2 Reservoir is out of service, to pull the tanks from that room, install a liner in the room and a flood panel across the door and then reinstall the tanks (work complete, waiting on DEP permitting to put into service)
 - Submit a schedule for construction of a new tank system, associated with the construction of the Highland Pump Station. PWSA has received the construction permit for this work. (complete)

All three of these sites within the next three years will have capital projects that are in progress and then the existing tank systems will be replaced with new booster stations.

1.4.5 PRE-DISPOSITION REMEDIATION RESOLUTION (PDRR), PLEA AGREEMENT, AND ADMINISTRATIVE AGREEMENT

Related to past WTP violations, a Pre-Disposition Remediation Resolution (PDRR) dated July 15, 2020 was developed between the Commonwealth of Pennsylvania, 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 has been overseeing WTP and lead and copper

water distribution system compliance and providing quarterly reports to the AG and the Southwest PADEP office. If the AG is satisfied that the PWSA has complied with the conditions of the PDRR, their corporate monitorship term is anticipated to have been fulfilled by December 21, 2022.

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. The sentencing formalized the terms of the Plea Agreement and requires PWSA to provide monthly reports to a court appointed probation officer.

Leading up to the Plea, the PWSA was working with the EPA Suspension and Debarment Office (SDO) to establish what is known as the Administrative Agreement. On the date of PWSA's Plea, the Authority was also entered into an Administrative Agreement dated September 14, 2021 between USEPA Suspension and Debarment Office and the PWSA. The Plea type placed the Authority under probation for three years; however, the Administrative Agreement is for a four-year period. The Administrative Agreement enforced the requirements of the Plea Agreement and PDRR and included the establishment of a Chief Environmental Compliance and Ethics Officer (CECEO), implementation of improved ethics and compliance programs, expansion of the environmental compliance program to all PWSA facilities, continued implementation of Corrosion Control Optimization Plan and replacement of lead service lines 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. The Administrative Agreement also extends PWSA's compliance program to focus not only on the water treatment plant but all PWSA facilities by September 15, 2023.

In response to the Plea Agreement and the Administrative Agreement, the PWSA implemented new initiatives in 2021 and more in 2022 with the intent of improving water treatment plant operations and attention to environmental compliance and ethics. These initiatives are further described in Section 2.1.2.

1.4.6 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 | Completed |
| PADEP Consent Order And Agreement, The May 13, 2020 Covid-19 Extension, The May 7, 2021 Coa First Amendment, And The August 4, 2022 Second Amendment | September 6, 2019 | Varies |
| PADEP Consent Order And Agreement | May 7, 2021 | Varies |
| PDRR (Monitorship) | November 10, 2020 | December 21, 2022 |
| Plea Agreement | January 13, 2021 | January 13, 2024 |
| Administrative Agreement | September 14, 2021 | September 14, 2025 |

1.4.7 WATER RELIABILITY PLAN (WRP)

The Authority's Water Reliability Plan (WRP) consists of a series of grand-scale unique to a generation infrastructure improvement projects intended to modernize the region's water distribution system while also increasing the reliability of water services for PWSA customers. Comprised of eight projects completed in sequence, the WRP culminates in the complete restoration of a 44-million-gallon basin while previously rehabilitated reservoirs act as temporary Clearwells. The WRP represents an approximate \$480 million investment by the Authority. The eight projects include: 1) Highland II Reservoir Liner Cover Replacement, 2) Highland Park Pump Station and Rising Mains, 3) Aspinwall Pump Station to Lanpher Reservoir Rising Main Project, 4) Aspinwall Pump Station Improvements, 5) Bruecken Pump Station Improvements, 6) Rising Mains 3 & 4 Rehabilitation and Replacement, 7) Clearwell Bypass Project, and 8) Clearwell Replacement

The criticality of the WRP implementation is not taken lightly. PWSA has implemented numerous workshops that outline every project to identify opportunities for coordination and to identify all the potential outages that need to occur in order to ensure PWSA can deliver an uninterrupted quality water supply.

1.5 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

1.5.1 COMBINED AND SANITARY SEWERS

Approximately 26 percent of the PWSA sewer system (based on linear feet of pipe) 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 35 CSO outfall structures maintained by the PWSA. 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.

1.5.2 STORM SEWER SYSTEM

The PADEP issued the latest Municipal Separate Storm Sewer System (MS4) NPDES Permit #PAI136133 to the PWSA and the City (as co-permittees), with a permit term of July 1, 2020 through June 30, 2025.

As part of the PWSA's MS4 stormwater 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 26, 2021, PWSA and the City of Pittsburgh entered into a two-year Administrative Order on Consent with the USEPA to resolve violations related to the MS4. The Order required PWSA and the City to develop and implement a program for conducting inspections and enforcement of constructed erosion and sediment controls, and post-construction Best Management Practices (BMPs), 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. On January 7, 2022 an agreement between PWSA and the City of Pittsburgh was executed establishing roles and responsibilities as they relate to MS4 compliance within the City. The agreement specifies that the primary roles and responsibilities of PWSA's Stormwater Division include the planning, design, implementation, and maintenance of stormwater related Capital Projects that may reduce localized flooding and Combined Sewer System overflows at the rivers while improving the water quality health of streams and waterways. Remaining responsibilities relating to stormwater will follow in a separate agreement or agreements following the MS4-focused January 7, 2022 agreement.

February 11, 2022 the PUC indicated that the agreement dated January 7, 2022 was certified as filed. As part of the Agreement, an annual report is due to the DEP on or before September 30, 2022. PWSA is to take the lead in compiling the annual report, with input provided from the City. The Agreement spells out what the City needs to provide to the PWSA for the annual report and by when. Associated Administrative Order reports are due to the EPA the last day of each quarter until January 2023. Other measures under the responsibility of the PWSA are:

- Track and list all surface waters that receive stormwater discharges from an MS4 area.
- Identify a lead entity for each Minimum Control Measure (MCM) and provide key contact information.
- Maintain a Standard Operation Procedure (SOP) for all MCM's. The City and PWSA shall review the SOPs by July 31st of each year.
- Specifics are outlined for MCM's #1, 2, 3, 4, 5 and 6 within the Agreement document.
- Report on Pollutant Control Measure (PCM's) if applicable
- Report on Pollutant Reduction Plans (PRPs) and Total Maximum Daily Load (TMDL) Plans.

1.5.3 ADMINISTRATIVE CONSENT ORDERS AND CONSENT ORDERS AND AGREEMENTS

Administrative Consent Orders (ACOs) and Consent Orders and Agreements (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.

1.5.4 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.

1.5.5 DEVELOPING CONSENT DECREE (CD) FOR CSO COMPLIANCE

USEPA, DOJ, and PADEP 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 into 2023. 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.

2.0 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 August 2022 to have a dialogue and obtain current data.
- A review of the Mott MacDonald Facilities Assessment Report dated November 2021.

The Facility Assessment Report was prepared 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 was 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. 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. An updated Facility Assessment Report will be prepared by ms consultants, inc. beginning in early 2023. The updated Facility Condition Assessment Report will be used for the 2023 Consulting Engineer's Annual Report.

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 2023-2027 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.

During 2022, unforeseen affects from supply chain issues and inflation continued to have an effect on PWSA capital, maintenance and repair projects. This is expected to continue in 2023. The effects include delays on material and equipment availability along with significant cost increase seen in fuel and chemicals needed for operations.

Other impacts are a result of the City agency requirement updates and how in the long-term they will impact the PWSA. Generally, coordination with City entities such as Department of Public Works (DPW) and Department of Mobility and Infrastructure (DOMI) has increased, especially in regards to agreements. More clarity has been established regarding easements, cooperation agreements, joint funding opportunities and cost shares are approved and signed off on in advance. A major impact over the last year involved the new

imposition of permitting fees with regards to surface restoration, acquiring the permit and the approach to the duration for leaving the permits open which resulted in a significant increase in permit fee costs.

The PWSA's Operation and Maintenance (O&M) final budget for 2023 will not be available until December 16, 2022; therefore, only the summary of the proposed operations budget was available 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. 60 PWSA Facilities and major process areas were inspected as part of this condition assessment. The facilities that were evaluated and their 2022 status are listed in **Table 2.1**. Updates to the current facilities improvement status is based on interviews with staff at the PWSA.

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, Construction expected to commence in 2023 |
| Bruecken Pump Station (subject of COA) | Design in progress, Construction expected to commence in 2023 |
| Fox Chapel Pump Station (in the basement of the Aspinwall Pump Station) | |
| Herron Hill Pump Station | In CIP FY 2024-FY 2027 |
| Herron Hill Tank Pump Station | In CIP FY 2023-FY 2026 |
| Highland Reservoir Pump Station (Includes New H2 to H1 Pump Station as well as pump station to Garfield tank) | Design in progress, Construction expected to commence in 2023 |
| Howard Pump Station | In CIP FY 2025-FY 2027 |
| Inline Pump Station (Coral and Pacific) | In CIP FY 2024-FY 2027 |
| Lincoln Pump Station | Bypass Pump Station for Lincoln PS – construction in progress |
| Mission Pump Station | In CIP FY 2025-FY 2027 |
| Saline Pump Station | In CIP FY 2026-FY 2027 |
| Chlorine Booster Stations | |
| Allentown Chlorine Booster Station | |
| Brashear Chlorine Booster | Design in progress |
| Bedford Chlorine Booster | Design in progress |
| Herron Hill Chlorine Booster Station | Construction in progress |

| | |
|--|------------------------|
| Highland No. 2 Chlorine Booster Station | Design in progress |
| Lanpher Chlorine Booster Station | Design in progress |
| Lincoln Chlorine Booster Station | Design in progress |
| McNaugher Chlorine Booster Station | Design in progress |
| Squirrel Hill Chlorine Booster Station | Design in progress |
| | |
| Water Storage Reservoirs | |
| Herron Hill Reservoir | Construction complete |
| Highland Reservoir No. 1 | |
| Highland Reservoir No. 2 | In construction |
| Lanpher Reservoir | Construction complete |
| | |
| Water Storage Tanks | |
| Allentown Tanks | |
| Bedford Tank | |
| Brashear Tank | |
| Garfield Tank | In CIP FY 2024-FY 2027 |
| 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 2024-FY 2027 |
| Squirrel Hill Tank | |
| Disinfection By-Product Mitigation (Allentown, Squirrel Hill and Brashear Tanks) | Design in progress |
| | |
| Water Treatment | |
| Highland Park Microfiltration Plant (MFP) Improvements | Construction complete |
| MFP1 Corrosion Control Chemical Storage & Feed System | Construction complete |
| MFP2 Corrosion Control Chemical Storage & Feed System | Construction complete |
| 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 | Design in progress |
| 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 (Part of Clearwell Improvements) | CIP FY 2023 -FY 2026 |
| WTP – Clearwell Outlet Gate House (Part of Clearwell Improvements) | In CIP FY 2023-FY 2026 |
| 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 | |
| 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 | |

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 eight metrics that are being measured and tracked: number of lead service line replacements (PWSA side); four metrics for customer communications; number of water meters repaired or replaced; number of training hours per employee per year; and, length of service disruptions. The PWSA has met or exceeded the expectations for several of the metrics shown in the Headwaters webpage. However, the average speed to answer customer calls has significantly increased the past couple months and is not meeting its goal of one minute.

2.1.1 WATER SYSTEM FINDINGS

In reviewing the American Water Works Association (AWWA) standards and guidance for the percent of water system renewal that should occur based on system size, PWSA has been behind, however; over the past few years they have made a concerted effort to help close the gap and are continuing to do so as evidenced in their 2023 – 2027 CIP. Water System successes include PWSA's ability to undertake and successfully complete a large amount of work as part of their Small Diameter Water Main Replacement (SDWMR) contracts also helping close the renewal gap. With such success and yet other project needs to focus on in addition to funding source uncertainty, to what level of design should the SDWMR contracts be carried forward remains in question.

The 2021 Facilities Assessments Report was reviewed for the PWSA's vertical facilities. The report documented significant site observations and summarized 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 2023-2027 CIP. Water system projects in the 2023 to 2027 plan consist of:

- 27 projects at the Water Treatment Plant, with estimated capital costs of \$200,197,272
- 25 water pumping and storage projects, with estimated capital costs of \$435,179,33
- 26 water distribution projects, with estimated capital costs of \$752,018,887

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 used the February 25, 2020 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. Although the master plan recommended over \$446 million in improvements for the water distribution system, which consists of pumping, storage, and transmission mains, the current 2023-2027 CIP

budget has almost \$1.2 billion allocated for improvements in these categories. This reflects PWSA's continued commitment to increasing reliability, reducing outages, and improving their water distribution system overall.

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. Completion of Improvements for Highland No. 2 Reservoir are anticipated in December 2022. The Highland No. 2 liner and cover project is the single largest cover and liner project in North America for 2022 and 2023. According to the manufacturer's associations, there are only three genuine manufacturers in the United States. PWSA was steadfast about the fact that the project had to occur in one calendar year or face product warranty issues. The Authority has a yearly maintenance program for the covers to be cleaned. Two of the three reservoirs' covers have been replaced and the third is currently finishing up as. As a result, all covered reservoirs will have new covers by the end of 2023.

In regards to water storage tank inspection and renovation, there is no regulatory requirement for tank inspection and cleaning in Pennsylvania. The American Water Works Association (AWWA) Standard M42 recommends tanks to be inspected at least once every 3 to 5 years. **Table 2.2** provides storage tank inspection and renovation information. Proposed improvements for three water storage tanks (Garfield, Lincoln, and Spring Hill) are identified in the CIP, as well as tank reservoir security. No additional elevated storage tank projects have been added to the 5 year CIP.

Table 2.2: Water Storage Tank Inspections and Renovations

| Name | Type | Construction Material | Year Constructed | Last Major Renovation | Last Known Inspection Date |
|-----------------------|-----------|-----------------------|------------------|-----------------------|----------------------------|
| Allentown Tanks (2) | Standpipe | Riveted steel | 1939 | 2015 | 2019 |
| Bedford Tank | Standpipe | Welded steel | 1993 | N/A | 2006 |
| Brashear Tanks (2) | Standpipe | Welded steel | Undetermined | 2010 | 2006 |
| Garfield Tank | Elevated | Welded steel | 1959 | 1992 | 2018 |
| Herron Hill Tank | Elevated | Welded steel | 1967 | 2012 | 2008 |
| Lincoln Tank | Standpipe | Welded steel | 1939 | 1982 | 2020 |
| McNaugher Tanks (2) | Standpipe | Concrete | 1998 | N/A | Undetermined |
| Spring Hill Tanks (2) | Standpipe | Riveted steel | 1928 | 1982 | 2006 |
| Squirrel Hill Tank | Standpipe | Welded steel | 1939 | 2012 | 2008 |

*There is no regulatory requirement for tank inspection and cleaning in Pennsylvania. AWWA Standard M42 recommends tanks should be inspected at least once every 3 to 5 years.

As historically documented, there are several facilities that have potential major-to-moderate structural defects. 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 pump stations as the rehabilitation of the pump stations occur.

The existing water distribution system has significant portions of the system operating beyond their useful lives. The PWSA's program for rehabilitation and/or replacement of large- and intermediate-sized diameter water mains addresses the most critical lines to prevent system outages. A robust water distribution system replacement program is included in the CIP.

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.

Operations has made significant strides in the past couple years, specifically focused on their meter renewal, leak detection, hydrant flushing, and valve exercising programs. Average daily pumpage in the system has also reduced from over 70 MGD to around 62-65 MGD in 2022. This can be a reflection of both the PWSA leak detection program and capital investment in their infrastructure.

Relative to their meter program, Operations has worked on installing meters for customers that were historically placed on a flat billing rate. As of August 2022, only 269 customer accounts (down from around 450 accounts) remain on a flat billing rate. On top of that, they have installed meters on city facilities that were not metered previously and are now down to three known services left to install meters. PWSA plans to hire a consultant to assist with the design of the new meter vault that will service those three accounts. The goal is to complete the meter vault in 2023/2024.

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 and 2022 include the following awarded projects:

- Construction and construction management of 2021 Small Diameter Water Main Replacement
- Construction and construction management of 2022 Neighborhood LSLR Program
- Construction of 2022 Urgent LSLR Program
- Construction of 2022 Valve Replacement
- Large Diameter Water Main Project – Rising Main 4
- Design and Engineering Services for WRP Clearwell Bypass System – Permitting, Implementation, and SOP's Design and Engineering Services for Aspinwall Pump Station Improvements, Bruecken Pump Station Improvement, and the Clearwell Emergency Bypass Project
- Construction and construction management of Highland Reservoir Pump Station Supply and Rising Mains Project
- Construction of Lincoln Pump Station: Bypass Pump Station Project

2.1.2 PDRR, PLEA AGREEMENT AND ADMINISTRATIVE AGREEMENT COMPLIANCE STATUS

The PDRR has a 24-month term ending in December 2022. PWSA is currently discussing satisfaction of the PDRR requirements with the Office of the Attorney General. PWSA has been in compliance with the requirements under the PDRR, including:

1. PWSA issued a public statement of apology to consumers.
2. PWSA made donations totaling \$500,000 to organizations identified in the PDRR.
3. PWSA retained a Corporate Monitor (Cornwell Engineering Group) who reports quarterly to the Office of the Attorney General and PA DEP.

In response to the Plea Agreement, associated Judgment and Conviction in Federal Court, and the Administrative Agreement, PWSA has:

1. Retained an Independent Monitor (Sewerd & Kissel) who shall oversee the Authority's compliance with the Agreement
2. Retained an Independent Environmental Consultant (Arcadis) to conduct annual environmental audits of the water treatment plant during the period of probation. The annual audit and corrective actions are posted on PWSA's public website
3. Implemented an Environmental Compliance and Ethics Program (ECEP).

PWSA's Independent Monitor who oversees their compliance with the Administrative Agreement recently certified to the government that PWSA is in compliance with their Administrative Agreement and they have a work plan approved by the government of things that they will audit.

The 2021 Environmental Compliance Audit Report for Aspinwall WTP has been completed and posted on PWSA's public website. PWSA has either addressed or is in the progress of addressing all of the findings from the audit. Given it was the first in a series of audits, numerous items were identified such as waste management policies, inspection reports, etc. The 2022 audit will be completed in November and December 2022 and the final report posted by January 13, 2023. Also as part of the advisement under the Independent Monitor and to aid in the expansion of environmental compliance programs, PWSA's Independent Environmental Consultant performed an assessment of 11 other PWSA facilities.

2.1.3 WASTEWATER SYSTEM AND STORMWATER SYSTEM FINDINGS

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.

In 2021, PWSA reported having proactively completed approximately 79,296 linear feet (15 miles) of sewer televising through a variety of contracts. Comparitively, in 2022 they completed 112,504 linear feet (21 miles). This work does not include the televising performed by PWSA internal Operations staff, since it is primarily performed in reaction to an operation or maintenance issue. Inspection and condition assessment of below-ground infrastructure, pipelines, and storage facilities should continue to be conducted with a proactive approach. The PWSA anticipates establishing a risk-based approach towards prioritizing condition assessment.

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. Construction of new junctions should be avoided wherever possible. It is recommended that manholes are constructed instead of junctions or in place of existing junctions where feasible and standard guidance applies. 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 they are not connected to the sanitary sewer. The PWSA completed testing of the catch basins in 2011. It is recommended that the PWSA systematically continues to disconnect illicitly connected catch basins to the sanitary sewer system, as discovered.

In 2022, the City of Pittsburgh made some updates to policies and requirements that have substantial impacts to both Capital and Operational planning for the PWSA, even though some initiatives were developed with PWSA input.

The Department of Mobility and Infrastructure (DOMI) updated its Right-of-Way (ROW) Procedures Manual, effective May 1st, 2022. This is directly relevant to PWSA since the majority of their assets reside within public ROW. The update includes setting a 7-inch curb reveal standard, which provides benefits to improving stormwater management, and language stating proposed green infrastructure (GI) construction in the right-of-way must follow any GI standards set by PWSA and must show that PWSA agrees to own and maintain the GI. Implementation of these requirements directly impacts PWSA’s surface restoration requirements and associated capital costs. Starting in Spring of 2020, PWSA and their consultant, in close collaboration with the Department of City Planning, had been working on a substantial update to the City’s Code and Ordinances specific to stormwater management. This effort was done primarily to create a more unified Code and make improvements to the stormwater review and approval process. As part of this effort, the City released a Stormwater Design Manual providing guidance for compliance with the stormwater management requirements included in the City’s modified Code. The stormwater Code updates went into effect on March 31, 2022.

In conjunction with the Code and Ordinance updates, PWSA and their consultant also drafted a Stormwater Strategic Plan which is a high-level planning document that serves as a roadmap for stormwater management and education. The Stormwater Strategic 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. A draft of the Strategic Stormwater Plan is currently under review and anticipated to be released and shared with the public in December 2022. The creation of the plan was funded by three foundations (\$100k per foundation) which helped defer the cost of its development. 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. In October 2021, the PWSA awarded a contract for a Wet Weather Program Management (WWPM) consultant to assist the PWSA with negotiating the consent

decrease and developing the new LTCP. This LTCP, once finalized and accepted, will create a significant draw on the PWSA resources.

PWSA is working on their compliance with their MS4. PWSA has an ongoing project in City parks since they took over any City park greater than 50 acres in 2022. PWSA didn't have a good idea of what the infrastructure looked like in those City parks thus they are doing CCTV work to identify all of the infrastructure and determine where MS4 outfalls are located. That work remains in progress as work to date has located more buried infrastructure than anticipated. The City has separate MS4 requirements. As a result, PWSA meets with them regularly to coordinate efforts. 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. Specific to Pollution Reduction Plan (PRP) requirements defined under the MS4 program, PWSA has partnered with PennDOT to implement projects for credit in areas such as Saw Mill Run with future projects targeted in lower Chartiers Creek and Beck's Run. Through the implementation of PWSA's new Learning Management System, MS4 training requirements have been met 100% by August 11, 2022.

As part of wet weather planning team efforts, a task is being performed by a consultant to evaluate the impacts of ALCOSAN's Regionalization program to the PWSA. As part of this evaluation, a Benefit Cost Estimate (BCE) is being prepared as a justification for PWSA and PUC use as to whether Regionalizing assets is beneficial to the PWSA or not. The initial evaluation is to be summarized via a Technical Memorandum shared with the PWSA by the end of 2022.

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 2022 included the following projects and awards:

- Design and Engineering Services for 2023 Small Diameter Sewer Rehabilitation
- 2020 Large Diameter Sewer Rehabilitation
- Construction of Lawn and Ophelia Green Infrastructure Project
- Award of Construction for the 2022 Small Diameter Sewer Rehabilitation Projects
- Completion of the M-29 Outfall Improvements Project

The 2023 to 2027 CIP includes:

- 10 wastewater system projects, with estimated capital costs of \$210,325,892.
- 23 stormwater system projects, with estimated capital costs of \$161,382,350, including budget for Wet Weather Program projects in 2024 through 2027.

As part of late 2021 through 2022 wet weather planning efforts, approximately 100 flow meters were installed in a systematic manner throughout PWSA's system to help inform H&H model expansion and long-term control planning efforts. The meters are anticipated to be installed to the end of November 2022 resulting in a 9-month total monitoring period. Subsequently in 2023, the WWPM Team will be siting and installing flow meters in separate sanitary sewered areas for another 9 months of metering. PWSA also has 74 permanent flow meters and associated rain gages installed as part of their CSO reporting requirements.

The CIP for 2023 through 2027 doesn't include projects related to the Stormwater Strategic Plan, presumably because the Plan hasn't been finalized yet; however, a draft of the Plan has been completed and is currently under PWSA review, its main focus:

- Outlines priorities for investment for stormwater management focusing on 4 lenses:
 1. Water Quality – CSO and MS4
 2. Flooding – localized, basement backup, riverine
 3. Equity – Investment in distressed communities
 4. Opportunity – Targeting existing green space and vacant property
- Looked for ways to leverage PWSA's investment through partnerships, external funding partners, etc.
- Connects stormwater to other infrastructure investment such as energy, transportation, etc.

A draft of the Strategic Stormwater Plan is currently under review and anticipated to be released and shared with the public in December 2022. A consideration for the development and implementation of future stormwater projects is their synergy with the on-going wet weather planning efforts and the recommended projects that will result from the long-term control plan development. These efforts will require on-going coordination.

2.2 ENVIRONMENTAL COMPLIANCE AND ETHICS PROGRAM (ECEP)

Another piece of the Administrative Agreement is that it extends PWSA's compliance program to not just focus on the water treatment plant. Within two years, September 15th, 2023, PWSA is required to expand their environmental compliance program to all of PWSA facilities. This includes the wastewater side, field operation side, the warehouse, 1200 Penn, engineering, etc.

The Environmental Compliance and Ethics Program (ECEP) is also intended to satisfy those requirements imposed upon the PWSA by virtue of the Plea Agreement between the PWSA and the US Department of Justice, Judgement and Conviction from the U.S. Western District Court, and Administrative Agreement between the PWSA and the U.S. Environmental Protection Agency. To that end, the ECEP establishes systems to prevent and detect criminal and violative conduct and establishes a reporting structure to ensure the development of a culture of compliance in which employees are encouraged to understand and implement environmental compliance and ethics standards. Employees are empowered to report acts of non-compliance without fear of retribution. The ECEP also emphasizes the importance of training and educational updates on compliance and regulatory issues that impact the operations of the PWSA.

The primary goals of the ECEP are to:

- Prevent fraud, waste, abuse, and other improper activity by creating a culture of environmental compliance and ethics within PWSA
- Detect any non-compliance activities at an early stage before they may impact water quality or compliance with regulations
- Respond swiftly to environmental compliance and ethics issues through appropriate action and documentation

The ECEP applies to all PWSA board members, executives, employees, representatives, and agents. PWSA will also require contractors to comply with applicable parts of the ECEP.

There are five key components to PWSA's ECEP, establishing an organization-wide framework for environmental compliance and ethics and complying with requirements in the Plea and Administrative Agreements.

1. **Mission Statement:** PWSA's Mission Statement and Core Value on Ethics & Integrity re-enforce the Authority's commitment to protecting public health and the environment and doing so in an ethical and professional manner.
2. **Organizational Structure:** The compliance group was expanded in 2022 beyond the Chief Environmental Compliance and Ethics Officer (CECEO) to a team of six individuals, five environmental compliance specialists and an environmental compliance program manager, all who report to the CECEO. The CECEO also is stationed in the field at the Water Treatment Plant, reports directly to the CEO, and participates on the Board Executive and Environmental Compliance and Ethics Committee.
3. **Codes and Policies:** The Code of Ethics (Revised January 7, 2022) and Code of Conduct (Revised January 7, 2022) are maintained to include obligations to report suspected or known compliance, ethics, or safety violations. PWSA implemented an independent third-party whistleblower system for anonymous reporting which includes a third party operated Anonymous Reporting Hotline in addition to a whistleblower policy (Revised January 7, 2022). Other updates included their non-discrimination retaliation policy (Revised January 7, 2022). PWSA maintains copies of all of these policies on the intranet site for staff access and as hard copy in the breakroom of all staffed facilities.

On August 19, 2022 PWSA held a mandatory Administrative Agreement training for in-house staff and contractors and emphasized the importance of daily awareness and compliance. These compliance polices were reviewed as part of the training and copies of the latest versions of the polices were also shared.

4. **Training:** PWSA is committed to the development and training of each staff member, equipping them with necessary knowledge of environmental compliance and ethics obligations and the understanding of how to report suspected acts of non-compliance. PWSA Human Resource Department maintains the Comprehensive Training Policy and Employee Training Requirements. Organization wide training is facilitated and tracked using a cloud-based Learning Management System (LMS). Each PWSA employee is made aware of the Administrative Agreement, codes and policies, and the Environmental Compliance Manual during the on-boarding process (within 30 days of hire date). Annual refresher training is provided to all PWSA staff by September of each year. Refresher training includes ethics, environmental compliance, and whistleblower information. Environmental compliance and ethics training is also conducted as part of weekly tailgate meetings at Aspinwall WTP, Mission, Howard, and Brilliant. These tailgate meetings include review of environmental compliance, ethics, and safety topics for PWSA's Operations staff. PWSA also provides training for contractors and consultants on environmental compliance and ethics requirements.

5. **Environmental Compliance Manual:**

The purpose of the Environmental Compliance Manual is to establish the foundation of PWSA's compliance with water quality and environmental requirements in accordance with federal, state, and local laws and regulations; orders and agreements; and PWSA's policies and procedures. The Manual is used to manage and demonstrate water quality and environmental compliance for PWSA's water production system including the Aspinwall Water Treatment Plant (WTP), Highland Park Membrane Filtration Plant (MFP), pump stations, reservoirs, and storage tanks. The Manual covers the production of drinking water, disposal of wastes generated during water production, storage and management of chemicals used in water production, permitted stormwater and wastewater discharges, and monitoring and reporting to regulatory agencies. The Manual is currently not intended for the PWSA water distribution system (i.e., downstream of the point of entry) or for PWSA wastewater or stormwater assets but is being expanded to incorporate all of PWSA's operations by September 14, 2023 as required in the Administrative Agreement.

2.3 SUPPORT SERVICES

2.3.1 INFORMATION MANAGEMENT SYSTEM (IMS) UPDATE

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 (CMMS) 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. The PWSA is currently building the specifications for a CMMS with the goal to start implementation in 2023.

In 2020, the PWSA implemented a mobile application called SpryMobile, which is a cloud-hosted maintenance management system (MMS) 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 implemented a new Enterprise Resource Planning (ERP) System in 2022 and is in the process of 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. In conjunction with water model updates and related to asset management, the PWSA has been

reviewing historical records and updating asset data more specifically the asset installation date to assist with rehab and replacement prioritization and risk evaluation.

The PWSA's hydrologic and hydraulic (H&H) 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. In 2022, PWSA shared their H&H system-wide model with their WWPM Team. The WWPM Team is in the preliminary stages of evaluating the methodology and approach to its expansion.

The PWSA completed implementation of a new Enterprise Resource Planning (ERP) System in August of 2022.

In 2022, PWSA received Board approval to implement a cloud-based Environmental Management Information System (EMIS) program. This system is expected to be implemented in 2023 and will help PWSA move away from paper forms and documentation to an electronic system for tracking documents, deadlines and everything compliance related.

2.3.2 HEALTH AND SAFETY UPDATE

Significant strides were made in regards to safety support services regarding staffing, training, and emergency preparedness in 2022. PWSA hired two full-time employees, a Workplace Safety Manager and an Emergency Planning and Water Production Safety Manager. The Workplace Safety Manager is focused on workplace and field safety and the Emergency Planning and Water Production Safety Manager's focus is on water treatment facilities. The two positions enabled PWSA to bring the positions in-house and relieve themselves of an outside safety consulting contract and associated expense. Safety has been a focus and a concern at the PWSA, especially due to the impacts and added workload related to overseeing the Authority's' COVID 19 safety measures. In 2022, PWSA is on their 14th revision of their COVID Health and Safety Plan.

2.3.2.1 TRAINING AND INCENTIVES

The safety group implemented a training calendar in conjunction with Human Resources (HR) and the Environmental Compliance group to track required staff trainings. Safety trainings were also incorporated into PWSA's new Learning Management System (LMS). This improved the ease of training deployment and access, including tracking training completion status for the employees. PWSA was also able to complete additional training that isn't required but important to the organization to reinforce. Some key trainings this past year included another round of defensive driving, NFPA 70E, training for repairmen and electricians, competent persons' excavations training, DOT Hazmat and PA One Call. Other substantial training improvements included a full revision to new employee orientation that was also deployed via the LMS. Customized training versions specific to the following four categories 1) Plant-oriented, 2) Field, 3) Engineering, or 4) Other staff assigned to 1200 Penn Avenue were created and have been launched. A training matrix has also been established which serves as a roadmap depicting by job type which trainings are required and when. Specialized trainings, based on job type are offered as soon as day 3 and may include lockout/ tag out /authorized, forklift training, certified flagger training, etc. PWSA also re-trained over 80 employees in First Aid and CPR in 2022.

Another key and successful initiative included a customized web-based safety incentive program to improve safety culture. Part of this effort included a near-miss reporting program in addition to incentives for staff and managers. PWSA also implemented the Geotab system that monitors vehicles and encourages safe driving

practices. A volunteer ergonomics and stretching program to reduce workplace injuries was also included in the incentive program.

Additionally, electrical safety (600 volts or higher), previously identified as a training gap was also implemented in 2022. In addition to this, Safety has requested funds in the operating budget to perform assessment and training specific to Arc Flashes.

2.3.2.2 EMERGENCY PREPAREDNESS

In regards to emergency preparedness and response, last year PWSA implemented an Incident Command System (ICS) that designated roles and responsibilities for incident commanders, Public Information Officers, safety officers, operations, planning and logistic section chiefs. Staff were designated specific roles and trained on what the role entails. Various emergency scenarios such as plant outages, natural hazards, and water quality events, which are included in an emergency response plan, were reviewed. PWSA's Senior Health and Safety Manager holds regular meetings every six weeks with the individuals involved in an emergency scenario via a tabletop setting to walk through the actions that should be taken step-by-step under an emergency response scenario. Annual training on the Emergency Response Plan (ERP) reinforces these and other emergency safety measures for employees.

For the coming year, the Safety group is looking to hire a Safety Coordinator to support the two managers that report to the Senior Health and Safety Manager. This role would include helping with the implementation and administration of the various safety measures described above and more specifically, provide assistance with the incentive program.

2.3.2.3 EQUIPMENT UPGRADES

In 2022, the PWSA spent nearly \$40,000 upgrading their excavation equipment; 80% of the utility trucks were outfitted with a fin board. PWSA also switched from hydraulic shoring to pneumatic shoring since there were previous related issues. Some Modular Aluminum Panel Systems (MAPS) were recently purchased to aide with the larger scale excavation work PWSA crews perform.

PWSA had an ergonomic assessment completed in the last year. As a result, training was rolled out to reach staff operating equipment i.e. high risk lifts. Ergonomic practices addressing items such as exertions and static positions were rolled out to the field and the Plant personnel. While PWSA is not regulated by OSHA, OSHA 10 training will be required of all PWSA's engineers in construction and all of their field and plant managers are expected to attend a second class so that they all get an OSHA 10 certification for construction. Consequently, PWSA is hopeful that at least 50 to 60 employees will be authorized in the OSHA 10 training.

2.3.2.4 SECURITY MEASURES

Regarding physical security, the main items completed in 2022 include a \$250,000 project to implement access upgrades at the Water Treatment Plant and Brilliant Yard facility. The other two projects include approximately 2,000 linear feet of replacement of fencing at PWSA's sedimentation ponds as well as approximately 250 feet at the Lincoln Tank location. The other project is to provide fencing across the front side of the WTP.

In October 2022, PWSA received \$10 million in funding for the purpose of funding a variety of needed security improvement throughout its system. This project will have its own line item in the capital budget and will be drawn down on over two to three years.

2.3.3 HUMAN RESOURCES AND STAFFING UPDATE

The PWSA employs over 400 people and projects a total workforce of over 500 employees in the coming years. It is anticipated that a greater number of staff positions will be needed for the engineering, procurement, and environmental compliance departments to address the responsibilities of the CIP program and numerous regulatory requirements. This need was reinforced during interviews with the various leadership throughout PWSA with some specific needs identified such as an additional safety coordinator and Senior Water Engineer that can focus on the projects related to vertical infrastructure.

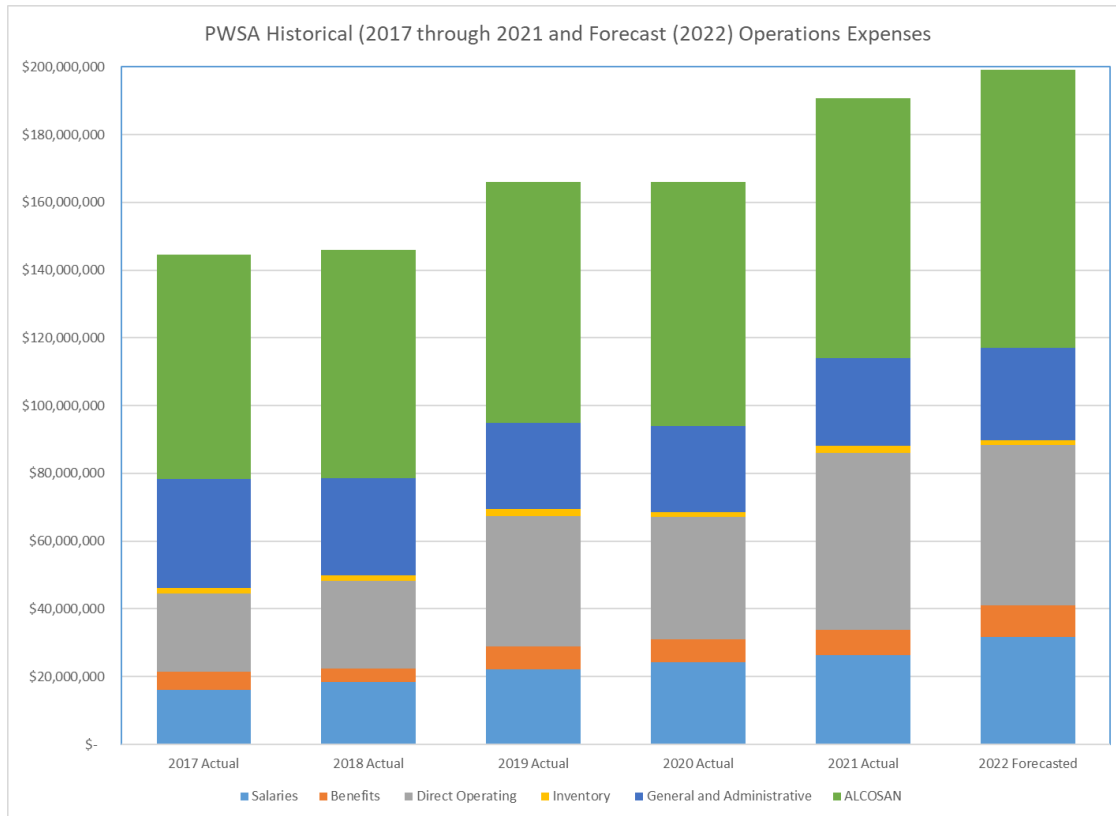
PWSA made great strides in regards to staffing and authorized strength by filling a total of 43 positions in 2022. Staffing enhancements in 2022 include the environmental compliance expanding to a team of six individuals, five environmental compliance specialists and an environmental compliance program manager that report to the CECEO to help implement compliance requirements and the expansion of the work. Additionally, two key positions were filled in 2022 including a Workplace Safety Manager and an Emergency Planning and Water Production Safety Manager. As of October 31, 2022, the PWSA has posted approximately 18 open staff positions such as Manager of Field Operations, Senior Project Manager (Water Programs), and Water Production Manager with the bulk being new positions.

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. PWSA has reported in 2022 that this policy change has made a considerable positive impact to the number of applicants and hires for the PWSA's job postings.

2.4 RECOMMENDATIONS FOR MAINTENANCE, REPAIR AND OPERATION OF THE WATER, WASTEWATER, AND STORMWATER SYSTEMS DURING THE 2023 FISCAL YEAR

As Consulting Engineer for the PWSA, ms consultants, inc. recommends the PWSA advance the 5- year CIP, approved on October 28, 2022. 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 2023 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 2023-2027.

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 2017 through 2021 (actual operations expenses) and for 2022 (forecast operations expenses), that the PWSA provided November 9, 2022.

Figure 2.1: PWSA Historical (2017 through 2021) and Forecast (2022) Operations Expenses¹

On November 9, 2022, PWSA provided a draft Operating Budget for 2023. The 2023 operations expenses 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 operation expenses may be higher than any previous year. The PWSA has indicated that the final PWSA operations budget for 2023 will not be available and approved until December 18, 2022.

When looking beyond 2023, a greater amount of operations expenses is anticipated to be needed because of the upcoming negotiations (estimated to continue for another two years) to implement the outcome of the consent decree for reduction of sewer overflows.

Table 2.3: PWSA's Estimated Operating Expenses for 2023¹

| | |
|----------------------------|-------------------------|
| Salaries | \$34,858,532.61 |
| Benefits | \$10,770,773.88 |
| Direct Operating | \$47,981,730.84 |
| Inventory | \$1,965,660.00 |
| General And Administrative | \$19,307,740.89 |
| ALCOSAN | \$86,364,411.19 |
| TOTAL | \$201,248,849.41 |

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

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. Overall, the proposed 2023 Operation Budget, if approved, will be 12% higher than the approved 2022 budget. Of that increase, the salaries itself increase by 23% which reflects both the cost of living and planned additional hires. Also noted is the General and Administrative expenses which decreased by 39%.

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 will 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.

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 2023 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.

Continued emphasis is recommended for tracking and achieving environmental and regulatory compliance; updating the water production Environmental Compliance Manual. The manual covers the production of drinking water, disposal of wastes generated during water production, storage and management of chemicals used in water production, permitted stormwater and wastewater discharges, and monitoring and reporting to regulatory agencies. Water distribution (i.e., downstream of the point of entry), wastewater, and stormwater systems are not currently covered in this manual. As required under the Administrative Agreement PWSA is working to expand the manual to incorporate these systems by September 2023; 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.

The projected increase in the draft 2023 operating budget is in line with what is needed in order for PWSA to execute all their internal initiatives such as safety and regulatory compliance and training programs. This also reflects the PWSA commitment to improving their operations with the goal of maintaining a much more reliable system to meet or exceed customers expected level of service.

When looking beyond 2023, a greater amount of operations expenses is anticipated to be needed because of the upcoming negotiations (estimated to continue for another two years) to implement the outcome of the consent decree for reduction of sewer overflows.

2.4.1 WATER SYSTEM RECOMMENDATIONS

2.4.1.1 NEW RECOMMENDATIONS FOR 2023

Monitor upcoming federal and state regulations, including the Federal Lead and Copper Rule revision (LLCR) and Federal regulation on per- and polyfluoroalkyl substances (PFAS). The LLCR focuses on lead service replacement of which PWSA is ahead of the curve compared to most other utilities in the U.S.; however, there are other aspects of the rule that will require additional sampling and communications that may impact PWSA.

Sluice gates are currently inspected on an as-needed base, therefore it is suggested that a maintenance plan be developed to address the inspection and maintenance of PWSA's sluice gates on a more routine basis.

Consider adding additional staff in the engineering group to assist with the execution of ever increasing capital projects in the capital improvement program.

2.4.1.2 ON-GOING RECOMMENDATIONS

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 unencumbered access and necessary maintenance, the PWSA should establish easements where the PWSA facilities or infrastructure are located.

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.

Continue the Water Quality Initiative Program and adjust the program as necessary, depending on regulatory requirements and testing results. These types of requirements include a lead and copper testing program for residential customers, continued optimization at the WTP, continuing 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 non-revenue water, through increased leak detection efforts, large meter calibration and/or replacement, and installation of meters on unmetered uses.

PWSA Operations (OPS) staff is aggressively changing out meters aiming to change out 50,000 small (one inch or less) meters in a five year period. The small meter replacement was slightly impacted by the effects of the COVID pandemic and only 6,000 new meters were installed in 2020 and 5,000 new meter were installed in 2021. The estimated 2022 total small meter replacements are 5,300; 5,200 have been replaced through October 2022. Additionally, OPS is just as aggressive on targeting large meters to replace. Consideration should be made on first replacing the larger, older meters that serve PWSA's largest customers as those would yield the highest return on investment.

PWSA has a team of employees charged with surveying for leaks with acoustical sounding equipment. PWSA has expressed a desire to supplement the current program by creating a District Metering Program. Adding flow monitors in zones/districts of the system would allow PWSA to determine baseline demands in that district so when you see a significant increase would alert you possible losses that does not typically surface. Currently finished water leaving the plant is accurately metered however once it leaves the plant and they do not have a handle on the demands throughout different portions of the system. Creating a more programmatic approach of system leak detection will help improve non-revenue water.

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. PWSA has a program that exercises approximately 5,000 valves a year; the number may change based on conversations with the PUC and the need to exercise the it's critical valves (approximately 1,000 valves) every year. PWSA is striving to create a program in which they touch every valve in a four-year cycle. PWSA also created a program to flush and inspect 2,500 hydrants per year which put them one three-year cycle.

The need for performance of inspections on the water storage tanks is shown in **Table 2.2**. This activity would benefit from the development of a more programmatic inspection program.

Continue the routine maintenance program to remove and prevent vine and vegetation growth from the vertical facilities and perform detailed inspections of roofs and rain conductor systems. This is both accomplished by in-house employees who routinely cut grass and maintain some of the vegetation and by maintenance contracts at some of the Authority's facilities.

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.

PWSA has tried to address both waterline and sewer system upgrades simultaneously and they have proven the logistics are not ideal. It is recommended that PWSA continue strategic coordination of waterline replacements in conjunction with deteriorating buried sewer infrastructure where it makes sense specific to schedule and construction sequencing. This can be done by continuing to make repairs to deeper infrastructure prior to waterline replacements and jointly, where applicable.

2.4.2 LEAD SERVICE LINE REPLACEMENT (LSLR) 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.

In addition to dedicated Lead Service Line Replacement (LSLR) projects, a major component of the Small Diameter Water Main Replacement (SDWMR) program includes the replacement of lead service lines. There are three current lead service line replacement contracts:

1. 2022 neighborhood LSLR program - It's funded by a \$17 million grant from the city's American Recovery Plan (ARP) Act. PWSA initiated the work in April of 2022 and the work will proceed through September of 2023. PWSA's goal is to do work in at least 1,400 locations.
2. 2022 priority LSLR contract - It is funded by PENNVEST for a total of \$4.7 million. A little over 60% is grant funded and the remainder is a loan. The contract focuses on two major customer groups:
 1. Daycare Facilities – PWSA identified daycare facilities that were licensed as well as working with some community advocates to identify locations that might not be on those license. This list of customers is predominately complete.
 2. Customers where test results exceeded a certain lead level.
3. Urgent LSLR – PWSA OPS, by current practice, is out replacing either a section of a water main that's had a break or even a section of a public service line that's had a break. In doing so, if lead was encountered on the private side, PWSA will immediately try to connect the customer to a temporary private side service line. Then PWSA will bring in one of their construction contractors to do the private side replacement.

The COA also requires that PWSA provide an update of their inventory by the end of 2022. The PWSA submitted a detailed inventory of residential service lines in December of 2020 and the COA calls for an update of that inventory to include all of their service line connections by the end of 2022. PWSA is on track with these requirements and should meet the submittal deadline of December 31, 2022.

PWSA continues to optimize their use of orthophosphate as a control treatment, it is anticipated that testing for water quality parameters will start the beginning of next year (2023). As part of the optimization, PWSA made the following adjustments by first dropping the pH to 7.8 and studied the results for 10 weeks. Next they did a drop in orthophosphate from 1.9 milligrams per liter (mg/l) to 1.7 mg/l. PWSA was not satisfied with the results of that change therefore they continued the 40 weeks of monitoring and ultimately decided against making more adjustments. Once the study was concluded, the recommendation was to keep the pH at 7.8 and revert back to 1.9 mg/l orthophosphate dose. PWSA recently received approval to make the adjustment to the orthophosphate dosage. The permit, received in June 2022, requires PWSA to do another two months of six-month sampling before they submit the water quality parameters. PWSA started their 2022-B sampling which will go till the end of this year (2022) and then they'll do 2023-A. At this point they intend to submit a request for water quality parameters.

As part of the tap sample monitoring, PWSA will include as part of the 2022-B, asking customers to collect both first and fifth leader samples. The present rule requires the first leader samples. The future rule will require fifth leader. PWSA is proactively trying to determine their progress when the new requirement kicks in. Another provision of that requirement is to only collect samples from lead service lines, and PWSA has been doing that for years.

Significant progress has been made to replace lead service lines. Since July 1, 2016 and as of November 11, 2022, the PWSA has replaced 9,745 public lead lines and 6,628 private lead service lines. PWSA has met the obligations under this Order for lead service line replacements. PWSA will continue lead service line

replacements, working towards the goal to replace all lead service lines by 2026. No additional recommended improvements to the LSLR program are included at this time.

2.4.3 WASTEWATER SYSTEM AND STORMWATER RECOMMENDATIONS

2.4.3.1 NEW RECOMMENDATIONS FOR 2023

Review the Intermunicipal Agreements to assess opportunities to charge fees to upstream municipalities, where appropriate. Coordinate with PWSA WWPM team tasked with assessing the impacts of Regionalization to the PWSA which is specific to assets that convey flow from one or more community located upstream of the PWSA service area.

Continue participation in 3RWW Combined Sewer System (CSS) and Separate Sanitary Sewer System (SSS) committee meetings to facilitate knowledge transfer and collaboration with PWSA upstream municipalities to support 2021 "Revised Orders."

In relation to similar recommendations made on behalf of the Water System, the Wastewater Group should continue to strategically identify sewers for concurrent CCTV with future water main rehabilitation. For example, when 2023 small diameter water main repair areas have been identified, a query of interacting sewers is performed such that any identified as overlapping can be categorized as replaced, lined, existing quality CCTV, and those remaining would be identified for CCTV. Sewers identified as deficient can then be prioritized for lining ahead of waterline replacement.

While PWSA's financial status may limit or post-pone the development of a system-wide Stormwater Management Plan, a watershed-specific demonstration project is recommended as a pilot Stormwater Management Planning tool where a specified watershed is analyzed from a feasibility study phase, to concept all the way through to implementation where lessons learned could be scaled for future system-wide application.

In 2022, PWSA established more proactive program for preventative and post-intense rain maintenance. Hot spots have been identified and coordinated with PWSA sewer operations such that a visit will be made prior to and/or directly after an intense rain event to clean troubled or blocked areas to prevent and minimize flooding impacts. This initiative will continue to grow and expand beyond 2022.

The WWPM team is tasked with assessing PWSA's Capacity, Management, Operations and Maintenance (CMOM) framework and has provided preliminary recommendations. A planning initiative for risk assessment is to build out a logic tree in either Info 360 or Info Asset Manager (IAM) to initiate a risk based approach as it relates to the sewer mains.

2.4.3.2 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.

Continued coordination with the Wet Weather Program Management team is recommended as PWSA's system continues to be evaluated which will help identify and inform problem areas and eventually lead to a Level of Service evaluation.

Continue to replace junctions throughout the wastewater and stormwater systems with traditional manholes wherever possible. There are a few contracting vehicles for this work currently, 1) Operations Manhole Point Repair contract 2) Small Diameter Sewer Rehab projects 3) Urgent Sewer Repairs, as applicable.

Continue to update the electronic asset registry in asset management software InfoAsset Manager (IAM) for CIP projects that have been completed as-built drawings and resulted in asset changes such as addition of new manholes and sewer pipe, abandonment of existing infrastructure, updating of key attributes such as pipe, shape, material, invert depths etc., if applicable.

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. Through the course of this year PWSA has been working on an update to their Nine Minimum Controls document and hope to share the updated version with state and federal regulators as soon as it's finalized and approved which is anticipated to occur in early 2023.

Since 2021, PWSA has streamlined their approach to the documentation and logging of complaints related to sewer basement backups. In-field confirmations have increased in frequency in addition to the enhancement of the mapping of backups within PWSA's GIS environment. The Wastewater Group initiated a process in 2020 for a root cause analysis for basement backups. It is recommended that PWSA continue to enhance this tracking and analysis and coordinate with their Stormwater Group in regards to similar initiatives they have planned to further assess customers impacted by basement backups due to flooding. PWSA is exemplified as progressing these needs through projects such as Fuchsia Way, which was born out of a significant amount of reported basement backups.

PWSA has a monthly standing meeting with ALCOSAN, but currently both organizations meet several times a month due to all the coordination and overlap of wet weather planning initiatives. 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. More specifically of high priority is ALCOSAN's Ohio River Tunnel (ORT) design progress and impacts to the PWSA system.

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.

Continue to focus on opportunities for trenchless rehabilitation due to its significant cost savings (four times cheaper) as compared to rehab that requires digging up a street.

2.5 SUPPORT SERVICES RECOMMENDATIONS

2.5.1 INFORMATION MANAGEMENT SYSTEM RECOMMENDATIONS

2.5.1.1 NEW RECOMMENDATIONS FOR 2023

The PWSA should prioritize the process of 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.

2.5.1.2 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.

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.

2.5.2 HEALTH AND SAFETY RECOMMENDATIONS

2.5.2.1 NEW RECOMMENDATIONS FOR 2023

PWSA Safety Group desires to work with Engineering to utilize e-Builder to build out a platform that would facilitate contractors to provide site specific project information as it relates to health and safety for PWSA to review as opposed to an entire health and safety manual that doesn't provide a real look at what exactly the project is or what aspects of their program are going to be utilized.

2.5.3 HUMAN RESOURCES AND STAFFING RECOMMENDATIONS

2.5.3.1 NEW RECOMMENDATIONS FOR 2023

The PWSA has increased their salary operation budget by 23%, not all of which represents a cost of living increase. The PWSA will continue to assess staffing to enhance their authorized strength. Within the next few years, the PWSA is looking to grow from 400 to 500 staff. As the large programs continue to progress along and further knowledge gained from the result of consent decree negotiations, the PWSA should continue to assess staff makeup, composition, and levels needed to operate the Authority long-term.

The Authority is looking to expand their in-house human resources department gaining some technical ability with the focus on key hires and positions where voids are the greatest currently and in the near future.

The position of Senior Project Manager (Water Programs) is a key position need. This role is specific to a senior person with expertise in vertical facilities and a focus on pumping and storage. Having somebody, whether it's in operations or engineering, that's going to facilitate and make sure the money PWSA is spending today is going to see its life cycle and what's constructed is not going to become deficient because of deferred maintenance is critical. Identifying the position/individual, how they fit within the organizational structure and how they're going to facilitate their role is critical to the water system. This role is the Apex of a team needed to support this individual and specific expertise across the full lifecycle of a project from design to construction oversight and inspection.

Given the inevitable expansion of the Wastewater's Groups workload as a result of Wet Weather Planning and on-going Consent Decree negotiations, PWSA will likely need an additional position to support the Senior Wastewater Group Manager.

Whether in Engineering or Operations, a position is needed to review and QA/QC incoming CCTV data to qualify and identify true urgent repairs then funnel them through the appropriate work order/contract mechanism for immediate or future repair.

With Wastewater, Stormwater and Water Systems needed improvements as outlined in this report and through Planned CIP expenditures resources needs will continue to expand over the next few years or even decades, a potential consideration to supplement PWSA Senior Management would be the reintroduction of a Program Management Team.

As a backup plan to fill resources voids in the meantime and/or the future is to continue to find and leverage embedded employees also looking to on-calls to fulfill certain project manager roles as has been done in the past.

2.5.4 SUPPLY CHAIN AND INFLATION IMPACTS

This past year PWSA has been impacted by supply chain issues and higher than anticipated inflation rates driving up the cost of goods and labor. PWSA's ability to acquire various materials, especially metal or plastics for items such as valves and piping, has proved quite challenging due to low supplies and resulting schedule impacts due to long delays. Unlike the past, contractors are presenting new challenges as suppliers are not guaranteeing their prices. Also, historically PWSA has not encountered the escalation clause in their contract documents being invoked or challenged; however, the script has flipped where almost all contractors are threatening to cease work until escalation is addressed. To further complicate things, PWSA is also working to minimize risk in their contract language to protect themselves against the potential scenario where prices start to drop. The PWSA is currently taking and should continue the following additional actions to help mitigate the issues:

- At the pre-bid meeting, communicate to potential bidders that early and increased communication during project execution is imperative. Clearly defining the intent and constraints of their escalation clause.
- If prices fluctuate and drop, provisions are in place to address a decrease in pricing such as via rebates.
- If PWSA is to let a large project out at the peak of the prices and suddenly all the costs start going down, have an escalation clause that goes both directions to avoid overpayment on a project that may span years.
- PWSA looked to other partner organizations such as PennDot for guidance. They also consulted Nationally recognized indices such as those published in Engineer News Record (ENR) magazine. PWSA had previously used the ENR index for multi-year surface restoration contracts.

It is recommended that PWSA review and potentially revise their specifications to transfer the burden on the contractor to prove escalation clause requirements. Less burden would be put on PWSA staff, and staff would be in a review role as opposed to developing the protocols, researching the indices, etc.

3.0 CAPITAL IMPROVEMENT PROGRAM PROJECTS

Sections 3.1, 3.2, and 3.3 are based on information in the PWSA fiscal years 2023-2027 Capital Improvement Plan, approved by the PWSA Board of Directors on October 28, 2022.

3.1 GENERAL

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

- Safety
- Regulatory Compliance
- Operational Flexibility
- Quality of Service
- Organizational Goals
- Social Impact

The PWSA, as with other utilities throughout the country, have seen impacts to their capital program due to supply chain issues and the labor shortage. Construction costs have significantly increased over the past couple of years, causing utilities to re-evaluate their capital program. This includes adjusting project costs, pushing out non-priority projects due to costs of priority projects, and extending project schedules to accommodate supply chain issues. The PWSA also explained that a winter moratorium on right-of-way construction work in the City and lengthy permit application review periods by regulatory agencies have also caused the Authority to adjust the timing of projects and have influenced its planning of 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 are Debt (Revenue Bonds), PENNVEST, WIFIA/PENNVEST, DSIC – Water, DSIC – Wastewater, ARPA, WIFIA, and Cash (Rates). **Figure 3.1** presents the annual allocation of the proposed CIP funding sources for FY 2023 through FY2027.

3.2.2 STORMWATER FEE

In April 2021, the PWSA submitted a request to the PUC to change how the PWSA bills for stormwater services. The stormwater fee was approved by the PUC in November 2021 and went into effect January 12, 2022 and will be phased-in over 2022 and 2023.

The new stormwater fee will provide an additional funding source and will assist the PWSA with implementing capital and operations projects, including stormwater management projects.

The implementation of the stormwater fee in 2022 raised many questions from PWSA's customer base, though it also served as an opportunity for PWSA to perform extensive outreach and education on stormwater issues within the PWSA service area and City boundary. This education will better inform and prepare PWSA customers for future conversations related to PWSA's system and associated Level of Service (LOS).

As the stormwater fee program evolves over the next year or two, it will lead the PWSA into master and strategic planning with a stormwater lens. Ultimately, future stormwater planning coupled with PWSA's wet weather planning and MS4 requirements will identify capital improvement projects and their estimated fee for implementation. How the projects get funded from the stormwater fee will be evaluated over time.

3.3 CURRENT CAPITAL IMPROVEMENT PLAN

Table 3.1 presents the fiscal years 2023 through 2027 CIP that was approved by the PWSA Board of Directors on October 28, 2022.

Table 3.1: PWSA 2023-2027 Capital Improvement Plan

| 2023 - 2027 CIP | | | | | | Total |
|---------------------------|----------------------|--------------------|--------------------|--------------------|--------------------|------------------------|
| | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | |
| Water Treatment Plant | 16,030,211 | 26,885,665 | 24,038,988 | 54,790,690 | 78,451,718 | 200,197,272 |
| Water Pumping and Storage | 55,304,597 | 115,127,475 | 121,491,637 | 113,245,473 | 30,009,851 | 435,179,033 |
| Water Distribution | 143,302,527 | 125,439,446 | 155,468,790 | 143,283,004 | 184,525,120 | 752,018,887 |
| Wastewater | 50,634,240 | 31,442,487 | 27,579,779 | 45,751,309 | 54,918,077 | 210,325,892 |
| Stormwater | 29,822,932 | 34,827,423 | 36,884,821 | 33,038,424 | 26,808,750 | 161,382,350 |
| Miscellaneous | 11,439,316 | 15,500,000 | 33,000,000 | 500,000 | 500,000 | 60,939,316 |
| | \$306,533,823 | 349,222,496 | 398,464,015 | 390,608,900 | 375,213,516 | \$1,820,042,750 |
| Debt (Revenue Bonds) | 122,335,310 | 150,214,517 | 203,743,270 | 236,469,077 | 316,179,204 | 1,028,941,377 |
| PENNVEST | 127,409,339 | 97,299,382 | 86,216,706 | 47,511,528 | 10,020,526 | 368,457,481 |
| WIFIA/PENNVEST | 35,113,456 | 89,843,438 | 98,036,402 | 98,113,624 | 40,456,543 | 361,563,462 |
| DSIC - Water | 6,028,526 | 6,058,669 | 6,088,962 | 6,119,407 | 6,150,004 | 30,445,568 |
| DSIC - Wastewater | 2,359,691 | 2,371,490 | 2,383,347 | 2,395,264 | 2,407,240 | 11,917,032 |
| ARPA | 10,582,757 | - | - | - | - | 10,582,757 |
| WIFIA | 2,540,345 | 3,310,501 | 1,995,327 | - | - | 7,846,173 |
| Cash (Rates) | 164,400 | 124,500 | - | - | - | 288,900 |
| Total | \$306,533,823 | 349,222,497 | 398,464,014 | 390,608,900 | 375,213,516 | \$1,820,042,750 |

Figure 3.1: PWSA FY 2023 to FY 2027 Proposed Funding Sources

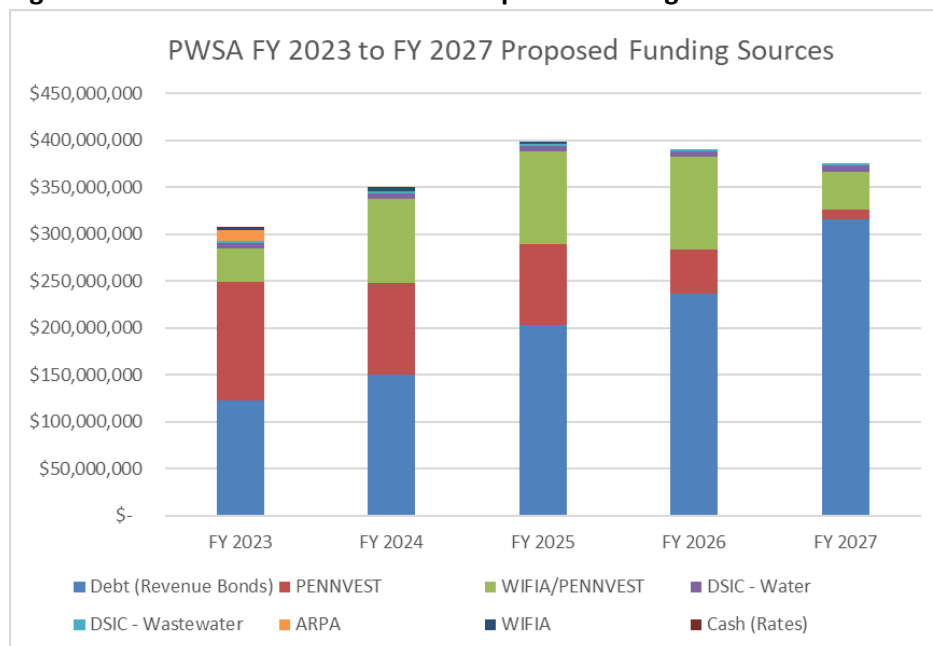


Figure 3.2 shows the annual projected capital budget by project class. The CIP is divided into six project classes: water treatment plant, water pumping and storage, water distribution, wastewater, stormwater, and miscellaneous. Figure 3.3 illustrates fiscal year 2023 capital budget by project class.

Figure 3.2: PWSA Annual Projected Capital Budgets by Project Class

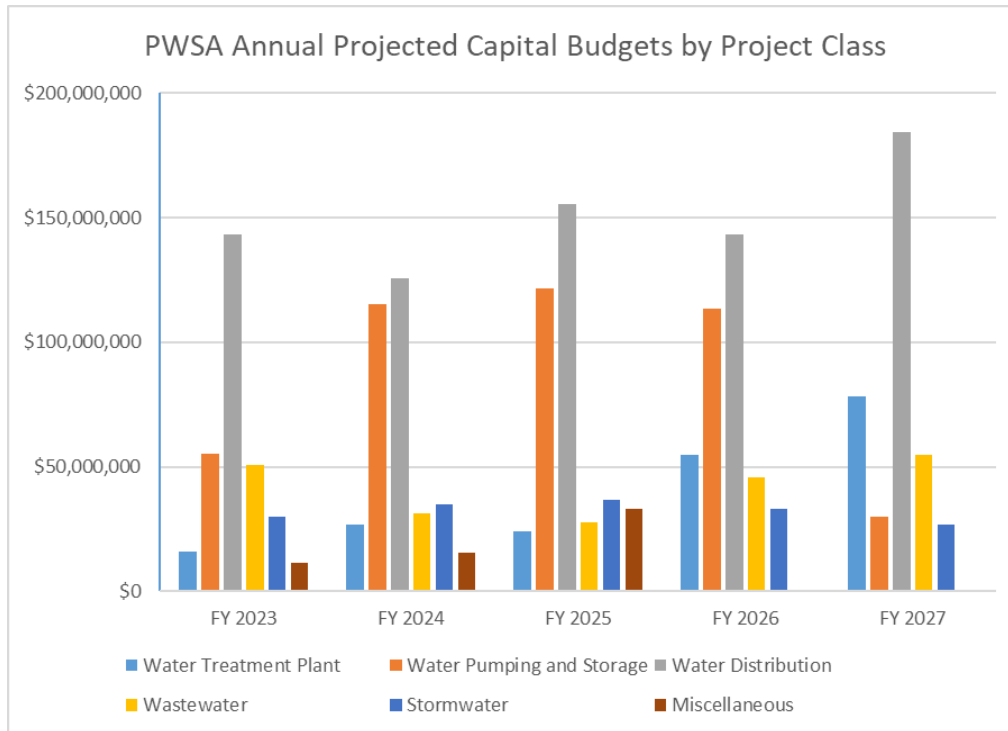


Figure 3.3: PWSA Fiscal Year 2023 Projected Capital Budgets by Project Class

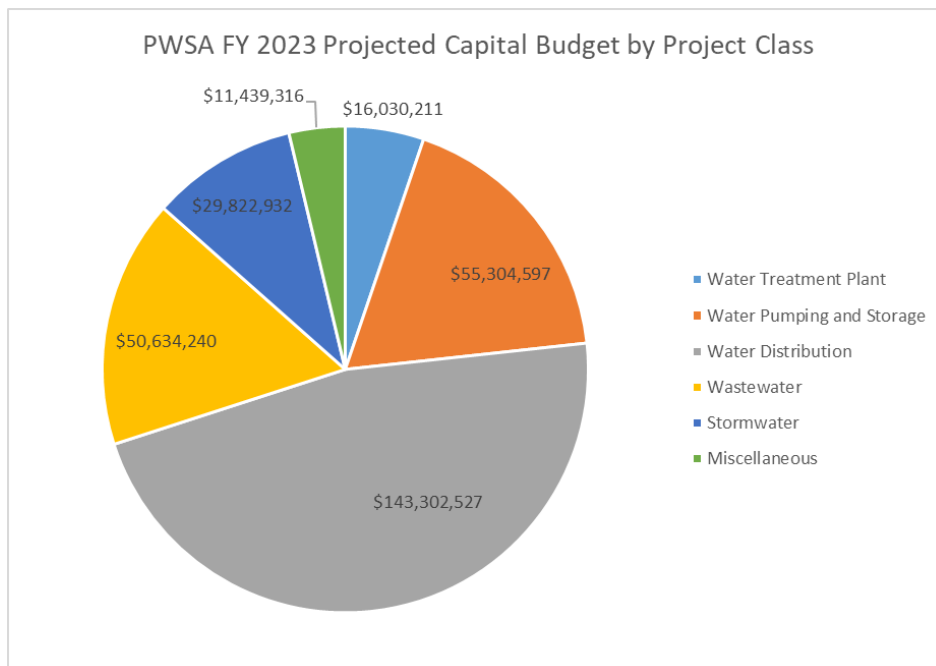


Figure 3.4 illustrates the annual water system capital budgets based upon project class. **Table 3.3, Table 3.4, and Table 3.5** summarize the water system capital budgets and the planned improvement projects for fiscal years 2023 through 2027, for water treatment plant, water pumping and storage, and water distribution system respectively. The CIP shows that 2024 through 2026 will be the peak years for water reliability plan projects.

Figure 3.4: PWSA Annual Projected Water System Capital Budgets

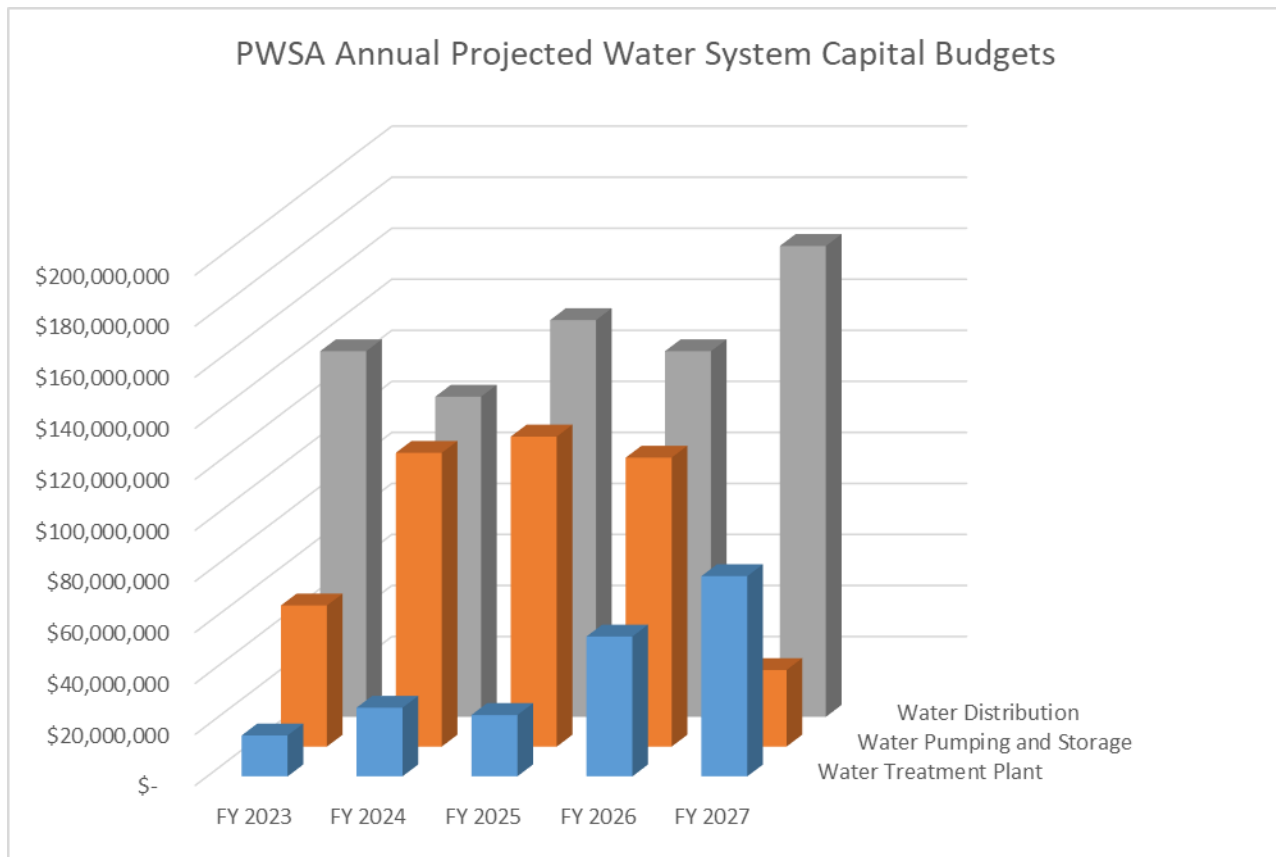


Table 3.2: Water Treatment Plant Improvements

| PWSA 2023-2027 Capital Improvement Program | Total 5-Year Commitment (Budget) | FY 2023 | FY 2024 | FY 2025- FY 2027 |
|--|----------------------------------|--------------|--------------|------------------|
| Algae Control for Open Basins | \$360,000.00 | \$360,000.00 | - | \$0.00 |
| Aspinwall Water Treatment Plant Electrical and Backup Power Improvements | \$24,623,823.00 | \$0.00 | \$866,981.00 | \$23,756,842.00 |
| Aspinwall Water Treatment Plant Filter Improvements | \$2,750,000.02 | \$123,706.90 | \$164,942.53 | \$2,461,350.59 |

| | | | | |
|--|-----------------|----------------|----------------|-----------------|
| Aspinwall Water Treatment Plant Filter Building Sodium Hypochlorite Improvements | \$3,222,924.72 | \$3,222,924.72 | \$0.00 | \$0.00 |
| Aspinwall Water Treatment Plant Raw Water Intakes - East Intake | \$2,373,000.00 | \$0.00 | \$465,000.00 | \$1,908,000.00 |
| Aspinwall Water Treatment Plant Raw Water Intakes - West Intake | \$16,709,210.53 | \$469,736.84 | \$1,127,368.42 | \$15,112,105.27 |
| Chemical Feed Modernization Project/Rapid Mix and Clarifier Improvements | \$42,399,965.45 | \$1,252,063.75 | \$2,789,028.23 | \$38,358,873.47 |
| Clearwell Emergency Response Project | \$26,202,067.73 | \$2,741,630.73 | \$7,408,660.00 | \$16,051,777.00 |
| Clearwell Improvements | \$23,664,938.19 | \$4,293,312.12 | \$2,448,008.62 | \$16,923,617.45 |
| Corrosion Control Chemical Storage & Feed Systems | \$50,000.00 | \$50,000.00 | \$0.00 | \$0.00 |
| Highland Park Membrane Filtration Plant Assessment and Critical Process Improvements | \$150,000.00 | \$150,000.00 | \$0.00 | \$0.00 |
| Highland Park Microfiltration Plant Improvements Project | \$14,128.00 | \$14,128.00 | \$0.00 | \$0.00 |
| Hydraulic Valve Replacement Program | \$3,250,000.02 | \$89,942.53 | \$302,298.85 | \$2,857,758.64 |
| Lime Slurry System Improvements | \$5,487,226.00 | \$756,079.00 | \$3,548,360.00 | \$1,182,787.00 |
| Overhead Crane Modernization | \$815,000.00 | \$0.00 | \$375,000.00 | \$440,000.00 |
| Phase 1 Sedimentation Basin Rehabilitation and Water Treatment Plant Gate Valve and 84-inch Coupling Project | \$5,000,000.03 | \$224,921.63 | \$299,895.51 | \$4,475,182.89 |
| Phase 2 Sedimentation Basin Rehabilitation Project | \$1,312,042.85 | \$0.00 | \$0.00 | \$1,312,042.85 |
| Post-Filter Chemical System Improvements | \$1,417,006.28 | \$0.00 | \$0.00 | \$1,417,006.28 |
| Powdered Activated Carbon System Improvements | \$40,588.77 | \$40,588.77 | \$0.00 | \$0.00 |
| Ross Pump Station | \$18,280,386.21 | \$0.00 | \$1,249,655.17 | \$17,030,731.04 |
| Sludge Chamber Pump Project | \$1,256,065.41 | \$386,721.63 | \$869,343.78 | \$0.00 |

| | | | | |
|---|-------------------------|------------------------|------------------------|-------------------------|
| Water Treatment Plant Filter Backwash System Improvements | \$13,500,000.00 | \$740,054.00 | \$883,290.00 | \$11,876,656.00 |
| Water Treatment Plant Filter Building Roof | \$3,500,000.00 | \$0.00 | \$3,500,000.00 | \$0.00 |
| Water Treatment Plant HVAC Improvements | \$1,379,999.00 | \$0.00 | \$163,333.00 | \$1,216,666.00 |
| Water Treatment Plant NPDES Permit Autosamplers and Flow Meters | \$288,900.00 | \$164,400.00 | \$124,500.00 | \$0.00 |
| Water Treatment Plant Rail Siding Improvements | \$2,000,000.00 | \$800,000.00 | \$300,000.00 | \$900,000.00 |
| WTP Sodium Hypochlorite Tank Emergency Replacement | \$150,000.00 | \$150,000.00 | \$0.00 | \$0.00 |
| Water Treatment Plant Contingency | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| TOTAL WATER TREATMENT PLANT | \$200,197,272.21 | \$16,030,210.62 | \$26,885,665.11 | \$157,281,396.48 |

Table 3.3: Water Pumping and Storage Improvements

| PWSA 2023-2027 Capital Improvement Program | Total 5-Year Commitment (Budget) | FY 2023 | FY 2024 | FY 2025- FY 2027 |
|--|----------------------------------|----------------|-----------------|------------------|
| Aspinwall Pump Station Improvements | \$52,919,545.37 | \$4,748,965.78 | \$15,197,171.56 | \$32,973,408.03 |
| Aspinwall Pump Station to Lanpher Reservoir Rising Main | \$135,209,893.42 | \$2,147,166.98 | \$29,622,031.14 | \$103,440,695.30 |
| Aspinwall WTP Chemical Unloading Area Improvements, Underground Storage Tank Removal & Replacement | \$1,352,161.22 | \$1,352,161.22 | \$0.00 | \$0.00 |
| Bruecken Pump Station Concealed Gutters | \$175,000.00 | \$0.00 | \$175,000.00 | \$0.00 |
| Bruecken Pump Station Improvements | \$106,861,250.00 | \$8,653,054.00 | \$30,991,126.00 | \$67,217,070.00 |
| Chlorine Booster Station Improvements | \$14,338,928.16 | \$311,268.79 | \$6,436,147.83 | \$7,591,511.54 |
| Disinfection By-Products Mitigation | \$6,609,876.38 | \$5,183,170.61 | \$1,426,705.77 | \$0.00 |
| Garfield Tank Improvements | \$2,926,940.00 | \$0.00 | \$122,198.00 | \$2,804,742.00 |
| Herron Hill Pump Station Improvements | \$14,000,000.09 | \$409,195.41 | \$818,390.81 | \$12,772,413.87 |
| Herron Hill Reservoir Improvements | \$198,631.00 | \$198,631.00 | \$0.00 | \$0.00 |

| | | | | |
|---|-------------------------|------------------------|-------------------------|-------------------------|
| Herron Hill Reservoir Improvements - Sodium Hypochlorite Building | \$828,429.11 | \$828,429.11 | \$0.00 | \$0.00 |
| Herron Hill Tank Pump Station Improvements | \$3,000,000.02 | \$0.00 | \$164,077.30 | \$2,835,922.72 |
| Highland 1 Reservoir Liner | \$704,981.00 | \$0.00 | \$0.00 | \$704,981.00 |
| Highland No. 2 Reservoir Liner and Cover Replacements | \$12,709,686.07 | \$2,122,235.00 | \$6,515,354.50 | \$4,072,096.57 |
| Highland Reservoir Pump Station and Rising Main | \$47,309,842.10 | \$23,789,287.16 | \$14,537,145.09 | \$8,983,409.85 |
| Howard Pump Station Improvements | \$2,426,564.51 | \$0.00 | \$0.00 | \$2,426,564.51 |
| Inline Pump Station (Coral and Pacific) Improvements | \$600,000.00 | \$0.00 | \$32,979.66 | \$567,020.34 |
| Lanpher Reservoir Improvements | \$12,865,313.19 | \$2,778,963.09 | \$6,370,326.38 | \$3,716,023.72 |
| Lincoln Pump Station Improvements | \$5,000,000.03 | \$288,633.46 | \$288,633.46 | \$4,422,733.11 |
| Lincoln Pump Station: Bypass Pump Station Project | \$4,320,171.00 | \$2,155,907.00 | \$2,164,264.00 | \$0.00 |
| Lincoln Tank Improvements | \$4,221,788.02 | \$337,528.74 | \$203,588.76 | \$3,680,670.52 |
| Mission Pump Station Improvements | \$2,426,565.00 | \$0.00 | \$0.00 | \$2,426,565.00 |
| Pump Station Architectural | \$2,500,000.00 | \$0.00 | \$0.00 | \$2,500,000.00 |
| Saline Pump Station Improvements | \$481,055.00 | \$0.00 | \$0.00 | \$481,055.00 |
| Spring Hill Tank Improvements | \$1,192,412.00 | \$0.00 | \$62,335.00 | \$1,130,077.00 |
| Water Pumping and Storage Contingency | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| TOTAL WATER PUMPING AND STORAGE | \$435,179,032.71 | \$55,304,597.34 | \$115,127,475.27 | \$264,746,960.10 |

Table 3.4: Water Distribution System Improvements

| PWSA 2023-2027 Capital Improvement Program | Total 5-Year Commitment (Budget) | FY 2023 | FY 2024 | FY 2025- FY 2027 |
|---|----------------------------------|-----------------|----------------|------------------|
| 2019 Large Diameter Water Main Improvements - Rising Main 3/4 | \$3,302,912.04 | \$3,062,142.13 | \$240,769.90 | \$0.00 |
| 2019 Large Diameter Water Main Improvements - Rising Main 4 | \$16,705,767.00 | \$12,529,326.00 | \$4,176,441.00 | \$0.00 |
| Bus Rapid Transit Water Distribution | \$1,500,000.00 | \$1,500,000.00 | \$0.00 | \$0.00 |
| District Metering Program | \$9,360,000.06 | \$0.00 | \$0.00 | \$9,360,000.06 |
| Hazelwood Backup Feed (formerly Duck Hollow Main Replacement) | \$3,000,270.02 | \$175,156.10 | \$175,156.10 | \$2,649,957.82 |

| | | | | |
|--|-------------------------|-------------------------|-------------------------|-------------------------|
| Herron Hill - Squirrel Hill Boundary Adjustments | \$1,044,000.00 | \$0.00 | \$0.00 | \$1,044,000.00 |
| Interconnection Vault Stormwater Removal | \$2,290,249.34 | \$453,007.96 | \$1,225,931.03 | \$611,310.35 |
| Intermediate Diameter Water Main Replacement Program | \$49,867,250.52 | \$0.00 | \$0.00 | \$49,867,250.52 |
| Intermediate Meter Replacement Program | \$487,923.08 | \$143,076.92 | \$84,307.69 | \$260,538.47 |
| Large Diameter Water Main Replacement Program | \$102,461,919.89 | \$2,980,665.80 | \$4,820,095.96 | \$94,661,158.13 |
| Large Meter Replacement Program | \$4,140,272.71 | \$1,557,508.32 | \$1,341,456.69 | \$1,241,307.70 |
| Low Pressure Area Remediation | \$1,696,441.49 | \$0.00 | \$0.00 | \$1,696,441.49 |
| Neighborhood Lead Service Line Replacement Program | \$124,752,757.48 | \$13,582,757.48 | \$27,792,500.00 | \$83,377,500.00 |
| North Side Boundary Adjustments | \$1,566,000.00 | \$0.00 | \$0.00 | \$1,566,000.00 |
| Priority LSLR | \$3,000,000.00 | \$3,000,000.00 | \$0.00 | \$0.00 |
| Private Lead Service Line Reimbursement | \$400,000.00 | \$400,000.00 | \$0.00 | \$0.00 |
| Regulator Valve and Vault Replacement Program | \$13,276,854.01 | \$378,494.08 | \$1,839,360.70 | \$11,058,999.23 |
| Small Diameter Water Main Replacement Program | \$359,552,304.75 | \$83,515,128.68 | \$75,057,893.92 | \$200,979,282.15 |
| Small Meter Replacement Program | \$4,096,697.15 | \$1,723,171.54 | \$1,351,089.38 | \$1,022,436.23 |
| South Side Slopes Boundary Adjustments | \$1,566,000.00 | \$0.00 | \$0.00 | \$1,566,000.00 |
| Unmetered and Flat Rate Properties | \$962,500.00 | \$327,250.00 | \$635,250.00 | \$0.00 |
| Urgent Lead Service Line Replacement | \$8,035,361.70 | \$1,778,653.60 | \$1,749,194.10 | \$4,507,514.00 |
| Valve Replacement Program | \$13,705,485.32 | \$2,505,485.32 | \$2,800,000.00 | \$8,400,000.00 |
| Water and Wastewater Safety and Security Improvements | \$1,567,547.00 | \$1,567,547.00 | \$0.00 | \$0.00 |
| Water and Wastewater Safety and Security Improvements (Pennvest) | \$9,978,156.00 | \$9,978,156.00 | \$0.00 | \$0.00 |
| Water Relay Program | \$13,702,217.50 | \$2,145,000.00 | \$2,150,000.00 | \$9,407,217.50 |
| Water Distribution Contingency | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| TOTAL WATER DISTRIBUTION SYSTEM | \$752,018,887.06 | \$143,302,526.93 | \$125,439,446.48 | \$483,276,913.65 |

Figure 3.5 illustrates the annual wastewater system capital budgets. **Table 3.5** outlines the wastewater system capital budgets and the planned projects for fiscal years 2023 through 2027.

Figure 3.5: PWSA Annual Projected Wastewater System Capital Budgets

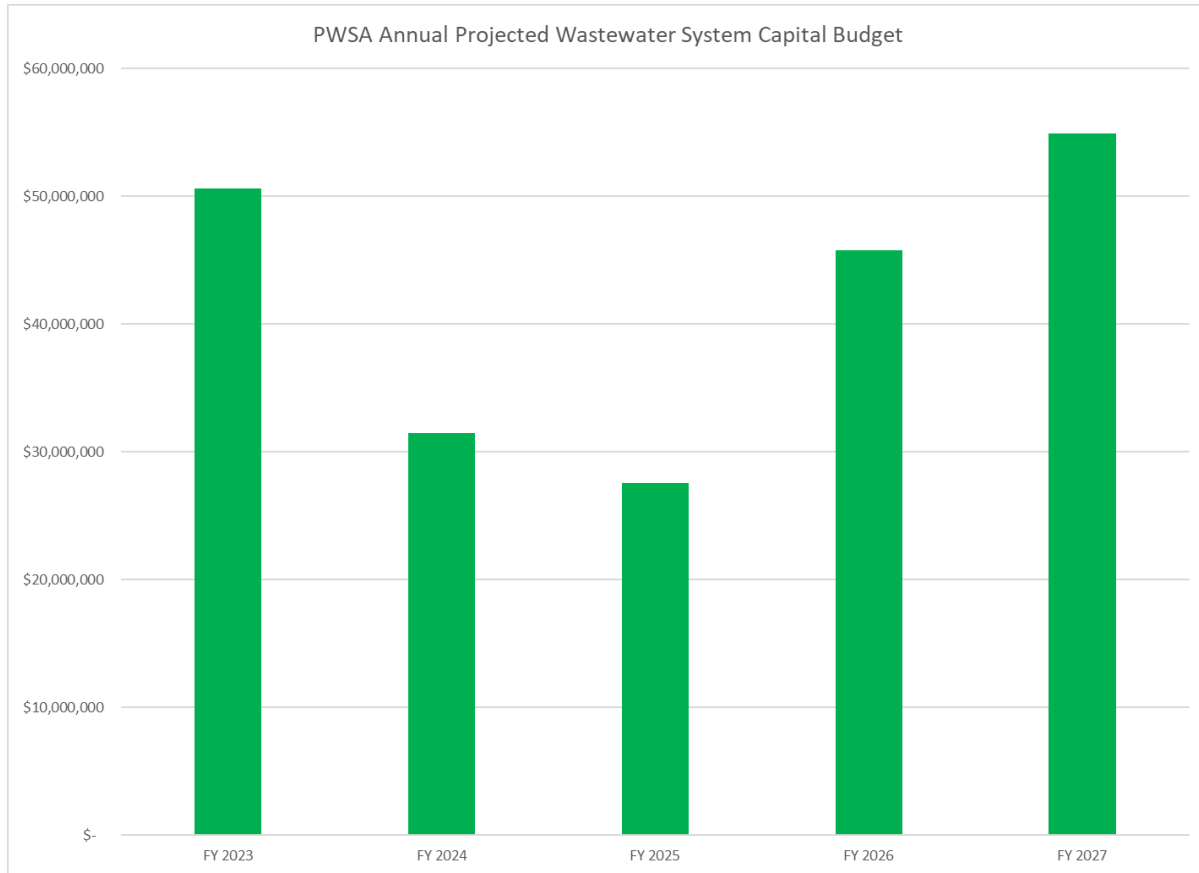


Table 3.5: Wastewater System Improvements

| PWSA 2023-2027 Capital Improvement Program | Total 5-Year Commitment (Budget) | FY 2023 | FY 2024 | FY 2025- FY 2027 |
|--|----------------------------------|-----------------|----------------|------------------|
| 31st Ward Pump Station and Appurtenances - Phase 2 | \$17,192,666.33 | \$958,333.00 | \$726,666.67 | \$15,507,666.66 |
| 6122 and 6150 Mifflin Road Demolition | \$50,000.00 | \$50,000.00 | \$0.00 | \$0.00 |
| Browns Hill Road Sewer Pump Station Replacement | \$3,920,000.00 | \$432,000.00 | \$1,608,000.00 | \$1,880,000.00 |
| Large Diameter Sewer Rehabilitation Program | \$29,891,724.46 | \$12,774,486.37 | \$2,997,238.10 | \$14,119,999.99 |
| M-29 Outfall Improvements | \$250,000.00 | \$250,000.00 | \$0.00 | \$0.00 |
| Maytide Storm and Sanitary Sewer System Improvements | \$6,102,308.95 | \$118,026.95 | \$4,026,497.00 | \$1,957,785.00 |

| | | | | |
|---|-------------------------|------------------------|------------------------|-------------------------|
| Queenston Sewer Improvements | \$2,453,753.00 | \$2,210,550.00 | \$243,203.00 | \$0.00 |
| Sewer Reconstruction Program | \$10,899,557.00 | \$2,691,769.00 | \$1,810,000.00 | \$6,397,788.00 |
| Sewers Under Structures Program | \$18,499,313.62 | \$6,786,029.94 | \$2,373,663.24 | \$9,339,620.44 |
| Small Diameter Sewer Rehabilitation Program | \$121,066,568.79 | \$24,363,045.00 | \$17,657,219.00 | \$79,046,304.79 |
| Wastewater Contingency | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| TOTAL WASTEWATER SYSTEM | \$210,325,892.16 | \$50,634,240.26 | \$31,442,487.00 | \$128,249,164.90 |

Figure 3.6 illustrates the annual stormwater system capital budgets. Table 3.6 outlines the stormwater system capital budgets and the planned projects for fiscal years 2023 through 2027.

Figure 3.6: PWSA Annual Projected Stormwater System Capital Budgets

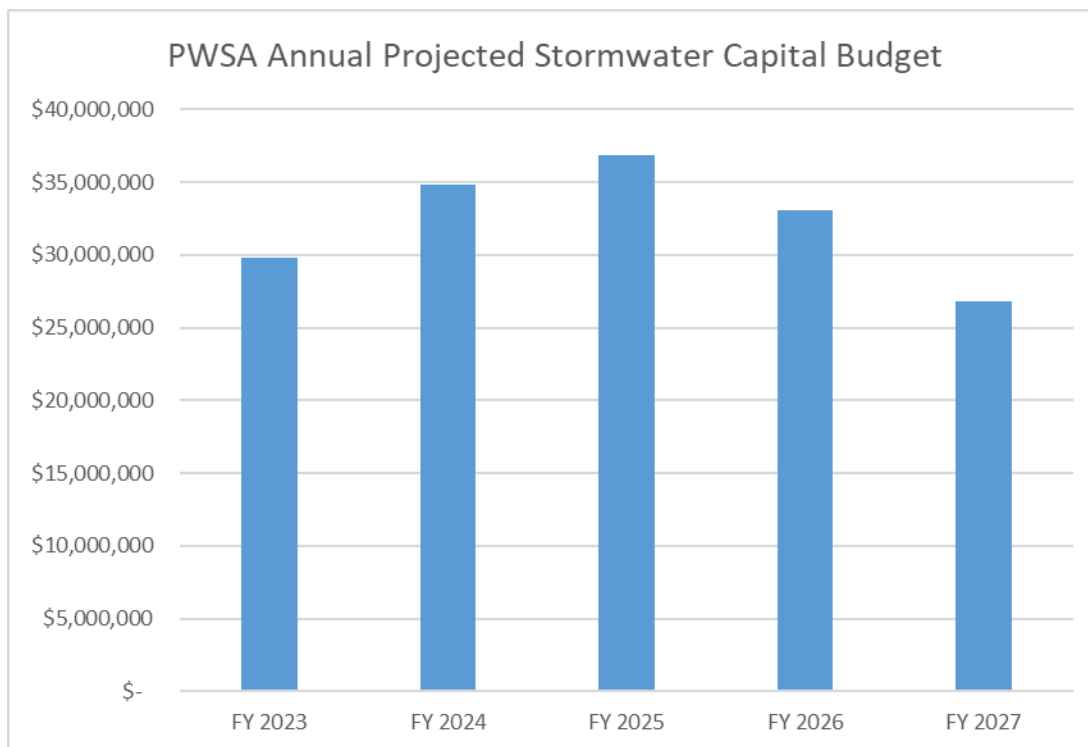


Table 3.6: Stormwater System Improvements

| PWSA 2023-2027 Capital Improvement Program | Total 5-Year Commitment (Budget) | FY 2023 | FY 2024 | FY 2025- FY 2027 |
|--|----------------------------------|--------------|--------------|------------------|
| Braywood Stormwater Improvements | \$874,000.00 | \$434,625.00 | \$439,375.00 | \$0.00 |
| Bus Rapid Transit Phase 2 | \$1,500,000.00 | \$0.00 | \$500,000.00 | \$1,000,000.00 |

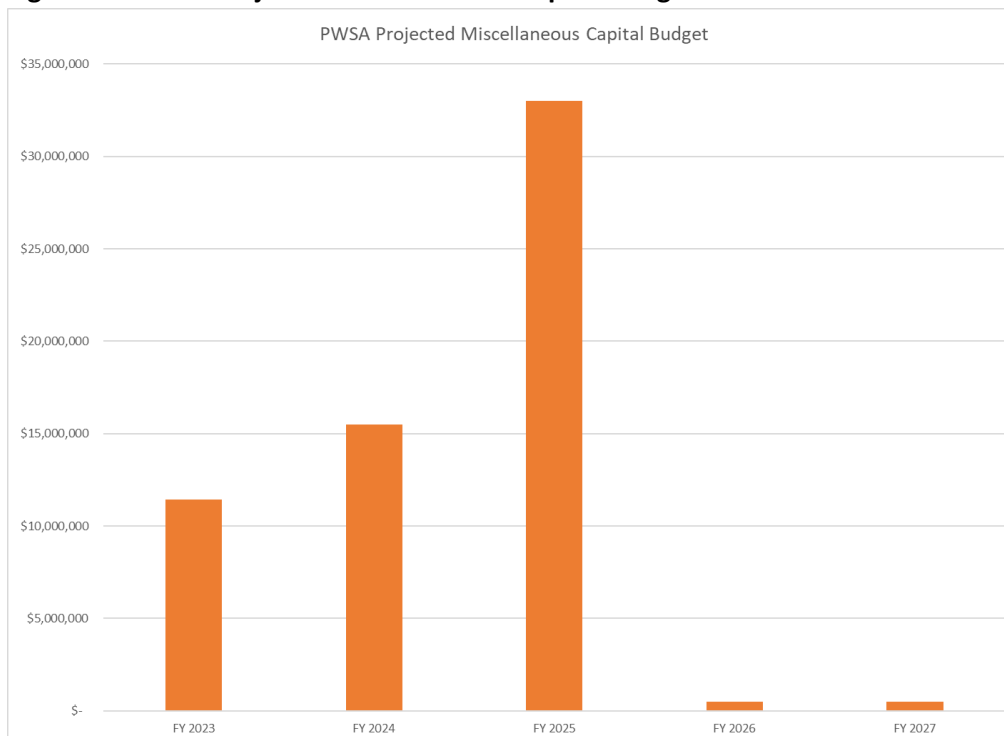
| | | | | |
|---|-------------------------|------------------------|------------------------|------------------------|
| Bus Rapid Transit Stormwater Infrastructure Improvements | \$1,560,654.15 | \$71,382.00 | \$785,634.29 | \$703,637.86 |
| Catch Basin and Inlet Replacement Program | \$72,159,259.67 | \$11,539,876.64 | \$16,007,303.03 | \$44,612,080.00 |
| Dragoon Way Stormwater Improvements | \$1,078,625.00 | \$983,000.00 | \$95,625.00 | \$0.00 |
| Fleury Way Stormwater Infrastructure Improvements | \$476,212.00 | \$476,212.00 | \$0.00 | \$0.00 |
| Four Mile Run Stormwater Infrastructure Improvements | \$20,040,792.00 | \$645,557.00 | \$4,500,108.00 | \$14,895,127.00 |
| Haverhill Street Improvements Project | \$1,108,400.00 | \$1,003,900.00 | \$104,500.00 | \$0.00 |
| Lawn and Ophelia | \$203,741.00 | \$203,741.00 | \$0.00 | \$0.00 |
| Martin Luther King Field Stormwater Infrastructure Improvements | \$4,420,975.00 | \$3,096,867.00 | \$1,324,108.00 | \$0.00 |
| Maryland Avenue Stormwater Infrastructure Improvements | \$6,925.00 | \$6,925.00 | \$0.00 | \$0.00 |
| MS4 Permit PRP Plan Sediment Reduction Project | \$1,085,500.00 | \$173,000.00 | \$605,000.00 | \$307,500.00 |
| Saw Mill Run Municipal Separate Storm Sewer System Compliance | \$3,500,000.00 | \$0.00 | \$0.00 | \$3,500,000.00 |
| Saw Mill Run Watershed Improvements | \$1,000,000.00 | \$850,000.00 | \$150,000.00 | \$0.00 |
| Southside Flats Sewer Separation | \$5,560,116.00 | \$3,327,529.00 | \$2,232,587.00 | \$0.00 |
| Southside Stormwater Infrastructure Improvements | \$4,732,807.00 | \$2,029,140.00 | \$2,703,667.00 | \$0.00 |
| Stewart Avenue Stormwater Infrastructure Project | \$3,809,833.00 | \$1,400,000.00 | \$1,515,389.00 | \$894,444.00 |
| Thomas and McPherson Stormwater Infrastructure Improvements | \$854,905.13 | \$854,905.13 | \$0.00 | \$0.00 |
| Volunteer's Field Stormwater Infrastructure Improvements | \$413,125.42 | \$413,125.42 | \$0.00 | \$0.00 |
| Wet Weather Program Projects | \$33,000,000.00 | \$500,000.00 | \$2,500,000.00 | \$30,000,000.00 |
| Wightman Park Phase 2 Project | \$182,166.00 | \$182,166.00 | \$0.00 | \$0.00 |
| Woodland Road Stormwater Infrastructure Improvements | \$245,256.31 | \$245,256.31 | \$0.00 | \$0.00 |
| Woods Run Stream Removal Stormwater Infrastructure Improvements | \$3,569,057.66 | \$1,385,724.66 | \$1,364,127.00 | \$819,206.00 |
| Stormwater Contingency | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| TOTAL STORMWATER SYSTEM | \$161,382,350.34 | \$29,822,932.16 | \$34,827,423.32 | \$96,731,994.86 |

Miscellaneous costs have increased significantly in 2023 due to \$8.64 M capital project reclassification in 2023. The reclassification will reclassify operating costs related to urgent water replacements, urgent sewer replacements and manhole point repairs to increase PWSA operating flexibility and reliability. Additionally, increased miscellaneous cost in 2023-2027 budget is also attributed to PWSA's plans to build a new headquarters location that would also house and include space for the operations division with an estimated total cost of \$50 million.

Table 3.7 Miscellaneous CIP table

| PWSA 2023-2027 Capital Improvement Program | Total 5-Year Commitment (Budget) | FY 2023 | FY 2024 | FY 2025- FY 2027 |
|---|---|------------------------|------------------------|-------------------------|
| 2023 Capital Project Reclassification | \$8,639,316.00 | \$8,639,316.00 | \$0.00 | \$0.00 |
| New Headquarters and Operations Facility | \$50,000,000.00 | \$2,500,000.00 | \$15,000,000.00 | \$32,500,000.00 |
| Utility Cost Shares | \$2,300,000.00 | \$300,000.00 | \$500,000.00 | \$1,500,000.00 |
| Miscellaneous Contingency | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| TOTAL MISCELLANEOUS | \$60,939,316.00 | \$11,439,316.00 | \$15,500,000.00 | \$34,000,000.00 |

Figure 3.7 PWSA Projected Miscellaneous Capital Budget



In comparing the historic capital expenditures to the proposed, the proposed annual CIP for FY2023 is more than double the actual FY2021 (\$130M compared to \$306M)

4.0 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'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. The PUC approved the request in November 2021 and went into effect on January 12, 2022. The rate increase and stormwater fee will be phased-in over 2022 and 2023.

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 LTIIIP

The PWSA submitted their LTIIIP to the Commission on September 28, 2018. An update to the LTIIIP was finalized in August and September 2019 after consideration of input from interested parties and stakeholders. The Authority's LTIIIP for water and wastewater was approved by the PUC on August 27, 2020. The PWSA filed a revised LTIIIP with the PUC in October 2022 for the purpose of providing updated budget information for projects included within the plan. The revised LTIIIP is pending final approval while under review by the PUC.

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 Authority'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, June 18, 2020 and February 14, 2021. The Orders resolved a significant number of issues in the proceeding by approving a partial settlement.

Compliance Plan Stage 2 was initiated on January 24, 2020 to address stormwater and customer service issues. Regarding stormwater, the PUC approved the Authority's Stormwater Tariff on November 18, 2021 and a full settlement of the Stage 2 Compliance Plan - Stormwater on August 25, 2022. Regarding customer service issues, the PUC approved a full settlement of the Stage 2 Compliance Plan – Customer Service on July 14, 2022. The Authority filed an updated Compliance Plan and proposed Compliance Tariffs on September 12,

2022 regarding customer service issues. Similar filings regarding Stormwater are to be filed on November 4, 2022.

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.

5.0 CONCLUSIONS

In 2022, PWSA continued to make progress on being a more compliant, sustainable and reliable utility. Areas that specifically shows their commitment to this effort are:

- Developed a CIP to address requirements of the water treatment and distribution system Consent Orders, and improve the water, sewer, and stormwater systems.
- Moved forward with the Water Reliability Plan
- Broadened the Executive Leadership Team and added employees to the Environmental Compliance and Safety groups.
- Continue to strategically increase the number of staff.
- Started to implement some industry best practices to track and improve the maintenance and operation of their system.
- Improved compliance with regulations and Orders regarding abatement of lead, system resiliency, and overall water treatment and quality.
- Continuing 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.
- Successfully developed and obtained Board approval for an aggressive PWSA 2023 – 2027 Capital Improvement Plan.

Review of both the FY 2023-2027 capital program and proposed 2023 draft operational budget reflect significant increases from the previous year. Some of this increase can be attributed to increase cost for services and supplies and materials due to supply chain issues and inflation. Additionally it should be noted that while almost 58% of the current 5 year CIP in wastewater is devoted to the small diameter rehabilitation program, it is anticipated that once the consent order is negotiated, the wastewater CIP will significantly increase. With all this said, while PWSA has made concerted effort to obtain and secure capital funding to invest in their infrastructure, they need to ensure that they have sufficient staff and resources to execute their capital program otherwise those efforts are futile.

Based upon our review PWSA financial commitment both in the past couple years and for the future shown in the recent Board approved CIP for 2023- 2027, along with continued organizational and operational improvements, it is apparent PWSA is committed to investing in upgrading their infrastructure and becoming a well-run utility. Through interviews with key staff it is evident PWSA is starting to implement some industry best practices such as focused regulatory compliance and safety program, tracking and addressing non-revenue water and water valve exercising and replacement program. Though some of these initiatives are in their infancy they already have made an impact. Therefore in summary, it is the Consulting Engineer's opinion that PWSA is managing their organization, water and sewer and stormwater systems and committing the financial resources to continue to move the utility forward towards maintaining a regulatory compliant organization that provides reliable service to their customers.

6.0 ACKNOWLEDGEMENTS

ms consultants 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, Barry King, Ed Barca, Kevin Pawlos, Timothy DiSalvo, Kate Mechler, Sarah Bolenbaugh, Toby Stutzman, Tony Igwe, Dan Duffy, Frank Sidari, B.J. McFaddin, and Kasey Stewart, for participating in our staff interviews and providing sharing valuable insights to aid us during the preparation of this 2022 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 ISSUE AND REFUNDING (1984-2020)

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 2020. Present funding mechanisms 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.

B.11 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.

B.12 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.

B.13 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.