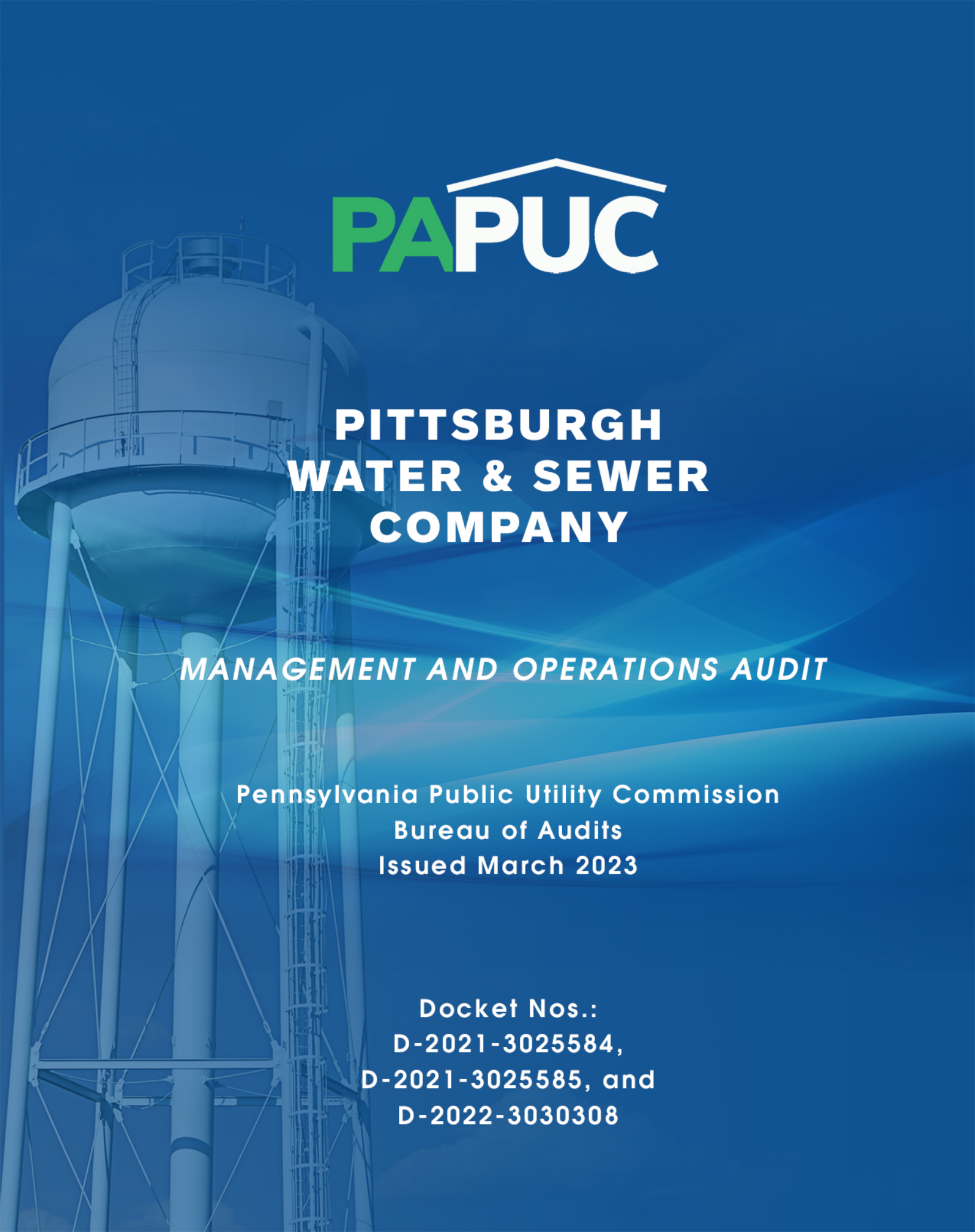

PITTSBURGH WATER & SEWER COMPANY

MANAGEMENT AND OPERATIONS AUDIT

Pennsylvania Public Utility Commission
Bureau of Audits
Issued March 2023

Docket Nos.:
D-2021-3025584,
D-2021-3025585, and
D-2022-3030308

MANAGEMENT AND OPERATIONS AUDIT

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I. INTRODUCTION

Pennsylvania law grants the Pennsylvania Public Utility Commission (PUC or Commission) the general administrative power and authority to supervise and regulate public utilities within the Commonwealth of Pennsylvania per 66 Pa. C.S. § 501(b). Management and Operational Audits are required of certain Pennsylvania-based utility companies pursuant to 66 Pa. C.S. § 516(a). Specifically, the Commission can investigate and examine the condition and management of any public utility pursuant 66 Pa. C.S. § 331(a). In accordance with the PUC's ongoing program to identify improvements in the management and operations of fixed utilities under its jurisdiction, it was determined that a Management and Operations Audit should be conducted of the Pittsburgh Water & Sewer Authority (PWSA).

This report summarizes the work of the PUC's Management Audit Division and outlines its conclusions. The findings presented in the report identify areas and aspects where weaknesses or deficiencies exist. In all cases, recommendations are offered to improve, correct, or eliminate these conditions. The final and most important step is for the company to initiate actions toward implementation of the recommendations.

A. Objectives and Scope

The objectives of this Management and Operations Audit were to:

- Provide the Commission, the PWSA, and the public with an assessment of the efficiency and effectiveness of the company's operations, management methods, organization, practices, and procedures

- Identify opportunities for improvement and develop recommendations to address those opportunities

- Provide an information base for future regulatory and other inquiries into the PWSA's management and operations

The scope of this audit was limited to certain functional areas within the PWSA as explained in section B. Audit Approach.

B. Audit Approach

The Management and Operations Audit was performed by the Management Audit Division of the PUC's Bureau of Audits (auditors). The process began with a pre-fieldwork analysis as outlined below:

- A four-year internal trend (2018 – 2021) and ratio analysis was completed using financial and operational data obtained from the PWSA, the Commission, and other available sources

- Input was solicited from PUC bureaus and offices, external parties, and the PWSA regarding any concerns or issues they would like addressed during our review

- Prior Commission conducted audits, annual diversity reports, and other available documents were reviewed

This information was used to focus the auditors' work efforts. Specifically, these listed functional areas were selected for in-depth analysis and are included in this report:

- Executive Management and Organizational Structure
- Corporate Governance
- Financial Management
- Operations
  - Water System
  - Wastewater System
  - Stormwater System
  - Engineering and Construction
- Emergency Preparedness
- Purchasing and Materials Management
- Customer Service
- Information Technology
- Fleet Management
- Human Resources and Diversity

The pre-fieldwork analysis should not be construed as a comprehensive evaluation of the management or operations in the functional areas not selected for in-depth examination. Had we conducted a thorough review of those areas, weaknesses or deficiencies may have come to our attention that were not identified in the limited pre-fieldwork review.

Fieldwork began on November 1, 2021 and continued through May 11, 2022. The principal components of the fact gathering process included:

- Interviews with the PWSA's personnel as well as personnel of the Commission's various bureaus

- Analysis of records, documents, and reports of a financial and operational nature focused primarily on the period 2018 – 2021, and the year 2022, as was available

- Visits to select company facilities and observation of several work practices

C. Functional Area Ratings

For the functional areas selected for in-depth examination, the auditors rated the operating or performance level relative to the expected performance level at the time of the audit. This expected performance level is the state at which each functional area should be operating given the company's resources and general operating environment. Expected performance is not a "cutting edge" operating condition; rather, it is management of a functional area such that it produces reasonably expected operating results.

Listed below are the evaluative categories used to rate the operating or performance level of each functional area examined:

- Meets Expected Performance Level
- Minor Improvement Necessary
- Moderate Improvement Necessary
- Significant Improvement Necessary
- Major Improvement Necessary

Our ratings for each examined functional area can be found in Exhibit I-1 on the next page.

Exhibit I-1
Pittsburgh Water & Sewer Authority
Functional Area Rating Summary

Functional Area	Meets Expected Performance Level	Minor Improvement Necessary	Moderate Improvement Necessary	Significant Improvement Necessary	Major Improvement Necessary
Executive Management and Organizational Structure			X		
Corporate Governance		X			
Financial Management				X	
Operations				X	
Emergency Preparedness			X		
Purchasing and Materials Management				X	
Customer Service			X		
Information Technology				X	
Fleet Management		X			
Human Resources and Diversity		X			

D. Benefits

Wherever possible, the auditors estimated the potential savings anticipated from implementing the recommendations made in this report. The audit report details potential annual cost savings of $18.6 – $21.2 million. We tried to identify, whenever practical, the potential savings, net of the projected costs, for implementation. Some of these savings could be an actual reduction in costs, avoided costs, or increased revenues; whereas others, would result in better deployment and/or use of existing resources. These quantifications require some judgment and may require efforts beyond the scope of the audit for further refinement; therefore, actual benefits from effective implementation of the recommendations are subject to uncertainty and could be higher or lower than estimated. An overall summary of the annual and one-time costs savings quantified in the audit report are shown in Exhibit I-2.

Exhibit I-2
Pittsburgh Water & Sewer Authority
Quantifiable Savings Summary

Recommendation	Annual Savings	One-Time Savings
Petition the City and ALCOSAN to renegotiate the ALCOSAN billing servicing agreement with the PWSA to include equitable criteria for handling the uncollectable portion of the PWSA's billings that are on behalf of ALCOSAN. If negotiations are unsuccessful, consider legal action to require ALCOSAN to bill customers directly. (III – 4)	$1,785,000	
Payoff and/or refinance higher interest variable and fixed rate debt with proceeds from grants or more favorably priced loans. (V – 1)	$12,046,350	
Track actual billing service costs incurred to bill customers on ALCOSAN's behalf to work toward charging ALCOSAN the higher of cost or market for these services through servicing agreement renegotiations. (V – 3)	$907,000	
Follow 52 Pa. Code § 56.331 when initiating the service termination process to balance sufficient customer notification with timely collection of past due customer billings further streamlined by enabling the automation process available to the PWSA through its customer information system. (V – 4)	$94,000	
Expedite the installation of new flow meters at strategic locations and/or rehabilitate existing flow meters as needed to gain basic insight into areas contributing to excessive water loss that require replacement to maximize treated water retention. (VI – 2)	$3,800,000 – $6,400,000	
Totals	**$18,632,350 – $21,232,350**	**---**

NOTE: The references in parenthesis indicate the chapter number followed by the recommendation number

For most recommendations, it was impractical to estimate quantitative benefits as the benefits are of a qualitative nature or insufficient data was available to quantify the impact. For example, it is difficult to estimate the actual benefit where new management practices or procedures are recommended where such did not previously exist nor was not fully functional. Similarly, changes in workflow or implementation of good business practices could result in improved efficiency and effectiveness of a function but cannot be easily quantified.

The PWSA will have options to implement the recommendations and, as a result, the auditors have not estimated the cost of implementation for recommendations where no savings were quantified. However, it should be noted that the cost of implementing some recommendations could be significant.

E. Recommendation Summary

Chapters III – XII provide findings, conclusions, and recommendations for each functional area examined during this Management and Operations Audit. Exhibit I-3 summarizes the recommendations with the following priority assessments for implementation:

- INITIATION TIME FRAME – estimated time frame on how quickly the company should be able to initiate its implementation efforts given the company's resources and general operating environment — time necessary to complete implementation is expected to vary depending on the nature of the recommendation and the scope of the efforts necessary as well as the resources available to effectively implement the recommendation

- BENEFITS – net quantifiable benefits have been provided where they could be estimated as discussed in section D. Benefits — overall rankings are not solely based on quantifiable dollars but our assessment of the potential overall impact of the recommendation on the efficiency and/or effectiveness of the company and/or the services it provides

    - HIGH BENEFITS – implementation of the recommendation would result in major service improvements, substantial improvements in management practices and performance, and/or significant cost savings

    - MEDIUM BENEFITS – implementation of the recommendation would result in important service improvements, meaningful improvements in management practices and performance, and/or meaningful cost savings

    - LOW BENEFITS – implementation of the recommendation is likely to result in service improvements, improvements to management practices and performance, and/or enhance cost controls

Pittsburgh Water & Sewer Authority
Management and Operations Audit
Summary of Recommendations

No.	Recommendation	Page	Initiation Time Frame	Benefits (including $ estimates)
Chapter III – Executive Management and Organizational Structure				
III – 1	Complete phase two of the Strategic Planning Initiative which includes the development of a five-year strategic plan and annual action plan.	29	0 – 3 Months	Medium
III – 2	Analyze and revise the signing authority levels for the PWSA's leadership and executive teams.	29	3 – 6 Months	Low
III – 3	Designate an owner to develop and provide oversight of a centralized guiding document repository who can initiate and maintain control over the PWSA's guiding documents.	29	6 – 9 Months	Low
III – 4	Petition the City and ALCOSAN to renegotiate the ALCOSAN billing servicing agreement with the PWSA to include equitable criteria for handling the uncollectible portion of the PWSA's billings that are on behalf of ALCOSAN. If negotiations are unsuccessful, consider legal action to require ALCOSAN to bill customers directly.	29	3 – 6 Months	High Annual Savings $1,785,000
III – 5	Separate the combined COO&CFO role into two separately dedicated roles and realign departmental reporting to ensure each function is receiving appropriate executive level oversight.	29	12 – 24 Months	Low
Chapter IV – Corporate Governance				
IV – 1	Form a PWSA Board Audit Committee and implement most of the NYSE's Corporate Governance Rules and the SEC's Final Rules for Audit Committees.	34	6 – 9 Months	Low
IV – 2	Develop charters and activate all proposed board committees.	34	3 – 6 Months	Low
IV – 3	Hire an experienced internal auditor and develop an internal audit function.	34	24 – 36 Months	Medium
Chapter V – Financial Management				
V – 1	Payoff and/or refinance higher interest variable and fixed rate debt with proceeds from grants or more favorably priced loans.	45	3 – 6 Months	High Annual Savings $12,046,350
V – 2	Develop and implement controls to verify the accuracy of all invoices for purchased services.	45	0 – 3 Months	High
V – 3	Track actual billing service costs incurred to bill customers on ALCOSAN's behalf to work toward charging ALCOSAN the higher of cost or market for these services through servicing agreement renegotiations.	45	0 – 3 Months	High Annual Savings $907,000
V – 4	Adequately staff the financial function and maintain separation of duties.	45	3 – 6 Months	Medium

Pittsburgh Water & Sewer Authority
Management and Operations Audit
Summary of Recommendations

No.	Recommendation	Page	Initiation Time Frame	Benefits (including $ estimates)
Chapter V – Financial Management (continued)				
V – 5	Follow 52 Pa. Code § 56.331 when initiating the service termination process to balance sufficient customer notification with timely collection of past due customer billings further streamlined by enabling the automation process available to the PWSA through its customer information system.	46	0 – 3 Months	Medium Annual Savings $94,000
V – 6	Develop and mature the capital and O&M budgeting process including maintaining formal documentation as well as full analysis of material budget variances.	46	3 – 6 Months	Medium
V – 7	Revise borrowing and debt management guiding documents to include the appropriate PUC filing requirements.	46	0 – 3 Months	Low
Chapter VI – Operations				
VI – 1	Identify the most practical option to rehabilitate the east and west raw water intake gates at the WTP and expedite the project as is feasibly possible to ensure no disruptions in water service to the PWSA's customer base.	64	12 – 18 Months	High
VI – 2	Expedite the installation of new flow meters at strategic locations and/or rehabilitate existing flow meters as needed to gain basic insight into areas contributing to excessive water loss that require replacement to maximize treated water retention.	64	9 – 12 Months	High Annual Savings $3,800,000 – $6,400,000
VI – 3	Develop and implement a formal valve exercising program which includes identifying all critical valves in the system to ensure these valves are prioritized during the valve exercising routine cycle.	64	6 – 12 Months	Medium
VI – 4	Develop and implement a damage prevention program by creating a damage prevention manual to define procedures to track damage and enforce consequences against those who have caused damage to the system.	64	6 – 12 Months	Medium
VI – 5	Establish the practice of tracking and monitoring ST and OT hours, by department and specifically by work type and by individual, to ensure OT levels indicate sufficient staffing levels are being maintained. Once detailed OT data has been tracked effectively, perform a detailed workforce planning study to better understand staffing and contractor needs.	64	3 – 6 Months	Low
VI – 6	Perform a study of workforce aging to identify and appropriately prepare for impending vacancies in operations staff.	64	9 – 12 Months	Low

Pittsburgh Water & Sewer Authority
Management and Operations Audit
Summary of Recommendations

No.	Recommendation	Page	Initiation Time Frame	Benefits (including $ estimates)
Chapter VI – Operations (continued)				
VI – 7	Digitally track, report, and monitor callout acceptance to ensure contract terms are being enforced and that OT usage is appropriate.	64	3 – 6 Months	Medium
Chapter VII – Emergency Preparedness				
VII – 1	Determine alarm system requirements at all company-maintained buildings and install the necessary equipment.	69	9 – 12 Months	Medium
VII – 2	Complete and implement a comprehensive CSP and maintain its efficacy through annual review and testing.	69	6 – 9 Months	High
VII – 3	Explore the option of adding security monitoring devices, including cloud monitoring and infrared capable cameras, at all the PWSA's critical assets.	69	9 – 12 Months	Medium
Chapter VIII – Purchasing and Materials Management				
VIII – 1	Develop and establish a formal, direct hierarchy between the procurement and materials management business units as determined by best practices and the company's needs; adjust the company's organizational structure as necessary.	76	6 – 12 Months	Medium
VIII – 2	Develop and implement inventory control mechanisms based on formalized materials management procedures to track inventory more accurately and efficiently.	76	6 – 12 Months	High
VIII – 3	Establish appropriate EOP and EOQ based on relevant controlling factors to support an appropriate material turnover rate.	76	6 – 12 Months	Medium
VIII – 4	Identify and create an emergency stock list and develop and implement procedures to routinely review and update the list to maintain its relevance.	76	3 – 6 Months	Medium
Chapter IX – Customer Service				
IX – 1	Continue to participate in litigation proceedings and follow the subsequent Final Order to direct processes to work toward full compliance with Chapter 14 of the Pennsylvania Public Utility Code and Chapter 56 of the Commission's regulations.	84	0 – 3 Months	High
IX – 2	Begin tracking arrearages by customer type and by amounts being pursued through liens, segregating those resulting from pass-through billings of ALCOSAN, to maintain better control. Furthermore, once litigation over collection practices with the PUC is finalized, implement aggressive collection efforts to reduce arrearages.	84	0 – 3 Months	High

Pittsburgh Water & Sewer Authority
Management and Operations Audit
Summary of Recommendations

No.	Recommendation	Page	Initiation Time Frame	Benefits (including $ estimates)
Chapter X – Information Technology				
X – 1	Modernize IT architecture and processes to increase the PWSA's cyber maturity rating.	90	6 – 12 Months	Medium
X – 2	Enforce participation in a formalized cyber awareness training program which includes refresher training on IT policies, cyber security awareness, and remediation as necessary.	90	9 – 12 Months	Medium
X – 3	Dedicate the necessary resources to ensure the RISE project is completed in a timely manner.	90	0 – 3 Months	High
X – 4	Conduct a social engineering audit of the PWSA's employees' cyber awareness.	90	12 – 18 Months	Low
Chapter XI – Fleet Management				
XI – 1	Replace all vehicles which have exceeded the lifecycle limit and maintain the fleet within routinely reviewed and updated lifecycle standards going forward.	96	0 – 3 Months	Low
XI – 2	Implement *Geotab* and develop appropriate monitoring and reporting procedures to maximize investment value.	96	0 – 3 Months	Low
Chapter XII – Human Resources and Diversity				
XII – 1	Develop a formal, documented succession plan which covers the chief, director, and deputy director positions, at a minimum, to be extended to include the middle management layers as is reasonably feasible.	104	3 – 6 Months	Low
XII – 2	Perform a human resource single point of failure analysis to determine what positions need immediate support and then develop a plan to cross-train and/or hire staff to ensure ample coverage is available for all pivotal work tasks.	104	6 – 12 Months	Medium
XII – 3	Strengthen the underlying safety culture through continuous reinforcement messaging and consistent enforcement of safety policies and procedures. Set challenging yet attainable safety targets at industry average performance levels or higher and continuously perform root cause analysis of safety incidents to gain awareness of safety practices in need of support through procedure enhancement and/or additional training.	104	0 – 3 Months	Medium
XII – 4	Develop procedures to digitally retain accurate fleet vehicle driver records so that GPS monitoring device data can be used to effectively monitor vehicle driving behaviors for use in safety programs.	104	3 – 6 Months	Low

II. BACKGROUND

Pittsburgh was organized as a borough in 1794 and later incorporated as a city in 1816. The earliest efforts to establish a public water system were in 1802 with the construction of four 47-foot-deep public wells. As the municipality grew and absorbed many nearby developing communities, the need for water increased. The City of Pittsburgh (City) oversaw the construction of its intricate water distribution system and water treatment facilities through its Water Department.

On February 16, 1984, the City filed to establish a municipal authority under the Municipal Authorities Act (MAA) of 1945 which would allow the City to finance the public waterworks without tapping the general taxing powers of the municipality[1]. The Pittsburgh Water & Sewer Authority (PWSA) was incorporated in the Commonwealth of Pennsylvania on February 17, 1984. The most recent approved Certificate of Amendment, approved by the Pennsylvania Department of State on March 19, 2020, extended the PWSA's term of existence to March 13, 2070.

On March 29, 1984, the City entered into the original Lease and Management Agreement with the PWSA. An updated Capital Lease Agreement (1995 Agreement) went into effect on July 15, 1995 and is still in effect today. In 1995, the PWSA absorbed the City's Water Department and in 1999, became the sole proprietor of the City's sewer system.

Per the terms of the 1995 Agreement, the PWSA leases the waterworks and distribution systems as well as the sewage conveyance and stormwater systems from the City. The PWSA assumed all contracts used in connection with the systems and took on all responsibility to maintain the systems. The 1995 Agreement required $96,017,250, less a credit for $5,399,725 which had been remitted prior to the agreement effective date, to be remitted to the City broken down into four payments between July 27, 1995 and January 2, 1997. The PWSA fulfilled all amounts due under the 1995 Agreement and continues to honor its obligations to maintain the system. The 1995 Agreement will expire on September 1, 2025. Upon its expiration, the PWSA will have the option to acquire all the leased property from the City for the payment of $1. The PWSA is actively planning for the acquisition and has made known to the City its intention to exercise the option.

On December 21, 2017, Governor Wolf signed Act 65 of 2017 amending Pennsylvania Public Utility Code to include new language at 66 Pa. C.S. § 1301(b) and to add Chapter 32: Water and Sewer Authorities in Cities of the Second Class. Act 65 brought water and sewer authorities in cities of the second class under the Pennsylvania Public Utility Commission's (PUC or Commission) jurisdiction which was deemed necessary by the Pennsylvania Supreme Court to address the reasonableness of these specific municipal authorities' rates and services. Pittsburgh is the only city of the second class within Pennsylvania and the PWSA is the only water and sewer

[1] The amended MAA was approved on June 19, 2001 and is codified at 53 Pa.C.S. §§ 5601 – § 5622.

authority within Pittsburgh; therefore, Act 65 effectively brought the PWSA under the PUC's jurisdiction.

Chapter 32 established a process to transfer the PWSA from local rate and service regulation under the MAA to the uniform rate setting and service requirements of the Public Utility Code. Chapter 32 retained important aspects of the MAA. Most notably, Chapter 32 retained access to municipal financing vehicles which preserved the PWSA's access to low cost capital for public utility services.

On January 18, 2018, the Commission entered a Tentative Implementation Order, at Docket Nos. M-2018-2640802 and M-2018-2640803, for the PWSA's water and wastewater services, respectively, to take the first official step toward bringing the PWSA into compliance with Pennsylvania Public Utility Code. The Tentative Implementation Order provided procedures and guidelines for the implementation of Act 65 of 2017 and invited interested parties to submit comments. On March 15, 2018, the Commission entered its Final Implementation Order.

Prior to coming under the PUC's authority, the PWSA was not operating under a formal tariff but instead maintained a rate structure that was developed and proposed by the company to be approved by the PWSA's Board of Directors (PWSA Board). The company would periodically hire a consultant to prepare cost of service studies to assist in determining appropriate rates. At that time, the PWSA's rate structure included a minimum charge which was determined by service line diameter, a volumetric charge for six customer classifications (residential, commercial, industrial, health or education, municipal, and wholesale), and, during various periods, a distribution system improvement charge set at a percentage of the monthly billing. There was no specific regulatory process that guided the rate making process.

In its Final Implementation Order, the Commission ordered the PWSA to file its Official Prior Tariff no later than March 30, 2018, its separated water and wastewater Compliance Tariffs no later than July 2, 2018, and its Compliance Plan no later than September 28, 2018. The Commission also ordered the PWSA to report its 2017 revenue on or before May 1, 2018 which was used to determine the PWSA's first annual assessment as a regulated entity.

Upon initial review of the PWSA's Compliance Plan, the Commission determined it necessary to review and litigate the Compliance Plan in two stages. The Stage One Compliance Plan (CP1) prioritized health and safety issues over matters of lesser urgency, and Stage Two Compliance Plan (CP2) was focused on billing and collections practices and any issues that were unable to be finalized during CP1 litigation.

CP1 litigation was finalized through Commission Order entered October 21, 2019. As previously stated, CP1 issues were designated practices that could affect health and safety such as lead remediation efforts, security planning and readiness, and water reliability among other various issues. To comply with the resulting Order, the PWSA developed and will routinely report upon multiple improvement plans including a Lead Remediation Plan, a Long-Term Infrastructure Improvement Plan, a Capital Improvement Plan which encapsulates its water reliability projects, multiple

business continuity plans, and more. Additional details of the CP1 issues and the progress the PWSA has been making in those areas is discussed more thoroughly in chapters VI – Operations, VII – Emergency Preparedness, and X – Information Technology.

The PWSA filed its two-part CP2 on April 9, 2021 and April 12, 2021, respectively. Part one of CP2 focused on the customer service issues such as billing and collections; whereas part two focused on the PWSA's stormwater services and the development of a stormwater tariff. The PWSA filed the parties' joint settlement agreement with the Commission on March 14, 2022, and the Administrative Law Judge's (ALJ) Recommended Decision was due on or before May 25, 2022. Because CP2 litigation was ongoing throughout audit fieldwork, the auditors' review of some customer service processes was limited as described in Finding and Conclusion No. 1 of chapter IX – Customer Service.

In addition to the implementation proceedings, the PWSA also filed three base rate cases with the Commission during the audit period. Although the PWSA files individual base rate cases for each of its individually tariffed service types (water, wastewater, stormwater), the Commission has granted the PWSA to consolidate the proceedings to allow for a combined revenue requirement for each of the three base rate case proceedings within the audit period.

On July 2, 2018, the PWSA filed its first base rate case[2]. The focus of the proceeding was to determine an appropriate increase in operating revenue and to educate the PWSA on the data to be tracked and provided during future base rate cases as a regulated entity under PUC jurisdiction. Because the PWSA does not own the system assets, its rate design is established on a cash flow method as opposed to the traditional rate of return on assets. Most other traditional base rate case issues (ex. operational efficiencies, customer service standards, etc.) were deferred to be settled during the Compliance Plan proceedings described above. The parties' joint settlement agreement was filed on November 29, 2019. The ALJ's Recommended Decision, issued on January 25, 2019, recommended the Commission approve the joint settlement terms and specified necessary tariff corrections. The Commission entered its final Order on February 27, 2019 directing the PWSA to address the specified tariff corrections. Updated tariffs reflecting the new rates became effective March 1, 2019.

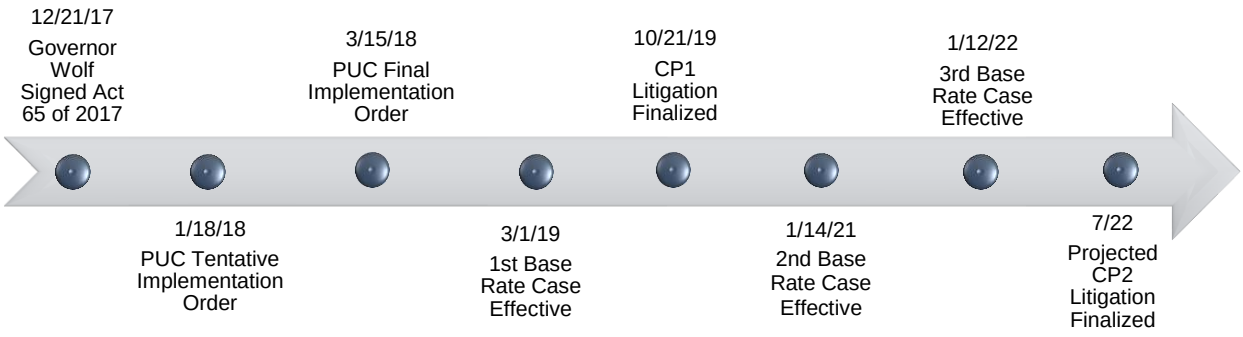
On March 6, 2020, the PWSA filed its second base rate case[3] including a petition to collect a distribution system improvement charge (DSIC). The parties' joint settlement agreement was filed on September 30, 2020. Some of the agreed upon terms included an increase in base rates; a 5% DSIC; cost allocation and rate design adjustments; COVID-19 relief measures; and enhancements to low-income assistance programs, customer service, and quality of service. The ALJ's Recommended Decision to approve the joint settlement without modification was entered on October 29, 2020. The Commission adopted the ALJ's Recommended Decision by Order entered on December 29, 2020. Updated tariffs reflecting the new rates became effective January 14, 2021.

[2] Docket Nos. R-2018-3002645 (water) and R-2018-3002647 (wastewater)
[3] Docket Nos. R-2020-3017951 (water) and R-2020-3017970 (wastewater)

The PWSA filed its third base rate case[4] on April 13, 2021. This proceeding would, among other things, establish the PWSA's Compliance Stormwater Tariff. The parties' joint settlement agreement was filed September 7, 2021. Some of the agreed upon terms included an increase in base rates segregated over a two-year period; additional reporting requirements for some customer service and operational processes; and continued efforts to further enhance low-income assistance programs, customer service, and quality of service. In addition, a lockout period was established precluding the filing of additional rate cases prior to March 2023. The ALJ's Recommended Decision to approve the joint settlement without modification was entered on October 6, 2021. The Commission adopted the ALJ's Recommended Decision by Order entered on November 18, 2021. Updated tariffs reflecting the new rates became effective January 12, 2022.

Exhibit II-1 portrays the timeline of the regulatory proceedings described above. Although the PWSA's history began many years prior, the starting point of the timeline is the legislative action which resulted in the PWSA being brought under PUC jurisdiction and continues through the projected conclusion of litigation of CP2 which extended past the end of audit fieldwork in May 2022.

Exhibit II-1
Pittsburgh Water & Sewer Authority
Timeline of Regulatory Proceedings
For the Period April 2018 – Projected July 2022



Source: PUC Case Files (docket numbers referenced in text)

A. Legal Considerations

Because the PWSA was a City department that was later organized as a municipal authority and, eventually, has come to be regulated by the PUC, it faces many legal challenges that most utility companies do not have to navigate. These circumstances reduce the overall authority of the PWSA leadership team when compared to other utility companies. Below is a list of these legal considerations.

- Although the PWSA has been a separate legal entity from its 1984 inception, MAA regulations retain the City's rights, as the organizing municipality, to establish and maintain the PWSA's Board. As such, the utility's operations are

[4] Docket Nos. R-2021-3024773 (water), R-2021-3024774 (wastewater), and R-2021-3024779 (stormwater)

not shielded from political considerations as they would be in private industry. This is further explained in chapter IV – Corporate Governance.

- The City has legal obligations to ensure the appropriate handling of sewage pursuant the regulations of the United States Environmental Protection Agency which required it to support the construction and financial stability of sewage treatment processes within its borders. These obligations were thrust onto the PWSA through the assignment of outdated, inequitable contracts with the Allegheny County Sanitary Authority (ALCOSAN) which have resulted in severe financial strain on the PWSA. The auditors make a recommendation in this regard in Finding and Conclusion No. 4 in chapter III – Executive Management and Organizational Structure.

- Because the City has maintained a disproportionate level of control over the operations of the PWSA throughout its 30 years in existence, oftentimes, political agenda has influenced financing and operating decisions which have resulted in less-than-ideal financial viability and a severely undermaintained system. Thorough descriptions of the current financial and operational state of the PWSA including the auditors' recommendations in those regards are available in chapters V – Financial Management and VI – Operations, respectively.

- As described earlier, the 1995 Agreement will expire in September 2025. There is a provision therein to allow the PWSA to purchase from the City the entire water, wastewater, and stormwater system infrastructure at that time for $1. It is uncertain whether the City intends to honor the contractual language. In addition, the PWSA has not fully determined how it would structure the ownership and governance of the independent entity.

These circumstances have been the catalyst to numerous regulatory actions, the most notable being the legislative actions deemed necessary by the Pennsylvania Supreme Court to bring the PWSA under PUC oversight. In addition, the ramifications of these legal challenges have caused the PWSA to operate in a continual state of emergency. The PWSA has had to devote special attention not only to comply with Public Utility Code but also with Consent Orders mandated by the Pennsylvania Department of Environmental Protection. Lastly, the uncertain outcome of the execution of the future transfer of assets from the City to the PWSA has made long-term planning difficult at best. All the while, the PWSA has continued to heavily rely on external legal counsel because the PWSA's Legal Department is under development.

B. Utility Service

Under its Articles of Incorporation, the PWSA is authorized to acquire, hold, construct, finance, improve, maintain, operate, own, and lease either as lessor or lessee projects of the following kinds and character:

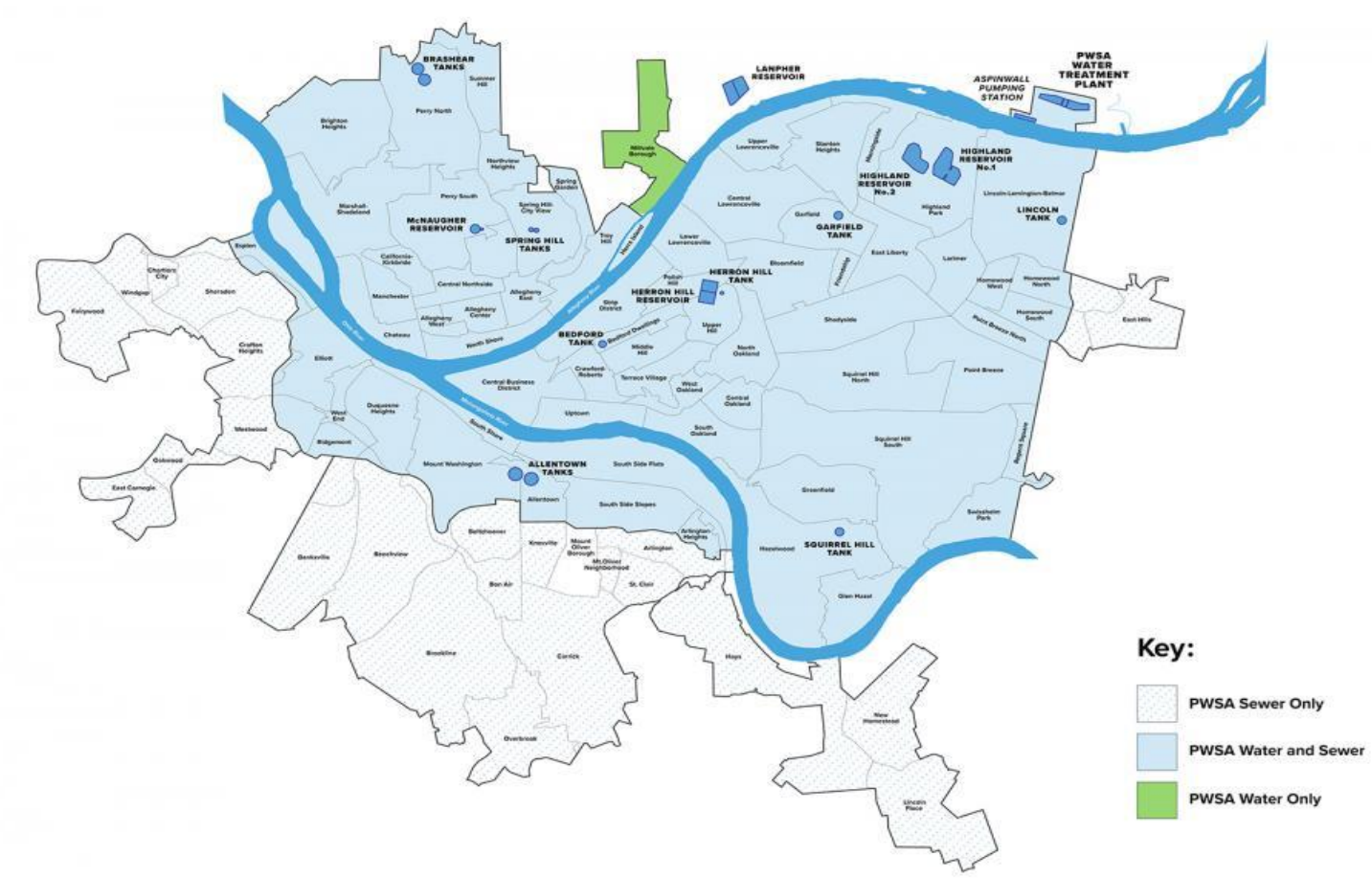
- Sewers
- Sewer systems or parts thereof
- Waterworks
- Water supply works
- Water distribution systems
- Low head dams
- Facilities for generating surplus power
- Stormwater systems

As Pennsylvania's largest combined water and sewer authority in Pennsylvania, the PWSA provides service to more than 500,000 customers in the City and surrounding areas. It provides water service, producing an average of 70 million gallons (MG) of water daily, to approximately 80,000 residential, commercial, and industrial customers in portions of the City; the Borough of Millvale; and in portions of Reserve, O'Hara, and Blawnox Townships in Allegheny County, Pennsylvania. It also provides bulk water to Reserve Township, Fox Chapel, and Aspinwall as well as being interconnected to several other regional water systems for emergency supply purposes. The PWSA's water system contains approximately 964 miles of water lines, five reservoirs, and 10 tanks with a water storage capacity of 455 MG of water.

In addition, the PWSA provides wastewater conveyance service to customers located in the City and portions of 24 neighboring communities. Its sewer system includes approximately 1,200 miles of sewer line and more than 25,000 storm drains. Approximately 70% of the sewer system is a combined system, meaning that stormwater and wastewater flow through the same pipe. The PWSA does not perform wastewater treatment. Wastewater treatment is the responsibility of ALCOSAN, a separate and distinct legal entity.

More in-depth details of the PWSA's water, sewer, and stormwater systems are available in chapter VI – Operations of this report. Exhibit II-2, on the next page, shows the PWSA's service territory.

Exhibit II-2
Pittsburgh Water & Sewer Authority
Service Territory
As of May 2022



Source: https://www.pgh2o.com/your-water/learn-where-we-provide-our-services

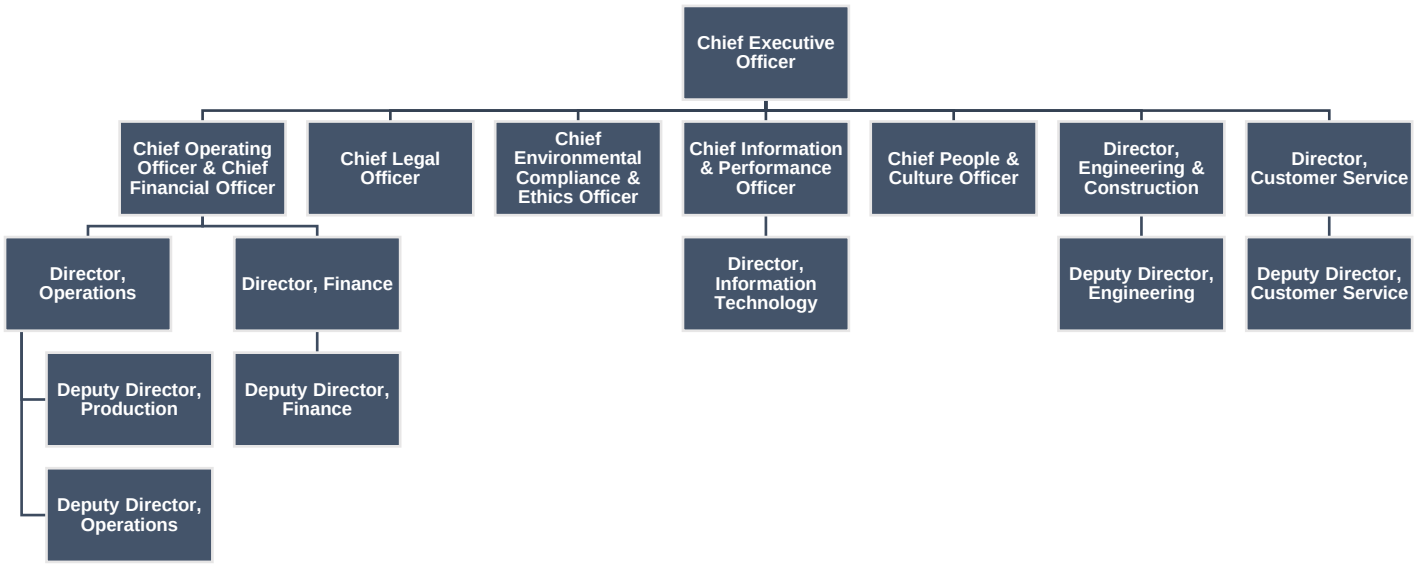
III. EXECUTIVE MANAGEMENT AND ORGANIZATIONAL STRUCTURE

Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under Pennsylvania's Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA.

The senior leadership team organizational structure, as presented in Exhibit III-1, was the result of reorganization efforts beginning in January 2021. Prior to that time, the leadership structure strongly resembled that of a non-profit organization or a division of a larger entity in that the top executive tier consisted of executive director and deputy executive director titles. To transition to a structure similar to an independent utility company, the top executive tier was modified so that it was headed by a chief executive officer supported by multiple department chiefs. Under the top executive tier is a layer of business unit directors many of whom are further supported by one or more deputy directors.

Exhibit III-1
Pittsburgh Water & Sewer Authority
Senior Leadership Organizational Structure
As of April 2022



Source: Data Request EM-34

The roles and responsibilities of the Chief Executive Officer and his direct reporting senior leadership team are as follows:

- **Chief Executive Officer** – oversees the progress toward goals and objectives established during the strategic planning process while ensuring adherence to the company's mission, vision, and core values; communicates with elected officials, outside consumer groups, other government entities, regulatory agencies, and the media; and serves as an advisor and strategic business partner to the senior leadership team

- **Chief Operating Officer & Chief Financial Officer** – serves as an advisor and strategic business partner to the senior leadership team regarding key management and development of current and future financial, security, and operational business objectives; identifies opportunities to leverage strengths to take advantage of new opportunities and/or to address organizational challenges; and implements and tracks comprehensive goals ensuring financial and operational stability and growth

- **Chief Legal Officer** – provides strategic guidance, consultation, and support to the senior leadership team on a comprehensive range of legal and other associated issues to ensure maximum protection of the PWSA's legal rights and to maintain its operations within the limits prescribed by local, state, federal, and applicable law

- **Chief Environmental Compliance & Ethics Officer** – oversees the strategic direction of the Environmental Compliance Program and ensures the water supply system complies with applicable federal, state, and local permits, regulations, rules, standards, and laws

- **Chief Information & Performance Officer** – leads the development and implementation of an information technology strategy integrated with the strategic business objectives of the PWSA and advises the senior leadership team on the effectiveness of performance management initiatives, infrastructure, programs, policies, and procedures

- **Chief People & Culture Officer** – drives the long-term strategies through large scale transformational change plans and programs; serves as an advisor and strategic business partner regarding organizational effectiveness, succession, compensation, and overall talent management; and supports all departments in efforts to achieve diversity in the workplace

- **Director, Engineering & Construction** – serves as an advisor and strategic business partner regarding the planning and execution of the Capital Improvement Plan; coordinates and organizes the engineering and construction projects undertaken by the PWSA; and provides oversight of the relationships with consultants and contractors who perform capital work on the water, wastewater, and stormwater systems

- **Director, Customer Service** – drives the success of the Customer Service Department utilizing in-depth knowledge of billing systems, processes, and interpersonal skills and implements procedures pertinent to effective operations by setting performance standards aligned with the strategic objectives of the company

The executive leadership team works closely with the PWSA's Board of Directors (PWSA Board) in planning the organizational strategies and projects. The company maintains the Board Executive Committee which meets bimonthly to discuss issues and initiatives. The Board Executive Committee consists of approximately three board members, including the Chair of the PWSA Board, and the PWSA's chief level executives. The PWSA Board then meets monthly to finalize and approve budgets, policies/procedures, projects, and contracts.

The PWSA has historically outsourced many of its supporting business functions, such as legal, information technology, safety, fleet, etc., especially since the company was previously organized as an operational division of the City; however, it has been expanding its internal workforce throughout the audit period. Exhibit III-2 shows staffing at the end of each year from 2018 – 2021. As of May 2022, the end of audit fieldwork, the PWSA employed 381 individuals which represented a 29.6% increase in staffing over 2018.

Exhibit III-2
Pittsburgh Water & Sewer Authority
Staffing
For the Years Ended December 31, 2018 – 2021

Year	2018	2019	2020	2021
Total Employees	**294**	**333**	**344**	**379**

Source: Data Requests HR-1 and HR-47

Hiring has been widespread throughout the company. Over the audit period, approximately 17% of staffing increases have been within supervisory/management levels and the remaining 83% were within the contributor levels from entry level (such as Customer Service Representative, Utility Worker I, and General Laborer) up through advanced specialties requiring specific education or vocational training (such as Plumber, Electrician, Chemist, and Engineer). Exhibit III-3, on the next page, presents a general overview of the hiring activities for the period 2019 – 2021.

Exhibit III-3
Pittsburgh Water & Sewer Authority
Hiring Activities
For the Period 2019 – 2021

Department	Customer Service	Engineering & Construction	Utility Operations	Administrative Support
2019				
Number of External Hires	20	12	37	12
% of Total External Hires	24.69	14.81	45.69	14.81
Supervisory/Management %	10.00	66.67	10.81	25.00
Contributor %	90.00	33.33	89.19	75.00
2020				
Number of External Hires	12	10	18	11
% of Total External Hires	23.53	19.61	35.29	21.57
Supervisory/Management %	0.00	80.00	5.56	27.27
Contributor %	100.00	20.00	94.44	72.73
2021				
Number of External Hires	14	7	45	11
% of Total External Hires	18.18	9.09	58.44	14.29
Supervisory/Management %	0.00	42.86	2.22	27.27
Contributor %	100.00	57.14	97.78	72.73
Period Totals				
Number of External Hires	46	29	100	34
% of Total External Hires	22.01	13.88	47.85	16.27
Supervisory/Management %	10.00	65.52	6.00	26.47
Contributor %	90.00	34.48	94.00	73.53

Source: Data Request HR-48 and auditor analysis

In Exhibit III-3, Customer Service includes the Call Center as well as those performing metering and billing functions. Engineering represents the internal capital project management team. Utility Operations includes those performing water treatment and distribution functions, sewer operations functions, and environmental compliance activities. And lastly, Administrative Support includes those in departments such as Finance, Legal, Public Affairs, Management Information Systems, Human Resources, and Safety and Security.

Technical positions are supported by labor unions which focus to ensure the opportunity for ample training and a safe work environment. Many of the PWSA's operations staff are represented by one of three unions with whom the PWSA maintains agreements. These unions are The Pittsburgh Joint Collective Bargaining Committee; The American Federation of State, County, and Municipal Employees Local 2719; and The American Federation of State, County, and Municipal Employees Local 2037.

Although Exhibit III-3 demonstrates the company successfully hired 209 individuals over the period 2019 – 2021, due to continued company-wide struggles with retention and frequent turnover, the overall headcount only increased by 85 over the same period as shown in Exhibit III-2. The hiring activities would also include the potential need to hire multiple candidates to fill a single vacancy for those new hires who were unsuccessful during the probationary period.

The trend for poor retention and frequent turnover is not necessarily unique to the PWSA. Many utility companies express the difficulty of being able to attract and retain talent, especially the raw aptitude required of employees who will be performing technical tasks of field operations roles. These positions have an inordinately high number of individuals who are unable to successfully pass the probationary period to achieve permanent status.

Exhibit III-4 gives a headcount snapshot, by line of business, as of February 1, 2022. As is typically the case for a utility, the operations group is the largest group within the organization. The administrative group includes the following functions: legal, compliance and ethics, public affairs, finance, information technology and performance, human resources, and safety and security.

Exhibit III-4
Pittsburgh Water & Sewer Authority
Headcount by Line of Business
As of February 1, 2022

Executive Leadership	6
Utility Operations	210
Engineering & Construction	32
Customer Service	62
Administrative	59
Total Headcount	**369**

Source: Data Request EM-34 and auditor analysis

Because the company has been and continues to be growing its internal workforce, the auditors did not conduct a formal span of control analysis. A cursory review did not highlight a concern in this area. The Operations Department's business units (water, wastewater/stormwater) have the greatest number of employees per each supervisor, and the company will need to continue to monitor the feasibility of the span of control in these business units as they continue to expand. Findings and Conclusions Nos. 5, 6, and 7 in chapter VI – Operations offer the company recommendations to improve processes to monitor and manage its Operations Department staffing.

Findings and Conclusions

Our examination of the executive management function included a review of the senior leadership team organizational structure; planning and performance management; executive compensation; development and succession planning; and corporate culture. Based on our review, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional efforts to improving the efficiency and/or effectiveness of the executive management function by addressing the following:

1. The Pittsburgh Water & Sewer Authority has not developed a five-year plan nor a formal strategic planning function.

The PWSA has experienced high turnover for many years at all levels within the organization. Frequent changes in key executive roles have resulted in inconsistent planning and a lack of continuity in company goals, objectives, and procedures which, in turn, has hindered management's ability to set a long-term course for the organization and to make progress in ensuring its viability. The current leadership team recognized the need for a clarified direction and a formal strategic planning process.

In August 2021, the PWSA kicked off its two-phase Strategic Planning Initiative which would focus on three specific goals:

- Develop an updated mission, a vision, and core values for the organization
- Create a five-year strategic plan that outlines strategic initiatives designed to move the company toward the defined vision
- Build annual action plans and success metrics aligned with each component of the strategic plan

Phase one of the initiative (executed from August 2021 – December 2021) focused on developing an updated mission statement and vision as well as the development of company core values. The company developed a core planning team to work on these goals. Exhibits III-5 and III-6 show the outcomes achieved during phase one of the Strategic Planning Initiative.

Exhibit III-5
Pittsburgh Water & Sewer Authority
Core Values, Mission, and Vision Diagram

Source: Data Request EM-25

Exhibit III-6
Pittsburgh Water & Sewer Authority
Core Values Definitions

Source: Data Request EM-25

In January 2022, the PWSA sought assistance from a third-party consultant to begin phase two of the Strategic Planning Initiative. Expected outcomes of phase two are a fully developed five-year strategic plan inclusive of a defined process for creating annual action plans designed to support the achievement of the five-year strategic plan. Phase two was ongoing at the end of audit fieldwork but is anticipated to be completed and in effect in time for the fall initiation of the annual action plan development for 2023.

Upon implementation of the newly developed strategic planning process, the PWSA will benefit from the continuity of a defined business plan and the congruence of all business functions working together toward coordinated goals. The leadership team will have defined metrics with which to monitor progress and to make annual adjustments to ensure success.

2. The Chief Executive Officer's expenditure signing authority is significantly lower at the Pittsburgh Water & Sewer Authority than those at like utilities.

As noted in section A. Legal Considerations of chapter II – Background, the City of Pittsburgh (City) continues to exercise significant indirect authority over the PWSA's operations through the appointment of its Board of Directors. The PWSA's lack of autonomy is evidenced by the current Delegation of Authority Policy which limits the Chief Executive Officer's (CEO) signing authority on purchases to no more than $250,000 which is significantly lower than the levels of CEO's signing authority at other regional utilities. Restricting the CEO's signing authority too severely can result in

excessive delays in business operations and capital projects while awaiting board approval.

Raising the CEO's signing authority would not necessarily weaken internal oversight and could be combined with other procedures to maintain strong internal control. As part of the PWSA's commitment to transparency, the Senior Leadership Team provides the PWSA's Board of Directors (PWSA Board) with a report, as part of the monthly board packets, of all purchases/contracts that were executed within the CEO's signing authority level. The PWSA Board is encouraged to ask questions or request supporting documentation for any transaction that was made. This process works as a control to confirm that aggregates of smaller deals are not being processed to avoid board approval requirements. With this control in place, there is minimal risk in increasing the CEO's signing authority level.

3. The Pittsburgh Water & Sewer Authority does not maintain a centralized repository of policies and procedures to actively manage and maintain its guiding documents.

Well-run utility companies maintain many guiding documents in the forms of standard operating procedures, policy statements, and process guidelines and manuals. These guiding documents are crucial to the daily operations of the various business functions within the company. They are the necessary resources to ensure that the processes and procedures used to perform designated responsibilities are consistently completed per management expectations regardless of if these expectations are rooted in efficiency, equity, safety, and/or another underlying business need.

The PWSA did not historically have many guiding documents likely due to procedural inconsistency stemming from high turnover in key leadership roles. As the current leadership teams of the various business units have initiated standardization of processes and procedures, the use of guiding documents has become more common; however, some are not complete in structure, and they are maintained piecemeal throughout the organization which lessens the effectiveness of the practice.

Each guiding document should have an owner who is responsible for routine review and update; a responsible party, such as a manager or department head, who is accountable for the execution of the processes described therein; and a scope that defines who all in the company are under the governance of each guiding document. Guiding documents must be routinely reviewed and updated according to a reasonable schedule that takes into consideration the stability or fluidity of the subject area and/or process. During review, the guiding document owner should ensure that written guidelines are still appropriately descriptive of actual work practices and that referenced personnel are still appropriate per the organizational chart. Companies should maintain written documentation of the effective date, the most recent date of review and update, and the name and title of the employee providing approval for each guiding document.

Although some companies house guiding documents by department or business unit, creating a centralized repository of all the company's guiding documents is a more

manageable way to ensure the guiding documents are being appropriately maintained. The repository owner provides oversight by enforcing accountability of each guiding document's owner and designated responsible party.

4. The 1955 Servicing Agreement between the City of Pittsburgh and the Allegheny County Sanitary Authority, as well as the subsequent assignment agreement and memorandum of understanding to include the Pittsburgh Water & Sewer Authority, are inequitable to the involved parties and many terms are not fully defined and/or are ambiguous.

Because of certain restrictive influences imposed by the PWSA's organizing municipality and various past ineffective management practices, the PWSA has been operating under financial strain for many years. One such circumstance leading to this financial strain has been the PWSA's obligations through outdated agreements between the City, the Allegheny County Sanitary Authority (ALCOSAN), and the PWSA.

The original servicing agreement was executed between the City and ALCOSAN on May 1, 1955. The agreement defined the responsibilities of the City to provide sewage conveyance to ALCOSAN who would provide sewage treatment and disposal. This agreement was established amidst the construction period of critical infrastructure both within the City and within other of Allegheny County's municipalities to establish both conveyance and treatment facilities to meet the necessary demand. Out of necessity to ensure this project was financially supported, many terms indicated the financial burden was mostly with the City even indicating that failure of other municipalities to provide adequate funding would fall on the City to guarantee payment. Language indicated that the City bears these responsibilities because of laws requiring the City to provide for the proper treatment and disposal of sewage.

In July 1995, the City officially transferred the responsibilities for operating and maintaining the City-owned water and wastewater system to the PWSA. In October of the following year, the City, ALCOSAN, and the PWSA entered into a Memorandum of Understanding, which was backdated to January 1, 1996, to effectively assign to the PWSA all of the City's obligations under the original servicing agreement. Also in October 1996, the City and the PWSA entered into an agreement to ensure that the PWSA had the necessary authority to act on the City's behalf regarding the original servicing agreement. Terms clearly indicated that the City would continue to be responsible for the sewage treatment costs incurred by properties owned by the City and that the City continued to have the primary obligation to pay ALCOSAN for any outstanding delinquent sewage accounts.

On March 25, 2004, there was an amendment made to the original servicing agreement that transferred the responsibility for billing the PWSA's customers for sewage treatment from ALCOSAN to the PWSA. At this time, the PWSA began incurring the cost of billing customers on ALCOSAN's behalf and absorbing the uncollectible portion of ALCOSAN's billings although agreement language indicated that the City remained the primary obligator of delinquent sewage accounts. In 2021, the PWSA hired a third-party consultant to determine the financial impact of this

arrangement. The consultant's study estimated that the PWSA will incur $1.2 million in expenses to bill customers on ALCOSAN's behalf and will absorb $1.6 million of uncollectible debt from the ALCOSAN's pass-through billings in 2022, alone.

As just presented, there are two specific financial conditions that have resulted in undue financial burden to the PWSA. The first financial condition is the costs the PWSA has been and continues to incur to bill its customers for sewage treatment services on behalf of ALCOSAN. This first issue is explained further in Finding and Conclusion No 3 in chapter V – Financial Management. The second financial condition is the uncollectible debt of the ALCOSAN pass-through billings that has been and continues to be absorbed by the PWSA. This second issue will be the focus of this finding and conclusion.

Once the PWSA began billing its water and/or wastewater customers on behalf of ALCOSAN, agreed upon procedures were developed for the PWSA to send ALCOSAN monthly usage data from which ALCOSAN would then develop quarterly invoices to submit to the PWSA for payment. The amounts due to ALCOSAN are calculated using the total amounts billed as opposed to amounts collected. There is no adjustment for expected uncollectible amounts.

In 2017, the Pittsburgh Mayor's Blue Ribbon Panel performed an independent audit of the PWSA. The Blue Ribbon Panel issued its report on December 28, 2017. It recommended that the PWSA should discontinue billing on behalf of ALCOSAN. The reasoning behind this recommendation was that ALCOSAN was no longer an immature entity that could not withstand its own business risk. The current executive leaders were not in the roles they hold now, but a current member of the PWSA Board explained that the PWSA did not act on this recommendation at that time as it felt bound to fulfill its obligations under the agreement.

Servicing agreements between non-affiliated entities should clearly define all terms so there is no ambiguity over each party's responsibility. Legacy agreements, over a decade old having multiple amendments and/or addendums, become sources of confusion and disagreement.

The Pennsylvania Public Utility Commission supports combined billing agreements where services related to utility distribution service, such as third-party supplier charges or service line protection plan charges, are directly integrated as a pass-through charge within the distribution company's billings. This has been determined to be a benefit to rate payers for convenience and budgeting purposes. As such, it would be beneficial for the joint customers of the PWSA and ALCOSAN to continue to benefit from combined billings. Billing service agreements are expected to be equitable to both parties and typically include terms to allow for the party responsible for billing to submit either actual amounts collected from the pass-through billings or, at the very least, submit an adjusted amount which considers a calculated amount of expected uncollectible.

As already mentioned, the PWSA has been working with a third-party consultant to determine the financial impacts of these inequitable terms of the servicing agreement

with ALCOSAN. That study has estimated that over the next five years, the PWSA will absorb an average of $1.7 million, annually, of ALCOSAN's bad debt. This is an unnecessary strain on an already stressed financial system. If processes are not changed, the amounts increase year after year and are expected to be over $2 million by 2027. In addition to the uncollectible revenue, it is reasonable to conclude that the associated strain on cash flow could increase financing needs which could potentially cost the PWSA an additional annual interest expense of $85,000 considering the current average borrowing rate of 5%.

5. The executive organizational structure may not provide for adequate oversight.

As discussed in the Background of this chapter, the PWSA's organizational structure was changed from one led by an executive director and deputy executive director to a structure led by a chief executive officer (CEO) at the beginning of 2021. Also, during this time, five additional chief level executives were named: Chief Operating Officer & Chief Financial Officer (COO&CFO), Chief Legal Officer, Chief Environmental Compliance & Ethics Officer, Chief Information & Performance Officer, and Chief People & Culture Officer.

There are two atypical conditions within the PWSA's organizational structure relative to the organizational structures observed at other regional utilities. The auditors believe these conditions present weaknesses in terms of adequate executive level oversight for two core functional areas. The first condition is that there is a combined chief operating officer (COO) and chief financial officer (CFO) role as opposed to having two separate positions for each of these roles. The second condition is that the Director, Engineering & Construction and the Director, Customer Service each report directly to the CEO.

Large and mid-sized regulated utilities typically have a dedicated COO whose focus is to provide oversight to all components of utility service and a dedicated CFO whose focus is to provide oversight to the fiscal management and accounting functions. The individual serving in the COO&CFO role previously held the title of deputy executive director which provided experiences leading to heightened expertise in both integral components. Because attracting and retaining talent has been a challenge for the PWSA, this individual has adopted the expanded role to guide the PWSA through these difficult transitions.

The PWSA's organizational structure forces the COO&CFO to split attention between the financial management and field operations functions. This would be difficult in any scenario, but it is made even more due to the PWSA's unique financial and operational challenges. As was introduced in chapter II – Background and expanded upon in chapters V – Financial Management and VI – Operations, the PWSA is operating in a continual state of emergency due to inappropriate decisions of prior leadership. The company was forced to operate with inadequate revenue due to insufficient rates resulting in deferred system maintenance. Consequently, dedicated

roles for each position are paramount to ensure adequate executive level oversight is provided for the financial and operational functional areas.

Two other integral components of utility service, engineering and construction and customer service, are segregated and report directly to the CEO who may provide less oversight than an executive focused solely on the utility service functions. The company chose neither to elevate the Director, Engineering & Construction and the Director, Customer Service to chief level executives, nor did they choose to place these departments under the oversight of one of the created chief roles during the 2021 reorganization. Although many of the departments were settled during the reorganization, the company continues to assess the effectiveness of the organizational structure and will continue to adjust to support company-wide efficiency and effectiveness.

Recommendations

1. **Complete phase two of the Strategic Planning Initiative which includes the development of a five-year strategic plan and annual action plan.**

2. **Analyze and revise the signing authority levels for the PWSA's leadership and executive teams.**

3. **Designate an owner to develop and provide oversight of a centralized guiding document repository who can initiate and maintain control over the PWSA's guiding documents.**

4. **Petition the City and ALCOSAN to renegotiate the ALCOSAN billing servicing agreement with the PWSA to include equitable criteria for handling the uncollectible portion of the PWSA's billings that are on behalf of ALCOSAN. If negotiations are unsuccessful, consider legal action to require ALCOSAN to bill customers directly.**

5. **Separate the combined COO&CFO role into two separately dedicated roles and realign departmental reporting to ensure each function is receiving appropriate executive level oversight.**

IV. CORPORATE GOVERNANCE

Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under Pennsylvania's Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA.

Although the PWSA was brought under PUC regulatory authority, many aspects of the MAA were retained. One such aspect was the composition of and director nomination process for the PWSA's Board of Directors (PWSA Board). 56 Pa.C.S. § 5610 states that the governing body of the municipality shall appoint the members of the board, and shall thereafter, appoint members whenever a vacancy has occurred.

To fulfill the duty of maintaining the membership of the PWSA Board, the City's Mayor's Office named a five-member nominating committee specifically dedicated to maintaining the board membership for the PWSA. The committee was activated in March 2020 and has since recommended six of the eight current members of the PWSA Board. Whenever a board vacancy occurs, the nominating committee liaises with current members to understand the expertise and experience needs of the PWSA Board. The committee then makes recommendations for new board members to the Mayor's Office. Subsequently, the Mayor nominates the selected candidate for City Council approval.

The PWSA Board's eight members are non-employee, volunteer directors with various backgrounds and expertise ranging from engineering and construction to nonprofit administration to regional academia. Most of the directors serve, or have previously served, in a City political affairs role. There are no employee directors on the PWSA Board; however, the PWSA's chief level executives work closely with the PWSA Board.

Because the PWSA is not a publicly traded company, it is not subject to the corporate governance requirements of the Sarbanes-Oxley Act of 2002 nor the rules of the New York Stock Exchange; however, the auditors encourage all regulated utilities to follow the spirit of many of these best governance practices to ensure successful oversight is maintained. More details of how a company can benefit from adopting these best governance practices are explained in Finding and Conclusion No. 1.

The PWSA Board set a goal for itself to establish board committees by the end of 2021. Although not all the committees have become active as of May 2022, the end of audit fieldwork, the PWSA Board stated it intended to develop and activate the following six committees:

- Supplier Diversity Committee
- Customer Service and Assistance Committee
- Environmental Compliance and Ethics Committee
- Executive Committee
- Stormwater Committee
- Finance Committee

The PWSA Board had not yet finalized the development of charters describing each committee's purpose and responsibilities.

Because the PWSA is a municipal authority that is dedicated to public service and transparency, it provides a vast amount of operational information to its customers and the public through its website. The PWSA maintains a Board & Board Meetings webpage within its website that describes the PWSA Board and provides access to historic records by way of board meeting agendas, minutes, and audio recordings since these meetings are open to the public. The PWSA Board's meetings have been held telephonically in response to the COVID-19 pandemic. The website provides instructions for how to dial in to listen to the live meetings as well as for how to request to speak during a board meeting.

As of November 2021, the PWSA established a role of Chief Environmental Compliance & Ethics Officer. One responsibility of this role is to oversee the enforcement of the company's policies related to ethical conduct. The PWSA maintains a variety of policies relating to ethical behavior and general code of conduct. The auditors found that the company performs appropriate routine review and update to ensure these guiding documents are relevant and current which will only be strengthened through implementation of the recommendation of Finding and Conclusion No. 3 in chapter III – Executive Management and Organizational Structure.

The PWSA has maintained a relationship with a local external financial auditor throughout the full audit period. The external auditing firm ensured independence by rotating audit leads as well as the audit partner at appropriate intervals. The external auditor issues an opinion on the company's annual financial statements but only reviews internal controls necessary to support its ability to issue an opinion over the financial statements as opposed to issuing an opinion of the internal control environment. The PWSA did not maintain an internal audit department as of May 2022, the end of audit fieldwork.

Findings and Conclusions

Our examination of the corporate governance function included a review of the Pittsburgh Water & Sewer Authority's Board of Directors (PWSA Board) including the PWSA Board's committees, related policies and procedures, and the relationship and operation of the external auditor. Based on our review, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional effort to improving the efficiency and/or effectiveness of the corporate governance function by addressing the following:

1. The Pittsburgh Water & Sewer Authority's Board of Directors does not have an audit committee.

Having a board audit committee is a universal best practice. Furthermore, it is best practice to follow the spirit of the New York Stock Exchange's (NYSE) Corporate Governance Rules and the Securities Exchange Commission's (SEC) Final Rules for Audit Committees (AC). These requirements were developed to assist companies in maintaining successful corporate governance practices and implementing processes that meet the NYSE/SEC requirements is encouraged.

The NYSE's Corporate Governance Rules relating to ACs are as follows:

- Maintain a written charter
- Should be comprised of a minimum of three independent director members
- At least one member should be a "Financial Expert" as defined by the SEC, and all other members should have financial literacy
- Review the report of the external auditor
- Routinely meet separately with management, the internal auditors, and with external auditors
- Oversee the internal audit function

The SEC's Final Rules for ACs of Listed Companies include:

- The AC should be comprised of solely independent directors
- The AC must be directly responsible for the appointment, compensation, retention, and oversight of the company's external auditors, and the external auditors must report directly to the AC
- The AC must establish procedures for the receipt, retention, and treatment of complaints regarding accounting, internal accounting controls, and auditing matters
- The AC must have the authority to engage independent counsel and other advisors
- Companies must provide appropriate funding to the AC
- Certain disclosures must be made regarding the AC – one disclosure is that at least one AC member qualifies as an Audit Committee Financial Expert (ACFE)

An ACFE is an individual possessing all the following attributes:

- An understanding of Generally Accepted Accounting Principles (GAAP) and financial statements
- The ability to assess the general application of GAAP to accounting for estimates, accruals, and reserves
- Experience preparing, auditing, analyzing, or evaluating financial statements of a breadth and level of accounting complexity comparable to that to be present in the company's financial statements
- An understanding of internal control over financial reporting
- An understanding of AC functions

Utility companies' boards should be mindful of the expertise and experience that its current membership possesses so that as director vacancies occur, the desired qualities and characteristics of new director candidates can meet the needs of the board.

The As was described in the Background of this chapter, the PWSA Board is in the developmental phases of establishing board committees which affords them the opportunity to mold an AC to serve the board. In addition, in April 2022, the PWSA Board incurred a member retirement which promotes an opportunity for analysis of any expertise deficiencies that could be filled through the newly appointed director.

The Executive Committee of the PWSA Board, as was described in chapter III – Executive Management and Organizational Structure, informally performed many of the roles typically assigned to an AC. Creating a formal AC with clearly defined responsibilities could provide the benefits of strengthened accounting controls and financial policies and procedures, enhanced independence from its external auditor, and appropriate oversight of an internal auditing function for additional support.

2. The Pittsburgh Water & Sewer Authority's board committees are not fully operational, and their charters are incomplete or missing.

As was previously explained in the Background section of this chapter, the PWSA Board set a goal to establish board committees by the end of 2021. Although the PWSA Board had made progress toward achieving this goal, they did not have final charters prepared for most of the planned committees and only one committee was actively meeting by May 2022, the end of audit fieldwork.

Below is a list of elements that thorough board committee charters should include.

- Mission statement or clear statement of purpose including the broad objectives the committee intends to accomplish
- Description of the composition of the committee including how members are to be selected and how members could vacate or be removed from the committee; this section should also include if the committee membership would benefit from regular rotation of members
- Authority granted the committee to make specific decisions and/or take specific actions; this also includes whether the committee is granted the authority to seek outside consultants to assist it in fulfilling its duties and responsibilities
- Designation of specific responsibilities and work tasks — although the objectives of the board committee may be broader, this section should provide specific activities the board committee intends to perform to meet its objectives and fulfill its mission/purpose
- Description of how the committee will approach its meetings — frequency (predetermined intervals or "as needed" with a minimum number of gatherings), format of meetings, what constitutes a quorum, etc.

- Requirements for how meeting minutes should be taken and retained as records of the activities of the board committee
- Process of how the committee will report on its activities to the full board
- Criteria for how the board committee will be evaluated for effectiveness (e.g., annual self-evaluation, survey of the full board, third-party evaluation)
- Notation of the effective date of approval as well as the date of future review/update

Maintaining thorough board committee charters helps to ensure that each board committee will be productive and efficient in its work to support the PWSA Board. Having defined responsibilities and designated work tasks to achieve those responsibilities promotes the fulfillment of intended committee objectives.

3. **The Pittsburgh Water & Sewer Authority does not have an internal audit department.**

As mentioned above, the PWSA did not maintain an internal audit department as of May 2022, the end of audit fieldwork. Internal audit departments provide objective insight into an organization's operations; improve operating efficiency; and can help detect, prevent, and correct fraud, waste, and abuse. Creating an internal audit department is recommended as a best practice for regulated utilities, including large municipal authorities. Bringing on an experienced internal auditor will aid the PWSA develop and mature its business processes. Furthermore, internal audit will help establish a risk management function and will work as a partner to the PWSA Board's AC (See Finding & Conclusion No. 1). Finally, having a functioning internal auditor that reports to the AC is an industry best practice. For the foregoing reasons, the establishment of an internal audit function is critical to the PWSA's long-term success.

Recommendations

1. Form a PWSA Board Audit Committee and implement most of the NYSE's Corporate Governance Rules and the SEC's Final Rules for Audit Committees.

2. Develop charters and activate all proposed board committees.

3. Hire an experienced internal auditor and develop an internal audit function.

V. FINANCIAL MANAGEMENT

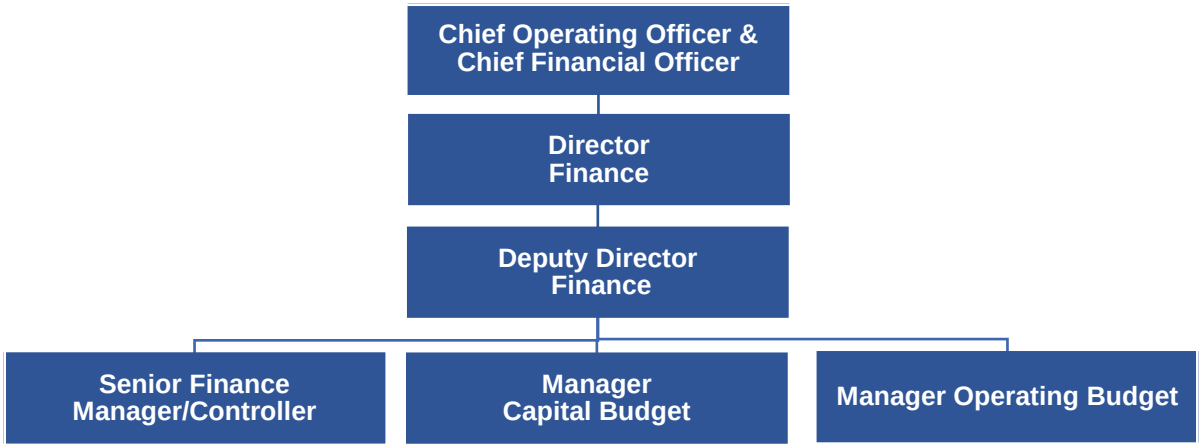
Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under the Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA. This chapter discusses the financial management organizational structure and respective roles and responsibilities at the PWSA.

The financial management function handles responsibilities in accounting, budgeting/forecasting, and cash/debt management. The PWSA creates a five-year capital improvement plan and an operating budget, annually. In addition, a consultant was hired to develop a cost of service and rate design spreadsheet to be used for financial forecasting which was submitted to the PUC during the various tariff filings.

As shown in Exhibit V-1, the PWSA's Finance Department is overseen by the Chief Operating Officer & Chief Financial Officer (COO&CFO). The Director of Finance is responsible and accountable for the leadership and strategic direction of the performance, management, and development of the PWSA's Finance Department. As of January 2022, the PWSA hired a Deputy Director of Finance who is responsible for directing, planning, and managing the day-to-day operations of the Finance Department including the implementation of standards, targets, policies, and processes to ensure the PWSA's financial stability and operational efficiency and effectiveness.

Exhibit V-1
Pittsburgh Water & Sewer Authority
Finance Department Organizational Structure
As of April 2022



Source: Data Request EM-34

The Senior Finance Manager/Controller performs professional management and supervisory work to support the Director and Deputy Director of Finance as well as to plan, direct, coordinate, lead, and supervise the accounts payable, accounting, financial reporting, and treasury activities. The Manager, Capital Budget and Manager, Operating Budget positions were created near the end of audit fieldwork; therefore, no job descriptions were available for review.

The PWSA uses financial metrics, such as the debt service coverage (DSC) ratio and days cash on hand,[5] both of which are shown in Exhibit V-2, as a guide to create the capital and operating & maintenance (O&M) budgets. The process uses historic data to estimate revenues in the following fiscal year. This estimate provides a baseline to plan expenditures while still meeting desired financial metrics. Departmental budgeting is then disbursed from the determined overall baseline.

Exhibit V-2
Pittsburgh Water & Sewer Authority
Senior and Subordinate Debt Service Coverage Ratios and Days Cash on Hand
For the Years 2019 – 2021

	2019	2020	2021
Final Senior DSC (1.25 x minimum)	2.16	1.51	1.74
Final Subordinate DSC (1.10 x minimum)	1.58	1.23	1.44
Days Cash on Hand (including ALCOSAN expense)	173	155	160
Theoretical Days Cash on Hand (ALCOSAN Billings Net Zero[6])	250	225	270

Source: Data Requests FM-39 and FM-55

To rate its financial position against similarly sized municipally owned water and wastewater authorities, the PWSA participated in a study of DSC and days cash on hand in 2019. Out of 11 peers, the PWSA ranked ninth. This concerning financial situation has resulted from inappropriate decisions of prior leadership that resulted in insufficient rates and a complicated heavy debt burden (See Finding and Conclusion No. 1).

The Finance Department leadership team actively monitors annual capital and O&M budget spending levels along with the other described financial metrics. A formal report is provided to the PWSA's Board of Directors (PWSA Board) monthly, and financial performance results are informally discussed during quarterly budget meetings with all departments. Budget transfers occur on an ad hoc basis depending on departmental needs. All budget transfers are completed on a net zero basis so that budgets stay within the approved levels.

[5] The DSC ratio is how much cash a company makes for every dollar of principal and interest that it owes. Days cash on hand is the number of days that a company can cover operating expenses with the amount of cash available.
[6] The 1955 Servicing Agreement with ALCOSAN requires the PWSA to remit 100% of billings without concern for amounts collected which creates a loss for the PWSA - See Finding and Conclusion No. 3. If the ALCOSAN billing was a net zero pass-through of amounts collected on behalf of ALCOSAN billings, the PWSA would not be subject to this inequitable financial strain.

The PWSA asserts that operating funds are monitored closely. Each day, the Accounting Specialist updates the daily cash report and distributes it throughout the Finance Department, including to the COO&CFO, as well as to the Chief Executive Officer and to a member of the PWSA Board. A formal reconciliation is done monthly for all accounts. The PWSA also performs a daily reconciliation of the collection account because this account, by far, has the most activity. The PWSA does not have formal cash forecasting policies; however, the cash balance is forecasted at least once a month. As part of the monthly close, actual revenues and expenses are compared to budgeted levels which allows for a projection to be made of how cash levels will be impacted over the remainder of the year. Budgetary adjustments may be made to ensure the desired cash balance is maintained.

The only short-term borrowing that the PWSA has in place is a capital line of credit. The capital line of credit is used to fund capital expenses while long-term financing is obtained. The PWSA issues municipal bond debt to repay the capital line of credit as it nears the capacity limit. Debt service accounts are funded semi-annually for principal and interest payments due on fixed rate borrowings and monthly for counterparty payments based on requirements for variable rate borrowings and associated swaps which are explained further in Finding and Conclusion No.1. The trustee sends a file with the debt service requirements which are then reviewed before payments are made. Amortization schedules are created and maintained which generate monthly posts to the general ledger.

Findings and Conclusions

Our examination of the financial management function focused primarily on a review of accounting/finance policies, procedures, and processes; the capital and operating and maintenance (O&M) budgeting processes; budget variance tracking and reporting; and long- and short-term financing. Pension funding would normally be reviewed during a Management and Operations Audit; however, because the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City), the City bears the responsibility of managing the funding of the pension plan in which the PWSA participates. Based on our review, the PWSA should initiate or devote additional effort to improving the efficiency and/or effectiveness of the financial management function by addressing the following:

1. The Pittsburgh Water & Sewer Authority is accruing an excess of interest expense because of complex variable and fixed rate debt from past issuances at high interest rates.

The PWSA's long-term borrowings include fixed rate municipal bond borrowings, variable rate borrowings with associated swaps[7], and Pennsylvania Infrastructure Investment Authority (PENNVEST) loans. Exhibit V-3, on the next page, shows the breakdown of outstanding long-term debt.

[7] A swap is an agreement between two counterparties to exchange financial instruments, cash flows, or payments for a certain amount of time.

The PWSA's long-term borrowings follow the parameters within the Debt Management Policy that was approved by the PWSA's Board of Directors (PWSA Board) on October 26, 2018. The financing highlighted in yellow in Exhibit V-3 shows debt issuances that were executed prior to the approval of the new Debt Management Policy. The high interest rates of the 2019 issuances are deemed reasonable when considering the financial circumstances surrounding the PWSA at the time.

The Debt Management Policy states:

> It is the intention that the PWSA use fixed rate debt whenever possible. When determining the balance between fixed and variable rate debt, the goal is to provide the PWSA with a balanced debt portfolio that manages the desire for the certainty of known quantity of future debt service payments provided by fixed rate debt versus the historically lower interest costs provided by variable rate debt.

Exhibit V-3
Pittsburgh Water & Sewer Authority
Outstanding Long-Term Debt
As of December 31, 2021

Year of Issuance	Outstanding Principal at Year-End 2021	Current Interest Rate	Annual Interest Expense	Principal Paid	Type of Financing	Debt Service
1998	$66,454,000				Capital Appreciation Bond	Back Loaded
2013	$51,040,000	5.62%	$3,328,200	$8,190,000	Fixed Rate Bonds	Wrapped
2013	$38,760,000	5.25%	$2,034,900	-	Fixed Rate Bonds	Back Loaded
2017	$218,806,000	4.50%	$9,848,888	-	Variable Rate Bonds	Wrapped/ Back Loaded
2017	$102,310,000	5.43%	$6,301,900	$13,650,000	Fixed Rate Bonds	Back Loaded
2019	$105,145,000	5.00%	$5,378,000	$2,415,000	Fixed Rate Bonds	Level
2019	$104,290,000	4.68%	$4,877,900	-	Fixed Rate Bonds	Back Loaded
2020	$890,000	0.53%	$4,673	-	Fixed Rate Bonds	Back Loaded
2020	$91,520,000	3.11%	$2,845,463	-	Fixed Rate Bonds	Level
Ongoing	$107,077,355	1.56%	$1,080,344	$3,624,193	PENNVEST Loans	Level
Total	**$886,292,355**		**$35,700,267**	**$27,879,193**		

Source: Data Requests FM-56 and FM-64

In addition, according to the PWSA's Financial Management Policy, the internal variable rate debt limit is 10% of total capitalization; however, the PWSA excludes variable rate debt that is hedged by derivative products, such as interest rate swap agreements, when calculating this percentage. The PWSA stated that they are cautious about using variable rate debt because of the potential for increased risk and only

sparingly use it to provide flexibility in the capital program while managing rate exposure. The Finance Department must apprise the PWSA Board of the benefits of using variable rate debt to request pre-approval. It is the PWSA's belief that variable rate issuances may provide them with a material cost advantage. The rationale for this is that the amount of cash and short-term assets the PWSA has on hand provides a natural hedge for variable rate debt. Furthermore, changes in interest rates impact both assets and liabilities, but the change is in opposite directions. It is the auditors' opinion that this would result in higher interest expense and lower revenue on the income statement as well as reduced cash flow.

The Finance Department, led by the current Director of Finance, has made great strides in improving the PWSA's financial condition and has stated that the focus, moving forward, is on fixed, low-interest rate debt with level debt service. The most recent bond issuance in 2020 was favorable for the PWSA. There was great interest from the bond marketplace; the PWSA had twice as many interested investors as bonds were available.

The PWSA stated that existing debt will be refinanced when economic conditions are advantageous and/or other considerations demand. A monthly present value analysis is prepared to analyze the potential savings and the costs of refinancing. This analysis includes calculations on each transaction as well as on a maturity-by-maturity basis. For the PWSA to consider proceeding with refinancing, the present value savings (PVS) on the transaction should be 3% or greater of the principal amount. An exception could be granted if refinancing provides other financial benefits such as terminating outstanding derivative agreements and/or bond insurance agreements, or if trust indenture changes are desirable. Refinancing the variable rate bonds, when callable, would not be cost effective as termination fees could be anywhere between $50 – $60 million. It should be noted that the 1998 Capital Appreciation Bond cannot be refinanced due to the trust indenture. Presently, PENNVEST loans have a funding requirement that an associated capital project be in progress; however, the Director of Finance alluded to potential availability to refinance higher interest debt with PENNVEST loans in the future. The ability to refinance high interest debt with PENNVEST debt was not available as of May 2022, the end of audit fieldwork. As the PWSA's credit continues to improve and bond markets are more favorable as a result, lower interest options may be available for refinancing historical, costly debt issuances.

Regulated utilities should minimize debt costs to keep rates as low as possible to ratepayers. In addition, regulated utilities traditionally do not finance capital programs with variable rate debt due to excessive risk. Regardless of how assets and liabilities would oppose each other, if interest rate increases were to occur, ratepayers could still be negatively affected by increasing rate environments.

The PWSA is paying excessive interest and must continually evaluate refinancing options, such as grants and/or more favorable bonds through improved credit, to improve its outstanding debt portfolio. Exhibit V-4 shows the potential annual savings if higher interest fixed rate bonds were refinanced with the PWSA's imposed PVS of 3% of principal in mind. This is without factoring in advantages of terminating

derivative agreements, bond insurance agreements, or trust indenture changes. The PWSA could save approximately $12 million, annually.

Exhibit V-4
Pittsburgh Water & Sewer Authority
Potential Annual Savings through Refinancing Past Debt Issuances
For Issuances Executed in the Years 2013, 2017, and 2019

Year of Issuance	The PWSA's Required PVS 3% of Principal
2013	$1,531,200
2013	$1,162,800
2017	$3,069,300
2019	$3,154,350
2019	$3,128,700
Total Annual Savings	**$12,046,350**

Source: Data Request FM-56 and auditor analysis

2. The Finance Department of the Pittsburgh Water & Sewer Authority does not have adequate controls in place to verify the accuracy of invoices for purchased services.

Per the 2019 Cooperation Agreement between the City and the PWSA, the PWSA is required to pay for numerous services that are performed by the City's Maintenance Department. The City provides the PWSA with spreadsheets detailing services performed, such as street sweeping, fleet maintenance, and fuel charges; however, the data is voluminous, and therefore, the PWSA has historically relied on the City to accurately invoice and did not perform reviews prior to payment.

For the two years 2020 and 2021, there were two street sweeping charges which were inordinately high compared to like charges throughout the period. The City was only able to provide definitive support for one of these two charges which proved the inaccuracy of the charge to the PWSA for its share of street sweeping activities. This inaccuracy along with the second suspected inaccuracy resulted in the PWSA potentially being overcharged an estimated $27,304 during the two-year period. The PWSA is encouraged to present these claims to the City for refund.

Because the PWSA does not review the accuracy of charges billed by the City, it is not maintaining appropriate internal control over spending. The PWSA indicated that it was relying on the City's controls to invoice accurately; however, as a separate entity, it is not the City's responsibility to control the PWSA's spending activities. The PWSA lacks the proper controls needed to ensure the accuracy of charges.

Adequate controls should be in place to verify that the PWSA is being accurately charged for purchased services. If supporting data of charges is too voluminous to be

reviewed at year-end when the invoice is provided, the PWSA should request monthly supporting data be submitted throughout the year, as services are provided, to allow for adequate review. The PWSA would then be able to verify that amounts it reviewed monthly equate to the annual charge on the invoice at the end of each year. It should be noted that such weaknesses in internal control can promptly be found and addressed by an experienced internal auditor (See Finding and Conclusion No. 3 in chapter IV – Corporate Governance).

3. The Pittsburgh Water & Sewer Authority is not being adequately reimbursed to bill customers on the Allegheny County Sanitary Authority's behalf.

Per paragraph 11 of the 1955 Servicing Agreement between the City and the Allegheny County Sanitary Authority (ALCOSAN), ALCOSAN is to reimburse the City for "reasonable expenses incurred" during the previous calendar year associated with providing water usage readings necessary for ALCOSAN to calculate the amounts due from the PWSA's customers for sewage treatment. Then, per paragraph 14 of the same agreement, ALCOSAN is required to refund the City for administering billing services on behalf of ALCOSAN in an amount equal to the average cost per customer that ALCOSAN experiences to bill its other customers. After the City established the PWSA, the City assigned its administrative responsibilities of the 1955 Servicing Agreement to the PWSA. See Finding and Conclusion No. 4 in chapter III – Executive Management and Organizational Structure for more thorough explanation of this situation.

The levels at which ALCOSAN reimbursed the PWSA for administering billing services on ALCOSAN's behalf were stagnant throughout the audit period and were inadequate to cover the PWSA's incurred costs. In addition, there was no evidence of any reimbursement to cover the PWSA's clerical costs incurred to provide water usage readings to ALCOSAN.

Shown in Exhibit V-5, ALCOSAN reimbursed the PWSA the following annual amounts from 2018 – 2021 for billing costs on ALCOSAN's behalf. The PWSA explained that ALCOSAN states that it calculates this amount per the terms of the servicing agreement.

Exhibit V-5
Pittsburgh Water & Sewer Authority
Compensation Submitted by ALCOSAN for Billing Services
For the Years 2018 – 2021

Year	Amount
2018	$323,984
2019	$332,006
2020	$335,855
2021	$351,793

Source: Data Request FM-68

An estimate of the actual cost the PWSA incurred in 2021 to provide billing services on behalf of ALCOSAN was approximately $1.2 million as opposed to the approximate average billing reimbursement of $336,000 paid by ALCOSAN over the years 2018 – 2021. Therefore, the PWSA is absorbing the excess billing costs by approximately $864,000[8], annually. Considering an average borrowing rate of 5%, this insufficient reimbursement potentially adds an additional annual interest expense of $43,200. This equates to a total annual savings of approximately $907,000 if ALCOSAN were to adequately reimburse the PWSA for these services. Between insufficient billing revenue and absorbed bad debt of ALCOSAN's pass-through billings as explained in Finding and Conclusion No. 4 of chapter III – Executive Management and Organizational Structure, this arrangement is causing millions of dollars in unnecessary losses per year adding to the PWSA's debt.

Although language in the 1955 Servicing Agreement indicates that ALCOSAN is only responsible to reimburse the PWSA for "reasonable expenses incurred" and for billing services at an average cost ALCOSAN experiences, services provided to a non-affiliated entity should be charged at the higher of cost or market. This will be an important consideration during contract renegotiation with ALCOSAN as is recommended in Finding and Conclusion No. 4 in chapter III – Executive Management and Organizational Structure. Once equitable terms allow for the PWSA to charge the higher of cost or market for billing services to ALCOSAN, the PWSA should perform, or have performed by a consultant, a billing service cost analysis on a routine basis to ensure that it continues to be appropriately reimbursed for these services.

4. The Pittsburgh Water & Sewer Authority has not conducted an internal, formal analysis to determine if its Finance Department has adequate internal controls by maintaining appropriate separation of duties.

The Director of Finance confirmed that an analysis of separation of duties had not yet been performed outside of the annual review of internal controls over financial reporting performed by the PWSA's external auditor. The Director of Finance asserts that internal controls are reviewed and updated when appropriate. The Director of Finance expressed the need to reassign some job responsibilities as the department continues to expand to optimize separation of duties. Moreover, the PWSA has not fully updated the Senior Finance Manager/Controller job description to reflect this position's actual duties/responsibilities as the Finance Department has grown. Outdated job descriptions and the addition of the new role of Deputy Director of Finance led to an incomplete assessment of appropriate separation of duties. The PWSA is currently determining the appropriate distribution of responsibility as new employees are being hired into the Finance Department which indicates this would be an ideal time to perform this analysis.

Best practices for the most effective internal control are to have the accounting and treasury functions separate; however, the most important goal is to maintain appropriate separation of duties. Proper oversight of core functions within accounting

[8] $1,200,000 (estimated costs incurred) - $336,000 (approximate average reimbursement) = $864,000 (insufficient annual reimbursement amount)

and treasury may not be possible while employees have conflicting responsibilities/duties. It should be noted that an internal auditor would be able to suggest improvements to compensate for the lack of personnel and segregation of duties (See Finding and Conclusion No. 3 in chapter IV – Corporate Governance).

5. The Pittsburgh Water & Sewer Authority's past due collection procedures are delaying the timely collection of past due customer billings.

In June 2021, after lifting a voluntarily extended COVID-related moratorium, the PWSA Board and Chief Executive Officer implemented a procedural requirement that the Customer Service Department was to make a documented courtesy telephone call attempt to all customers reaching 60 days past due before the termination process could begin.

Implementing this procedure required disabling of the automation capabilities of the PWSA's customer information system for the termination process. Including this additional personal telephone call, which requires manual handling of the termination process, has delayed the termination process by two months[9]. Termination notices automatically processed through the customer information system were issued within the same month; however, under the new procedures, the termination notices are not being released until the third month after the customer reaches the 60-day delinquency point.

52 Pa. Code § 56.331 provides regulations regarding general notice provisions and required content of termination notices for customers. The code states that the public utility shall mail or deliver written notice to the customer at least ten days prior to the date of the proposed termination. The regulations go on to describe information to be provided in the written notice, but the regulations do not require a personal telephone call to the customer before the termination process is allowed to be initiated. This regulation was put into effect to provide guidance to utilities with the intent to provide ample notification to customers while balancing the need for utilities to timely collect on customer billings. Utility companies are held accountable to keep overall arrearage as low as possible. There are some best practices that assist companies in managing arrearage levels such as ensuring to consistently use an equitable service termination process to encourage customer payment through natural consequences for non-payment.

The success of the collections process is reduced over time; therefore, it is imperative that collections efforts are initiated as swiftly as possible. The PWSA is experiencing excessive arrearage levels as is described in more detail in Finding and Conclusion No. 2 in chapter IX – Customer Service. Delaying the termination and collection processes by an additional two months is a contributing factor to this trend.

[9] On average, about 77 hours a week have been devoted to making the initial personal telephone calls and manually processing the terminations which equates to approximately $1,800 in salary being expended on the process per week. In a year's time, over 4,000 hours would be spent performing the manual process costing approximately $94,000, annually.

6. The Pittsburgh Water & Sewer Authority does not have a formal guiding document to govern the budgeting processes.

As of November 1, 2021, the beginning of audit fieldwork, the Director of Finance was responsible for the preparation of the annual capital and operating and maintenance (O&M) budgets for the PWSA Board's approval. The Director of Finance would solicit budget requests from all departments which were analyzed and included in the budget proposals. The goal of the process was to ensure each department would have the appropriate funding to achieve the PWSA's financial and organizational goals. In January 2022, a Deputy Director of Finance was hired to assume this responsibility.

As previously explained, budget transfers occur on an ad hoc basis as departmental needs arise. All budget transfers are completed on a net zero basis so that budgets stay within the approved levels. In practice, the Finance Department meets with all departments at least quarterly to review the status of budgets; however, no formal guiding documents exist to define the budgeting processes nor the handling of budget variances and/or necessary adjustments. On October 20, 2021, the Finance Department set a goal to start developing budget process guiding documents within the next fiscal year.

The PWSA had no formal reports to provide written explanations for capital and/or O&M spending variances to disseminate to the PWSA Board. During interview, the Director of Finance explained that he maintains personal notes in preparation for discussions with executive management and the PWSA Board; however, these are not retained in a formal report.

Historically, management has failed to recognize the benefit and necessity of having these guiding documents to govern the budgeting processes and improve accountability. Consequently, a potential for errors or inconsistent work practices in the budgeting processes could result. Moreover, the PWSA frequently experiences material capital and O&M budget variances, both in dollars and percentages, which could be improved through greater accountability with the documentation, review, and explanation of budget variances.

Budgeting processes should be clearly documented in a formal guiding document. At a minimum, topics should include the timeline for completing the budgeting process each year, how each step of the process should be executed and documented, how variances should be monitored and documented, and how adjustments to already approved budgets should be handled. As a best business practice, budget variance processes should require written explanations for variances meeting an actionable threshold (e.g., certain dollar amount, +/- 10%), by line item, to be retained in formal reports. This information is useful for future budgeting and decision making.

7. The Pittsburgh Water & Sewer Authority's borrowing and debt management guiding documents do not include Pennsylvania Public Utility Commission filing requirements.

The PWSA has the following borrowing and debt management guiding documents:

- Debt Narrative
- Debt Management Policy
- Financial Management Policy
- Post-Issuance Compliance Policy

Although these borrowing and debt management guiding documents explain the PWSA Board's, executives', and third parties' expectations, none of these include the appropriate Pennsylvania Public Utility Commission (PUC or Commission) filing requirements. Most of the debt issuances and management guiding documents were approved before the PWSA came under PUC jurisdiction. The employees of the Finance Department may unknowingly fail to file an application for the appropriate securities certificate and/or fail to notify the Commission when issuing and executing future debt issuances.

Title 66 Chapter 19 grants the Commission the right to require a notice of registration to be filed before the utility issues or assumes securities. At 52 Pa. Code § 3.601, the PUC requires a public utility to file and receive notice of registration of a securities certificate before the public utility issues or assumes securities. In addition, at 52 Pa. Code § 3.602, the PUC requires an abbreviated securities certificate when financing has been authorized by another state commission having primary jurisdiction or financing is provided by another agency of the state of Pennsylvania; therefore, a water utility securing a loan through PENNVEST would fall under this regulation.

Recommendations

1. Payoff and/or refinance higher interest variable and fixed rate debt with proceeds from grants or more favorably priced loans.

2. Develop and implement controls to verify the accuracy of all invoices for purchased services.

3. Track actual billing service costs incurred to bill customers on ALCOSAN's behalf to work toward charging ALCOSAN the higher of cost or market for these services through servicing agreement renegotiations.

4. Adequately staff the financial function and maintain separation of duties.

5. **Follow 52 Pa. Code § 56.331 when initiating the service termination process to balance sufficient customer notification with timely collection of past due customer billings further streamlined by enabling the automation process available to the PWSA through its customer information system.**

6. **Develop and mature the capital and O&M budgeting process including maintaining formal documentation as well as full analysis of material budget variances.**

7. **Revise borrowing and debt management guiding documents to include the appropriate PUC filing requirements.**

VI. OPERATIONS

Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under Pennsylvania's Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA. This chapter describes the PWSA's three utility service types being potable water distribution, wastewater conveyance, and stormwater management.

The PWSA's Operations Department is currently working with the PUC and the Pennsylvania Department of Environmental Protection (PADEP) on approved compliance plans, infrastructure plans, consent orders, and other various mandates to improve water quality and reliability for the PWSA's customers. In some cases, these plans and orders precede the current audit period, and some areas of operations and compliance were only reviewed as opposed to assessed to avoid redundant findings and recommendations from other agencies. A list of current plans and orders are provided below:

- PADEP – Consent Order and Agreement — speaks to regulatory issues related to lead service line replacements, corrosion control treatment, and other related matters during the period 2013 – 2017 (November 2017)

- PUC – Stage One Compliance Plan (CP1) — addresses how the PWSA will achieve regulatory compliance, including changes/improvements to existing information technology, accounting, billing, collection, and other operating systems and procedures (September 2018)

- PADEP – Consent Order and Agreement — focuses on critical upgrades to water distribution system infrastructure to restore functionality and resiliency specifically relating to rising water mains, reservoirs, and pump stations (September 2019)

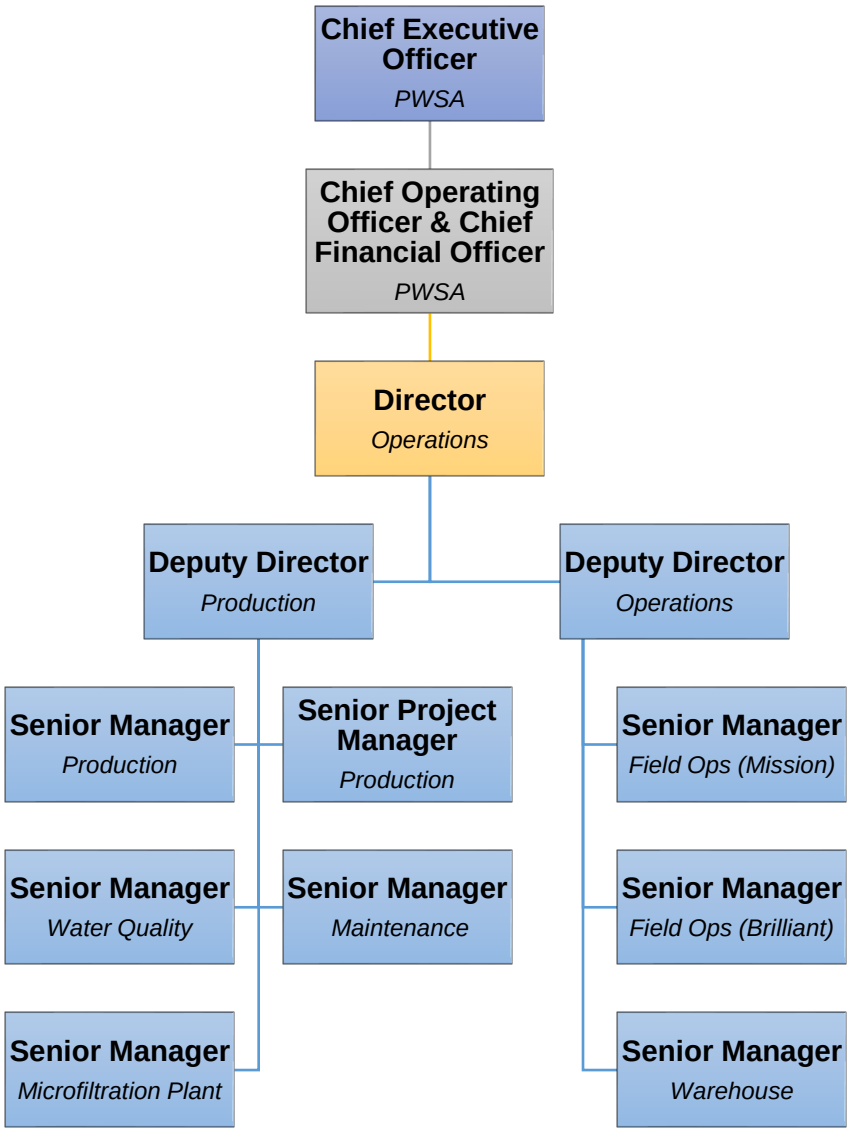
- PUC – Long-Term Infrastructure Improvement Plan (LTIIP) — documents a multiyear investment program that is limited to eligible property; an LTIIP is required for utilities seeking to implement a Distribution System Improvement Charge (DSIC) (April 2020)

A. Water System

The PWSA performs water treatment and distribution functions through its water operations business units of the Operations Department. As shown in Exhibit VI-1, the water operations function is under the guidance of the Director, Operations. The Deputy Director, Production and Deputy Director, Field Operations oversees the treatment and

distribution functions. Five managers lead the five production business units of water operations; two senior managers oversee each of the two service centers, Brilliant and Mission; and there is a senior manager over the warehousing activities.

Exhibit VI-1
Pittsburgh Water & Sewer Authority
Water Operations Organizational Structure
As of April 2022



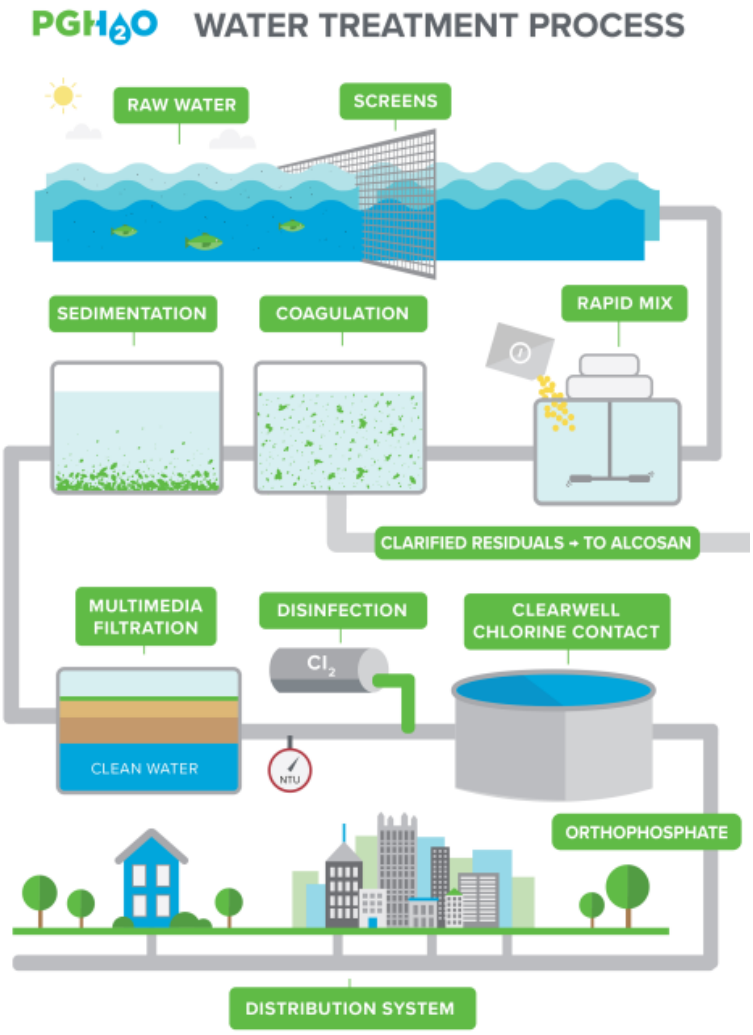
Source: Data Request EM-34

The following is an overview of the responsibilities of the water operations business units.

- **Production Functions:**

  – **Production** – treats raw water withdrawn from a lone source, the Allegheny River, at the Water Treatment Plant (WTP) through conventional flocculation[10], sedimentation, and rapid filtration. This process is depicted in Exhibit VI-2. The WTP has a capacity of treating 117 million gallons (MG) per day. Treated water is sent to the storage system consisting of three reservoirs, two of which are covered and the third is open air, and 10 distribution storage tanks. Total storage capacity is approximately 455 MG.

Exhibit VI-2
Pittsburgh Water & Sewer Authority
Water Treatment Process



Source: Water Quality & Treatment Pittsburgh Water & Sewer Authority (pgh2o.com)

  – **Water Quality** – monitors the quality of water throughout the treatment process and communicates results to the production team

  – **Maintenance** – based at the WTP; maintains the piping, grounds, and equipment at the WTP, pump stations, tanks, and reservoirs

[10] Flocculation is a water treatment process by which a chemical coagulant is added to the water which bonds particles of suspended solids creating larger aggregates which are easier to remove.

- **Operations Functions:**

  - **Field Operations** – maintains all distribution infrastructure operated by the PWSA which is made up of approximately 964 miles of mains, 81,000 services, 7,450 hydrants, 26,200 valves, and various pump stations throughout the system

  - **Warehouse** – purchases and manages materials, tools, and equipment needed to maintain operations (a more in-depth description is available in Chapter VIII – Purchasing and Materials Management)

As shown in Exhibit VI-3, the water main system is comprised of over 26 different diameter sizes of pipe. A significant amount of pipe (65.2% of total pipe) is either 6-inch or 8-inch. Pipe material was not available at the time of audit fieldwork but has been established as an issue in the PWSA's CP1. The PWSA has been able to identify about 26% of pipe material using old as-built drawings and will continue to update this information as it is identified and as pipe is replaced in the system. Most of the identified pipe has been ductile iron (97.0%) and cast iron (2.4%).

Exhibit VI-3
Pittsburgh Water & Sewer Authority
Diameter and Mileage of Water System

Diameter (Inches)	Feet	Miles	Diameter (Inches)	Feet	Miles
4	137,987	26.1	36.00	83,099	15.7
6	2,186,800	414.2	42.00	11,711	2.2
8	1,134,787	214.9	42.50	12,598	2.4
10	84,172	15.9	48.00	16,556	3.1
12	615,728	116.6	50.00	23,231	4.4
14	1,296	0.2	50.25	12,005	2.3
15	15,500	2.9	60.00	55,175	10.4
16	259,987	49.2	66.00	1,492	0.3
18	266	0.1	72.00	3,697	0.7
20	209,650	39.7	84.00	3,979	0.8
24	85,170	16.1	96.00	4,560	0.9
28	104	0.0	120.00	524	0.1
30	116,524	22.1	Undefined	15,263	2.9
Total Miles of Main = 964.4					

Source: Data Request WO-11 and auditor analysis

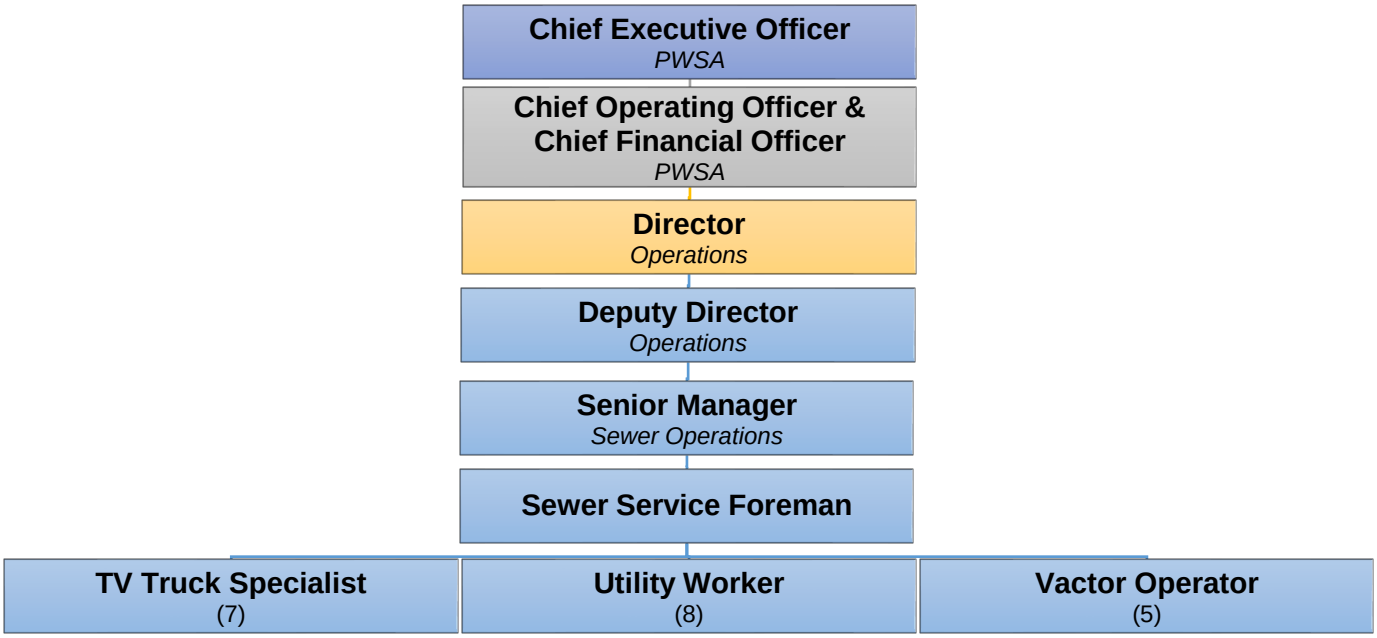
The PWSA uses *e-builder*, a web-based project management system, which allows for internal and external project managers to manage project budgets and process reports, schedules, change orders, contractor invoice payments, and other critical project related activities. This project management system is used to manage interactions and prepare budget estimates and allows project owners to modify processes to customize preferences based on project needs. *e-builder* has taken the PWSA from a paper-based system to a fully electronic, collaborative, and centralized web-based system. Since implementation, the PWSA has experienced measurable improvements including reductions in change orders, invoice approvals, and contractor payment application processing times as well as increases in contractor bidding participation of minority, women-owned, and disadvantaged business enterprises. The PWSA anticipates continuing to develop and refine its use of *e-builder* to accommodate the expansion of its capital improvements programs (i.e., Capital Investment Program, LTIIP, Lead Service Line Replacements).

In addition, field employees use a mobile work management system, *SpryMobile* (*Spry*), to track and monitor work orders and maintenance activities. *Spry* leverages a cloud hosted management system that can be interfaced with the PWSA's information systems enabling field employees to receive and update work orders remotely. The software assists in asset management and holds work orders for system repairs, inspections, and preventative maintenance activities. Furthermore, *Spry* manages company resources including staffing and scheduling and tracks available tools and materials in warehouse inventory. Field employees receive dispatch notifications, access customer information, and obtain mapping services through geographic information system integration which streamline work processes.

B. Wastewater/Sanitary System

The PWSA facilitates sanitary functions separately from the water operations business units. The organizational structure of the sewer operations business unit is displayed in Exhibit VI-4. Sewer operations is under the direction of the Senior Manager, Sewer Operations. Field operations is under the direction of the Sewer Service Foreman who reports to the Senior Manager, Sewer Operations. The field crews consist of three classifications: TV Truck Specialists, Vactor Operators, and Utility Workers. TV Truck Specialists conduct closed-circuit camera inspections of the sewer network to designate problem areas in the system by operating a camera while inspecting via a television monitor inside the truck. Vactor Operators operate vacuum trucks targeting blocked areas of the system. Finally, Utility Workers conduct inspections of the system, clean catch basins, and perform maintenance as needed.

Exhibit VI-4
Pittsburgh Water & Sewer Authority
Sewer Operations Organizational Structure
As of April 2022



Source: Data Request EM-34

The PWSA does not perform sewage treatment services. The PWSA is responsible for sewage conveyance for both its own customers and the municipalities surrounding the City. Sewage is conveyed through a combination of gravity and four pump station locations to the Allegheny County Sanitary Authority (ALCOSAN) for sewage treatment. The composition materials and miles of main in both the wastewater and stormwater systems (much of the system is combined wastewater and stormwater) are displayed in Exhibit VI-5.

Exhibit VI-5
Pittsburgh Water & Sewer Authority
Material Types and Mileage of Wastewater and Stormwater System

Material	Miles	% Total
Asbestos Cement	0.08	0.010%
Brick	69.10	5.600%
Brick/Stone	3.40	0.300%
Cast Iron	2.10	0.200%
Corrugated Metal Pipe	1.60	0.100%
Concrete/Brick	3.30	0.300%
Concrete Pipe	5.10	0.400%
Clay Tile	0.20	0.020%
Ductile Iron Pipe	5.10	0.400%
High-Density Polyethylene	0.02	0.002%
Polyethylene	1.20	0.100%
Polypropylene	0.10	0.010%
Polyvinyl Chloride	43.90	3.600%
Reinforced Concrete Pipe	108.80	8.800%
Reinforced Plastic Pipe	0.10	0.010%
Steel Pipe	0.20	0.020%
Vitrified Clay Pipe	731.60	59.200%
Unknown/Undefined	259.70	21.000%
Total	**1,235.60**	**100.000%**

Source: Data Request SS-30

Much of the PWSA's wastewater and stormwater system is antiquated, as 86% of the system is composed of clay, brick, and unknown materials. A sizable portion of the system also has an antiquated design due to combined wastewater and stormwater pipe. In time, the combined pipe will need to be addressed due to heavier storms frequently causing combined sewer overflows (CSO). CSO events must be reported to the PADEP. As of May 2022, the end of audit fieldwork, approximately 72% of the system consisted of combined wastewater and stormwater.

Due to historic interconnected construction design, if an upstream community's system has significant infiltration[11] of sanitary or combined overflows, this is received into and causes additional strain on the PWSA's system. Although this is not the PWSA's fault, it becomes the PWSA's responsibility to manage. There are continuous

[11] Infiltration is when groundwater enters the sewer or combined systems through broken pipe.

collaborations among the PADEP, the PWSA, and the surrounding communities to identify improvement opportunities and to clarify funding responsibilities. Final plans to renovate and modernize the company's systems have yet to be established.

The PWSA has been focusing most capital efforts on PADEP mandated projects and upgrades to the WTP. As a result, the company has not been proactively upgrading the wastewater system beyond mandated projects. In general, drinking water projects have been prioritized above wastewater projects considering the condition of both systems. Significant improvement is needed in the wastewater system, especially the need for modernization of design and materials; however, the auditors are aware of the regulatory requirements combined with limited capital resources that have deemed this unfeasible for the foreseeable future. Further investigations of the PWSA's wastewater system will be performed during future audits and feasible improvement measures will be reconsidered at that time.

C. Stormwater System

The PWSA's stormwater operations business unit shares the sewer operations business unit's Utility Workers for maintenance work. With much of the wastewater and stormwater system being combined, the Utility Workers are responsible to clear both combined and stormwater exclusive catch basins.

In November 2021, the PUC approved the PWSA's request[12] to implement a stormwater fee, effective January 12, 2022, which is based on a property's hard or impervious surface area. This rate structure is modified from the water and wastewater charges which are based on water usage. The intent of the stormwater fee is to fund stormwater projects and initiatives needed to improve stormwater management in the City.

To reduce hard and impervious surface area, which magnifies stormwater impact during rain events, a common stormwater project is the development of green areas. Wherever possible, the inclusion of vegetation within impervious surface areas helps absorb stormwater and allows for extended retention time before this water reaches the already frequently overloaded stormwater system. Another common project is the installation of retention areas that can hold, and more slowly release over time, stormwater as waters recede.

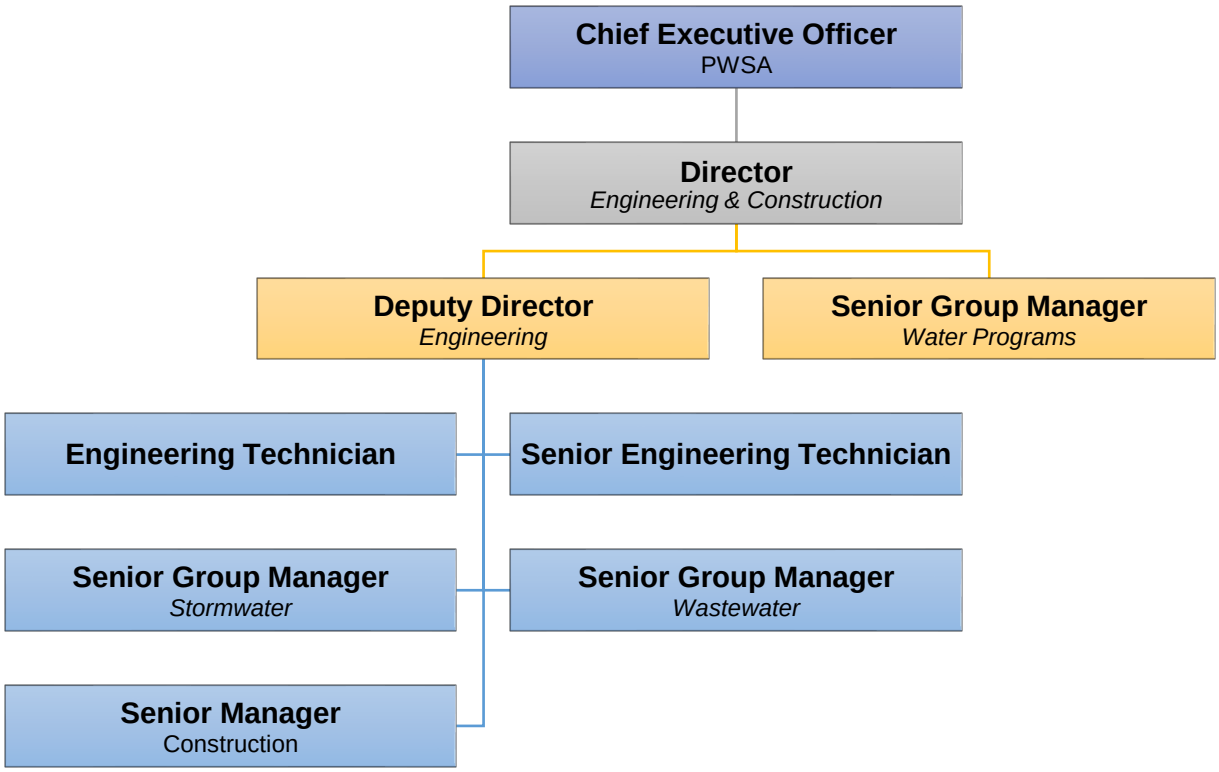
As was stated in section B. Wastewater/Sanitary System, most of the PWSA's capital improvement plan has been focused on PADEP mandated projects and upgrades to the WTP; therefore, much like the restrictions facing capital allocations to the wastewater system, the PWSA has not been able to invest in significant stormwater upgrades beyond PADEP mandated projects. Significant improvement is needed in the stormwater system much of which should focus on the elimination of the current combined wastewater and stormwater system. As previously explained, proactive improvement has been deemed unfeasible for the foreseeable future.

[12] Stormwater services were designated as a separate utility service and the stormwater tariff was approved by the PUC at Docket No. R-2021-3024779.

D. Engineering and Construction

The three previously described utility operations business units of the Operations Department collaborate with the Engineering & Construction Department which was insourced beginning in April 2019. Engineering & Construction Department staff work as project managers to liaison between the PWSA and the contractors used for construction projects. No construction activities are performed by the PWSA's departments. The Engineering & Construction Department reports directly to the Chief Executive Officer and is separate from the Operations Department. The Engineering & Construction Department organizational structure is displayed in Exhibit VI-6.

Exhibit VI-6
Pittsburgh Water & Sewer Authority
Engineering & Construction Department Organizational Structure
As of April 2022



Source: Data Request EM-34

Findings and Conclusions

Our examination of the water, wastewater, and stormwater operations functions as well as of the engineering and construction functions included a review of policies and procedures; operations and maintenance; inspection; damage prevention; reliability; budgeting; training; cross-connection control; unaccounted-for and non-revenue water; and sanitary, stormwater, and combined sewer overflows. Based on

our review, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional efforts to improving the efficiency and/or effectiveness of these operations functions by addressing the following:

1. The Pittsburgh Water & Sewer Authority's east and west raw water intake gates and components are deteriorated, past intended life cycles, and at elevated risk of failure; the west gate is inoperable.

As previously mentioned, the PWSA has a lone source for obtaining raw water, the Allegheny River. There are two raw water intakes designated east and west gates. The intake gates are original to the Water Treatment Plant (WTP), and each is over 90 years old. The gates use a suction tunnel to draw water in and sluice gates to control the flow of water as it enters the diversion chamber and raw water pumps. Also, before raw water is pumped for treatment, trash racks remove large debris, and a chemical feed injects the necessary chemicals to pretreat the water.

The PWSA has had visual and physical operating inspections, including underwater, conducted on the intakes and connected pump station throughout the audit period. It was determined that the west gate, in its current state, is inoperable to provide raw water for treatment and has been closed for an indeterminate time (at least over five years). Additionally, the inspections indicated that the east gate is deteriorating and is past its intended life cycle without any major repairs occurring in the past 40 plus years.

The current condition of the intakes is a result of past practices at the PWSA, that have been well publicized, such as prior budget restrictions and/or historic implementation of poor management decisions. The raw water intakes at the WTP are past their intended useful life and are at risk of failure which would disrupt water supply to the PWSA's entire customer base. The PWSA has identified the intakes as future improvement projects and have included them in the Capital Investment Plan which is outlined on the company's website. The intake projects include complex planning, design, and permitting and coordination with ongoing upgrades to raw water pump stations. However, the auditors believe the projects should be given priority, or even be expedited, to ensure the risk of service disruptions to the PWSA's customers is minimized.

2. The Pittsburgh Water & Sewer Authority does not have sufficiently functional equipment within the system to identify deteriorated areas contributing to excessive non-revenue water.

Beginning in 2019, the Pennsylvania Public Utility Commission (PUC or Commission) requires the PWSA to submit annual American Water Works Association (AWWA) water audit data. The AWWA defines non-revenue water (NRW) as "distributed volume of water that is not reflected in customer billings" and is specifically defined as "the sum unbilled authorized consumption plus apparent losses plus real losses." The AWWA defines the components of NRW as follows:

- **NRW** – water which does not provide revenue potential to the utility (apparent losses + real losses + unbilled metered consumption + unbilled unmetered consumption = NRW)

- **Apparent Losses** – losses associated with customer metering (worn meters, improperly sized meters, or wrong type of meter for the water usage profile); systematic data handling errors (meter reading, billing, archiving, and reporting); and unauthorized consumption (theft or illegal use)

- **Real Losses** – physical water losses from the pressurized system (water mains and customer service connections) and the utility's storage tanks up to the point of customer consumption; annual volume lost depends on frequencies, flow rates, and average duration of individual leaks, breaks, and overflows

- **Unbilled Metered** – metered consumption authorized by the utility but deemed by utility policy to be unbillable (company use or consumed during treatment process, water agreements with third parties, etc.); does not include water exported for wholesale

- **Unbilled Unmetered** – water that is neither billed nor metered (water used in activities such as firefighting, flushing water mains and sewers, street cleaning, fire flow tests conducted by the utility); typically, a minimal component of NRW

- **Water Losses** – total volume lost for the entire system or for partial systems such as transmission systems, pressure zones, or district metered areas (water supplied less authorized consumption = water losses)

Exhibit VI-7 shows the PWSA's amounts of water supplied and lost and its NRW data. It should be noted that, for 2017, the PWSA did not report unbilled unmetered consumption (e.g., hydrant flushing, operating & maintenance flushing, etc.); therefore, the reported water losses are the same as NRW.

Exhibit VI-7
Pittsburgh Water & Sewer Authority
Water Supplied and Lost Compared to Non-Revenue Water
For the Years 2017 – 2021

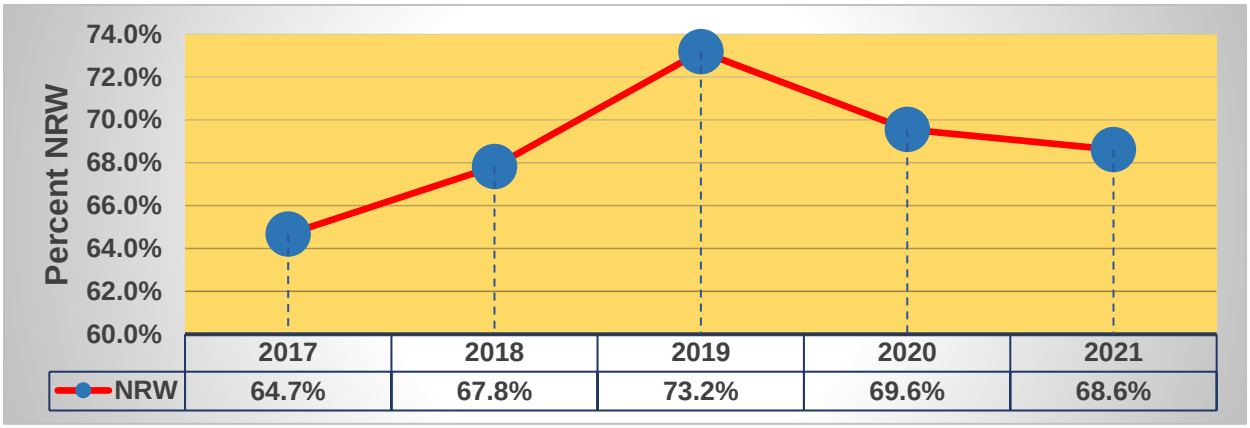
Year	Water Supplied (MG)	Apparent Losses (MG)	Real Losses (MG)	Water Losses[13] (MG)	NRW (MG)
2017	25,064.81	-	-	16,209.13	16,209.13
2018	24,597.10	81.27	16,294.91	16,376.18	16,683.78
2019	24,301.35	143.32	17,251.80	17,395.12	17,786.44
2020	22,700.23	49.06	15,580.14	15,629.20	15,789.36
2021	22,239.03	65.94	14,897.07	14,963.01	15,258.26

MG = million gallons
Source: Data Request WO-61 and auditor analysis

[13] Apparent Losses + Real Losses = Water Losses

The PWSA has seen a range of NRW levels from 15,258 MG – 17,786 MG for the period 2017 – 2021 with the lowest amount being recorded in 2021. However, the water supplied volume has gradually decreased over the period as well decreasing from 25,064 MG – 22,239 MG. Percent NRW is used to measure a water utility's efficiency or indicate deficiencies in the water system (storage, distribution, etc.). Exhibit VI-8 compares water supplied data to the NRW, as depicted in Exhibit VI-7, to show the PWSA's percentage of NRW.

Exhibit VI-8
Pittsburgh Water & Sewer Authority
Non-Revenue Water Percentage[14]
For the Years 2017 – 2021



Source: Data Request WO-61 and auditor analysis

On a percentage basis, the PWSA has experienced significantly high NRW levels ranging from 64.7% – 73.2%. This indicates that the PWSA either loses over half the water treated for distribution or has significant limitations in metering/monitoring usage to identify water losses and associated points of origin. There is a material excessive cost related to atypically high NRW. Exhibit VI-9 presents the cost of the PWSA's NRW for 2021, alone.

Exhibit VI-9
Pittsburgh Water & Sewer Authority
Material Cost of Non-Revenue Water
For the 2021 Calendar Year

Type of Loss	Volume MG/Year	Value $/Year	Basis of Valuation
Apparent Losses	65.9	$1,567,776	**CRUC**
Real Losses	14,897.1	$4,645,054	**VPC**
Unbilled Auth. Consumption	295.3	$92,062	**VPC**
Non-Revenue Water	**15,258.3**	**$6,304,892**	**Blended**

CRUC = Customer Retail Unit Charge – volumetric portion of the total charges that customers pay for water service
VPC = Variable Production Cost – cost to produce and supply the next unit of water (MG)

Source: Data Requests WO-34 and WO-61 and auditor analysis

[14] NRW (MG) divided by Water Supplied = Percent NRW

The PWSA will achieve potential savings by reducing NRW levels over an unspecified period through effective repair and/or replacement of leaking pipes. Exhibit VI-10 details the potential savings if the company were able to reduce NRW levels to either 40% or 20%. NRW levels average approximately 20% at other Pennsylvania regulated water utilities.

Exhibit VI-10
Pittsburgh Water & Sewer Authority
Potential Savings with Designated Reduction in Non-Revenue Water

Year	NRW (MG)	Blended Cost of NRW	Reduction in MG @ 40%	Reduction in Cost @ 40%	Reduction in MG @ 20%	Reduction in Cost @ 20%
2018	16,683.78	$13,557,683	6,844.94	$5,562,380	11,764.36	$9,560,032
2019	17,786.44	$9,509,058	8,065.90	$4,312,224	12,926.17	$6,910,641
2020	15,789.36	$6,310,445	6,709.27	$2,681,456	11,249.31	$4,495,950
2021	15,258.26	$6,305,172	6,362.65	$2,629,238	10,810.45	$4,467,205

Source: Data Request WO-61 and auditor analysis

Had the PWSA been able to achieve NRW levels of 40% over the period 2018 – 2021, estimated savings could have ranged from $2.6 million – $5.6 million. If the PWSA would have been able to achieve the 20% average NRW levels observed at other Pennsylvania regulated water utilities, savings could have ranged from $4.5 million – $9.6 million. That being noted, taking the average of the estimated savings as determined above at each the 40% and 20% NRW levels, the company could potentially save $3.8 million – $6.4 million, annually. Reduction in NRW will be a long-term goal and realized savings will vary and occur over an extended period.

3. The Pittsburgh Water & Sewer Authority has not identified critical valves, nor does it have a formal valve exercising program.

The AWWA established a valve exercising program in its management standard G200 “Distribution Systems Operation and Management.” Subsection 4.2.5.1 Valve-Exercising Program indicates:

> A utility shall have a valve exercising program. This program shall follow AWWA Manual M44 and the manufacturer's recommended procedures and include at least the following elements:
>
> - Goal for the number of transmission valves to be exercised annually based on the percentage of the total valves in the system
> - Goal for the number of distribution valves to be exercised annually
> - Measures to verify that the goals are met and written procedures for action if the goals are not attained
> - Critical valves in the distribution system shall be identified for exercising on a regular basis; potential water quality and isolation concerns shall be recognized — the program shall track the annual results and set goals to reduce the percent of inoperable valves

- The valve exercising program may be implemented in conjunction with the systematic flushing program (4.1.8)
- Goal for replacing the inoperable valves identified during the operation and maintenance process shall be established as part of the exercising program

The PWSA has been able to identify over 99% of the valves in its system. Exhibit VI-11 presents the total number of valves in the PWSA's system, by size, which ranges from 4 inch – 96 inch. Current practices for valve exercising were developed in response to the Stage One Compliance Plan. The PWSA assigned an Operations Department manager to oversee and hire three additional senior managers to ensure maintenance programs are appropriately resourced. Efforts to exercise valves since 2016, including a 3-year average, are detailed in Exhibit VI-12. Furthermore, the PWSA established a goal of exercising a total of 5,200 valves per calendar year, but the goal did not specify a minimum number of critical valves. This is because the PWSA does not have a formal standard operating procedure which defines what the company considers a critical valve.

Exhibit VI-11
Pittsburgh Water & Sewer Authority
Inventory of Valves by Size

Valve Size (Inches)	Count	Valve Size (Inches)	Count
4	595	30	148
6	14,530	36	103
8	6,320	42	18
10	353	42.5	6
12	2,693	48	63
14	8	50	4
15	27	50.25	2
16	584	60	12
18	2	72	2
20	329	96	1
24	181	Undefined	237
Total = 26,218 Valves			

Source: Data Request WO-26

Exhibit VI-12
Pittsburgh Water & Sewer Authority
Valves Exercised – Total and Greater Than 16 Inches
As of April 2022

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Valves Exercised	2022	301	312	267	31									
	2021	1,338*	307	224	132	356	415	100	2961*	595	585	534	595	**8,142**
	2020	413	367	281	251	199	203	127	123	124	157	141	165	**2551**
	2019	482	447	465	479	445	765	397	413	314	533	342	363	**5445**
	2018	584	476	669	663	625	665	456	332	264	553	521	440	**6248**
	2017	388	245	518	261	444	273	233	352	434	519	310	813	**4790**
	2016	191	205	326	217	203	196	159	235	230	223	293	392	**2870**
	3-year average (2019-2021) = 5,379													

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Valves Exercised >16"	2022	5	26	27	0									
	2021	94*	11	13	15	30	20	3	130*	21	21	20	33	**411**
	2020	16	56	19	5	20	7	18	16	16	21	9	8	**211**
	2019	24	23	10	35	24	53	24	20	32	43	105	102	**495**
	2018	21	18	38	33	13	35	23	14	26	35	31	26	**313**
	2017	43	30	31	20	16	22	10	64	32	11	47	33	**359**
	2016	20	47	19	41	16	22	15	12	26	30	23	31	**302**
	3-year average (2019-2021) = 372													

* – an error occurred within *SpryMobile* causing a delay in counting completed valve exercising
Source: Data Request WO-65

AWWA's distribution valve exercising recommended guideline can be resource intensive; therefore, the auditors encourage utilities to exercise critical valves on a one- to three-year cycle and the remaining non-critical valves on a seven- to ten-year cycle. Although not aligned with AWWA standards, a one- to three-year schedule for critical valves provides the company with a balance between resource management and appropriate maintenance.

4. The Pittsburgh Water & Sewer Authority does not have a damage prevention program.

Damage prevention programs are intended to minimize, and ideally prevent, line damage from construction related activities. An appropriately maintained damage prevention program includes the following:

- Active membership in damage prevention groups such as PA One Call and industry-based groups which could aid in implementing preventive measures
- Association with public and contractor damage prevention educational programs
- Employee training
- Proper line marking procedures (note that the PWSA uses a contracted line marking agency)
- Proper digging procedures
- The use of "inspector" or similarly related positions that can assist the public or contractors who are digging near company facilities to ensure proper digging procedures are used
- Damage documentation and data retention procedures
- Accurate mapping standards and usage
- Company-associated positions regarding damage prevention and identified responsibilities for each
- Damage litigation standards
- Procedures for dealing with multi-hit offenders
- Measurements and approximations for lost water volume and wastewater and stormwater volume released into the environment
- Emergency response procedures, or references to said procedures, including public notification and interaction

The PWSA does not have a damage prevention program. The company used various damage prevention measures in practice but has not established a formalized program.

Typical third-party line hit data retention includes the number of hits, causal factors, and damage billing and collections. The company recorded each line hit with supplementary information; however, the data was unable to be easily compiled into one database. Also, the PWSA did not record an estimate of water volume lost because of line hits. Water lost during line hits should be considered as a contributing factor to non-revenue water as was described in Finding and Conclusion No. 2.

The PWSA needs to develop a formal, comprehensive damage prevention program, including detailed record-keeping processes, to appropriately measure the effectiveness of its efforts. The program should be developed in compliance with Pennsylvania One Call Act 287 – Underground Utility Line Protection Law. As part of this program, the PWSA should maintain a database of incidents to allow analysis to target inadequate or ineffective practices and to recognize trends. Through this analysis, hits can be segregated into company-at-fault (improper line marking and mapping errors) and contractor-/public-at-fault. Each category can then be subdivided further for greater detail. For example, trends such as excessive inaccurate mapping, inferior performance of the line marking contractor, or repeat line hit offenders could be noted. In addition, consistently enforced litigation measures disincentivize improper digging procedures. Although the company has billed parties that have damaged facilities, litigation measures have not yet been used by the company.

5. The Pittsburgh Water & Sewer Authority does not actively track and monitor field operations overtime statistics by department nor individual.

A utility should incorporate a reasonable level of overtime (OT) into its workforce forecasting. Sensible management practices indicate that OT more than 15% – 20% of regular hours worked be reviewed to determine the need for additional staffing or the utilization, or better utilization, of shifts to reduce OT levels to within a reasonable range. Excessive OT increases costs and could potentially result in safety issues or decreased reliability.

The PWSA's operations employees are organized into four functional groups: Water Quality/Lab, Water Treatment, Water Service, and Sewer Service. The PWSA was able to provide straight time (ST) and OT hours worked by each functional group; however, the company was unable to provide this same data segregated by bargaining and non-bargaining employees due to software restrictions. Furthermore, the company was not able to provide hours worked by individuals which limited the auditors' review of the highest OT hours by individual as well. (See Finding and Conclusion No. 3 in chapter X – Information Technology).

Exhibit VI-13, on the next page, displays the number of employees as full-time equivalents (FTE) and the OT as a percentage of ST for each group over the period January 2016 – September 2021. OT levels ranged from 4.6% (Sewer Service) up to 18.2% (Water Treatment) and 8.2% – 12.2%, collectively. As previously mentioned, these hours included non-bargaining and back-office hours comingled with bargaining unit. Without the segregation of hours by bargaining or non-bargaining as well as by category (shift work, callout, emergency, etc.), the auditors were unable to evaluate the efficacy of the PWSA's usage of field employees. If more detailed hourly data had been available, there is the high probability that bargaining OT hours would have been deemed excessive.

Exhibit VI-13
Pittsburgh Water & Sewer Authority
Percent Overtime for Operations Staffing
For the Period 2016 – Year-to-Date September 2021

		2016	2017	2018	2019	2020	YTD Sept 2021
Water Quality/Lab	FTE	4	5	4	4	6	6
	ST	9,079	10,677	9,005	7,424	11,658	9,409
	OT	644	778	557	508	750	786
	OT/ST %	7.1	7.3	6.2	6.8	6.4	8.4
Water Treatment	FTE	29	30	37	37	36	41
	ST	60,063	63,360	75,969	77,448	75,291	64,086
	OT	6,130	11,512	9,866	9,629	9,257	7,374
	OT/ST %	10.2	18.2	13.0	12.4	12.3	11.5
Water Service	FTE	58	73	76	92	80	82
	ST	121,581	150,981	157,914	190,884	167,430	136,088
	OT	13,993	16,714	22,274	26,696	16,125	9,964
	OT/ST %	11.5	11.1	14.1	14.0	9.6	7.3
Sewer Service	FTE	39	26	28	24	18	15
	ST	80,925	54,905	59,166	50,086	37,862	24,258
	OT	5,856	3,076	4,233	2,885	2,832	1,116
	OT/ST %	7.2	5.6	7.2	5.8	7.5	4.6
Totals	FTE	131	135	145	157	141	141
	ST	271,647	279,923	302,055	325,842	292,240	233,840
	OT	26,623	32,081	36,929	39,718	28,962	19,239
	OT/ST %	9.8	11.5	12.2	12.2	9.9	8.2

Source: Data Request WO-28 and auditor analysis

The company is unable to assess, based on a meaningful standard, where and to what degree excessive levels of OT may be occurring which means there is the potential that staffing levels are insufficient to meet the current workload requirements. In addition, some employees may be incurring an excessive level of individual OT which could raise safety concerns. With proper analysis of when and by whom OT is occurring, management would be able to right-size each department to ensure the efficient use of human resources and to minimize costs and other risks.

6. The Pittsburgh Water & Sewer Authority has not analyzed future retirement trends within its field operations staff.

Pennsylvania utilities have identified an aging workforce as an operational risk. Understanding workforce age demographics provides insight into pending retirement trends of operations employees. The PWSA has never conducted an aging analysis of its workforce. The PWSA pension plans state employees are eligible to retire at age 60 with at least eight years of service. Exhibit VI-14 shows staffing for the water operations business unit of the Operations Department.

Exhibit VI-14
Pittsburgh Water & Sewer Authority
Water Operations Staffing
2017 vs March 2022

	2017			March 2022		
	Union	Non-Union	TOTALS	Union	Non-Union	TOTALS
Water Treatment Plant	36	5	**41**	47	8	**55**
Distribution	98	9	**107**	104	12	**116**
Water Quality	3	4	**7**	6	5	**11**
TOTALS	**137**	**18**	**155**	**157**	**25**	**182**

Source: Data Request WO-60

As of March 2022, the PWSA had a workforce complement of 182 employees for the water operations business unit. This was an increase of 27 employees (17.4%) for the period reviewed. Even though the company has been able to onboard new employees and increase staffing, it is unknown how many operations employees are at or nearing retirement age.

Operations employees often perform many skilled and complex work specific to infrastructure needs. The PWSA could lose valuable institutional knowledge[15] if the company is caught off guard by retirements and could be forced to rely on contractors unnecessarily increasing costs and operational losses. A workforce aging analysis would allow for the proactive preparation for impending vacancies and to encourage institutional knowledge transfer. For further information, refer to Finding and Conclusion No. 1 of chapter XII – Human Resources and Diversity that focuses on the PWSA's succession planning procedures.

7. The Pittsburgh Water & Sewer Authority's callout statistics are manually tracked and were not available for review during audit fieldwork.

The PWSA uses a job classification and seniority rotation for the purpose of OT and emergency callouts. Contract language states that OT callouts shall be equally distributed amongst each service center and then by job classification. In addition, the

[15] Institution knowledge can be in the form of skills and knowledge of system operations passed on through on-the-job training by tenured employees to less experienced employees. This type of training can take several years to effectively train less experienced staff.

company shall reset equal distribution of OT every six months beginning January 1 and July 1.

The current practice of tracking callout statistics is done manually at each service center. Once an employee is offered OT or emergency callout, the opportunity is recorded into a logbook as accepted or declined. The logbooks are kept at the service center and are reviewed by management.

Callout statistics regarding acceptance rates and equal distribution of OT were not readily available for review during audit fieldwork. The PWSA claimed that it would be cumbersome to be provide to the auditors due to the paper-based tracking methodology. The company needs to streamline tracking of callouts to monitor that acceptance rates are satisfactory and individual OT is within reasonable levels (See Finding and Conclusion No. 5).

Recommendations

1. **Identify the most practical option to rehabilitate the east and west raw water intake gates at the WTP and expedite the project as is feasibly possible to ensure no disruptions in water service to the PWSA's customer base.**

2. **Expedite the installation of new flow meters at strategic locations and/or rehabilitate existing flow meters as needed to gain basic insight into areas contributing to excessive water loss that require replacement to maximize treated water retention.**

3. **Develop and implement a formal valve exercising program which includes identifying all critical valves in the system to ensure these valves are prioritized during the valve exercising routine cycle.**

4. **Develop and implement a damage prevention program by creating a damage prevention manual to define procedures to track damage and enforce consequences against those who have caused damage to the system.**

5. **Establish the practice of tracking and monitoring ST and OT hours, by department and specifically by work type and by individual, to ensure OT levels indicate sufficient staffing levels are being maintained. Once detailed OT data has been tracked effectively, perform a detailed workforce planning study to better understand staffing and contractor needs.**

6. **Perform a study of workforce aging to identify and appropriately prepare for impending vacancies in operations staff.**

7. **Digitally track, report, and monitor callout acceptance to ensure contract terms are being enforced and that OT usage is appropriate.**

VII. EMERGENCY PREPAREDNESS

Background

On June 11, 2005, regulations at 52 Pa. Code § 101 (Chapter 101) went into effect that require jurisdictional utilities to develop and maintain written physical security, cyber security, emergency response, and business continuity plans to protect infrastructure within the Commonwealth of Pennsylvania and to ensure safe, continuous, and reliable utility service. A jurisdictional utility is required to maintain these "emergency preparedness" plans and annually file the Self-Certification Form to the Pennsylvania Public Utility Commission (PUC or Commission) documenting compliance with Chapter 101. This form, available on the PUC website, is comprised of 13 questions as shown in Exhibit VII-1.

Exhibit VII-1
Pennsylvania Public Utility Commission
Public Utility Security Planning and Readiness Self-Certification Form
For the Year Ended December 31, 2021

Item No.	Classification	Response (Yes–No–N/A)
1	Does your company have a physical security plan?	
2	Has your physical security plan been reviewed in the last year and updated as needed?	
3	Is your physical security plan tested annually?	
4	Does your company have a cyber security plan?	
5	Has your cyber security plan been reviewed in the last year and updated as needed?	
6	Is your cyber security plan tested annually?	
7	Does your company have an emergency response plan?	
8	Has your emergency response plan been reviewed in the last year and updated as needed?	
9	Is your emergency response plan tested annually?	
10	Does your company have a business continuity plan?	
11	Does your business continuity plan have a section or annex addressing pandemics?	
12	Has your business continuity plan been reviewed in the last year and updated as needed?	
13	Is your business continuity plan tested annually?	

Source: Public Utility Security Planning and Readiness Self-Certification Form, as available on the PUC website at http://www.puc.state.pa.us/general/onlineforms/pdf/Physical_Cyber_Security_Form.pdf.

A National Institute of Standards and Technology Cybersecurity Framework based audit plan, modified to address the needs and capabilities of the PUC and the Pennsylvania utility companies, is used to assess emergency preparedness. Due to the sensitive nature of the information reviewed, specific information is not revealed in the audit report; instead, the generalities of the information reviewed are discussed.

The Pittsburgh Water & Sewer Authority's (PWSA) 2021 Self-Certification Forms and were reviewed, and the PWSA's physical security plans, cyber security plans, emergency response plans, business continuity plans, and associated manuals and security measures were assessed. Facility inspections were performed on some of the company's facilities including the Water Treatment Plant, Microfiltration Plant, and other remote field locations.

The PWSA tests its physical security, emergency response, and business continuity plans at least annually, and in some instances, multiple times per year. A review is completed to ensure each plan has been tested, results of testing have been evaluated, and the necessary corrective measures have been taken. Each individual plan is updated following the testing and/or review. Although many individuals are involved in the maintenance of these plans, key personnel provide oversight of the four emergency plans. The purpose and ownership of the plans are detailed in the following bullets.

- **Physical Security Plan (PCP)** – Senior Manager, Safety and Security — ensures facilities and critical assets are protected from physical threats and malevolent acts.

- **Cyber Security Plan (CSP)** – Director, MIS — see Finding and Conclusion No. 1

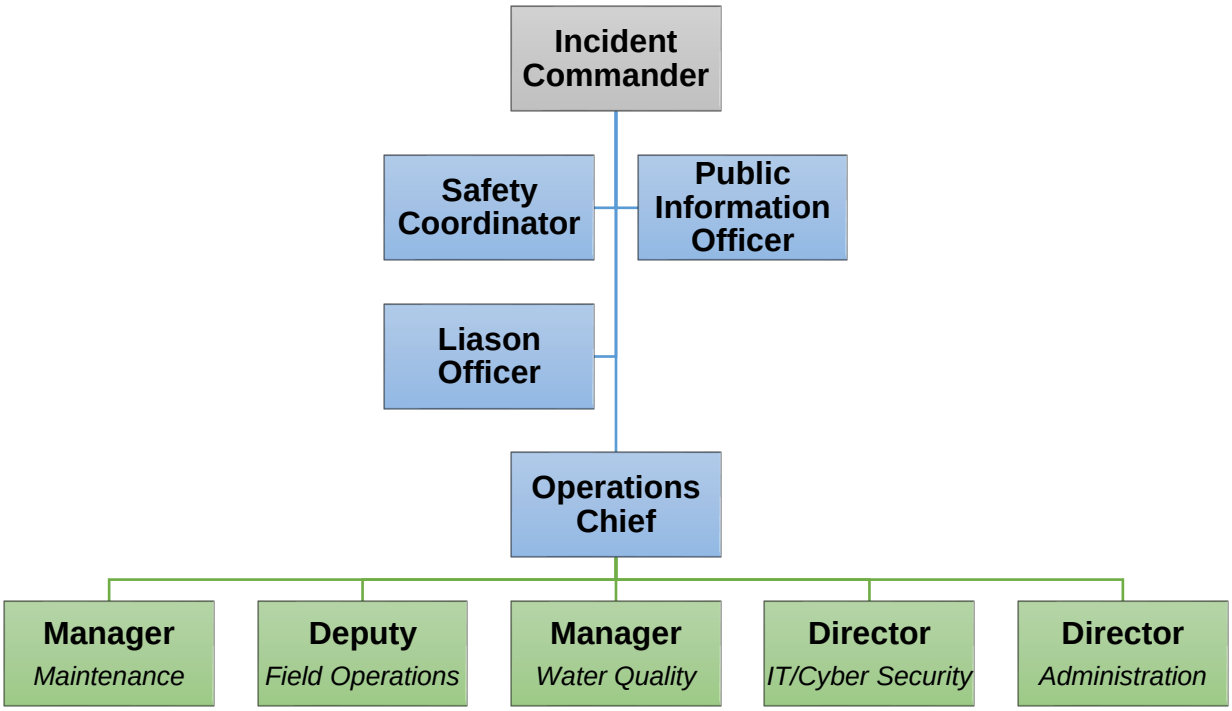
- **Emergency Response Plan (ERP)** – Senior Manager, Safety and Security — provides the information and identifies the resources to ensure an appropriate response and recovery approach for any unplanned event that disrupts normal water treatment and distribution to customers

- **Business Continuity Plan (BCP)** – Senior Manager, Safety and Security — provides established procedures for business continuity and continuity of services in the wake of an event that poses an unacceptable risk of business and/or operational disruption

The PWSA has established an incident command system (ICS) to provide an organized response and a defined structure of communication to unplanned levels of events that could disrupt normal business operations. A three-tiered approach is used to classify the level of emergency that could affect the company assets with a Level 1 being a worst-case scenario (i.e., mass destruction, sabotage/contamination, loss of water treatment capability, etc.). An example of the communication structure for the ICS is provided in Exhibit VII-2.

To provide constant protection to the physical and cyber resources, the designated groups/individuals developed procedures to ensure that the PWSA operates in a safe, secure, and reliable environment. A major commitment is made to keep plans current by performing various testing on an annual basis. The PWSA performs vulnerability assessments, penetration tests, system operational tests, third-party assessments, tabletop scenario simulations, and real-life events.

Exhibit VII-2
Pittsburgh Water & Sewer Authority
Incident Command System Structure of Communication
As of May 2022



Source: Data Request EP-03

Findings and Conclusions

Our examination of the emergency preparedness function included a review of the physical security, cyber security, emergency response, and business continuity plans as well as vulnerability assessments and associated security measures. Based on our review of the company's emergency preparedness efforts, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional efforts to improving the efficiency and/or effectiveness of the emergency preparedness function by addressing the following:

1. The Pittsburgh Water & Sewer Authority does not have active fire alarms at physical office buildings nor the Water Treatment Plant.

Upon inspection of the PWSA's Water Treatment Plant (WTP) and adjoining office building, it was noted that the building did not have an active fire alarm installed. In addition, the PWSA confirmed that other company offices and service centers also did not have alarm systems. Such alarm systems are essential to keeping employees and the public safe along with protecting company property.

The National Fire Protection Association (NFPA) provides the standard NFPA 72 – National Fire Alarm and Signaling Code that covers the application,

installation, location, performance, inspection, testing, and maintenance of fire alarm systems, supervising station alarm systems, public emergency alarm reporting systems, fire warning equipment, and emergency communications systems along with the correlated components. Moreover, the Occupational Safety and Health Administration provides further guidance explaining that, “an employer shall ensure that the number, spacing, and location of fire detectors is based upon design data obtained from field experience, tests, engineering surveys, the manufacturer’s recommendations, or a recognized testing laboratory listing.” With these standards, the PWSA can determine the necessary equipment to install and implement at each of its occupied buildings. It should be noted that the PWSA leases all buildings from the City of Pittsburgh; however, since the matter regards employee safety, the PWSA anticipates no issues with modifying leased properties.

2. The Pittsburgh Water & Sewer Authority does not have a finalized cyber security plan.

Per 52 Pa. Code § 101.3(a)(2), a cyber security plan (CSP) should, at a minimum, contain the following:

- A list of critical functions requiring automated processing
- Appropriate backup for application software and data which may include separate distinct storage media for data or a different physical location for application software
- Alternative methods for meeting critical functional responsibilities in the absence of information technology capabilities
- A recognition of the critical time period for each information system before the utility could no longer continue to operate
- Annual review and update to the plan
- An annual testing schedule

In 2019, the PWSA contracted a third party to help with creating each of the emergency preparedness plans as described in the Background section of this chapter. However, as of March 2022, the CSP was still under development and various components were incomplete. The PWSA indicated a finalized CSP will be available by late third quarter or early fourth quarter of 2022.

3. The Pittsburgh Water & Sewer Authority lacks an adequate number of security monitoring devices at remote sites such as pump stations, storage tanks, and reservoirs.

In the utility industry, it is necessary to monitor and protect critical infrastructure around the clock. To satisfy this need, utilities install and maintain video and other remote security devices to observe and properly identify, with advanced notice, any hostile threats or breaches in security and any operational deficiencies with equipment. The PWSA has identified a list of assets, away from the WTP and occupied office

buildings and service centers, which are critical to its daily operations. Remote and unoccupied sites pose a high security and operation risk. The identified sites lack many security features, other than fencing, and are only observed on routine security or maintenance checks. It is in the best interest of the company to procure and install the necessary security devices at these discrete locations.

Recommendations

1. **Determine alarm system requirements at all company-maintained buildings and install the necessary equipment.**

2. **Complete and implement a comprehensive CSP and maintain its efficacy through annual review and testing.**

3. **Explore the option of adding security monitoring devices, including cloud monitoring and infrared capable cameras, at all the PWSA's critical assets.**

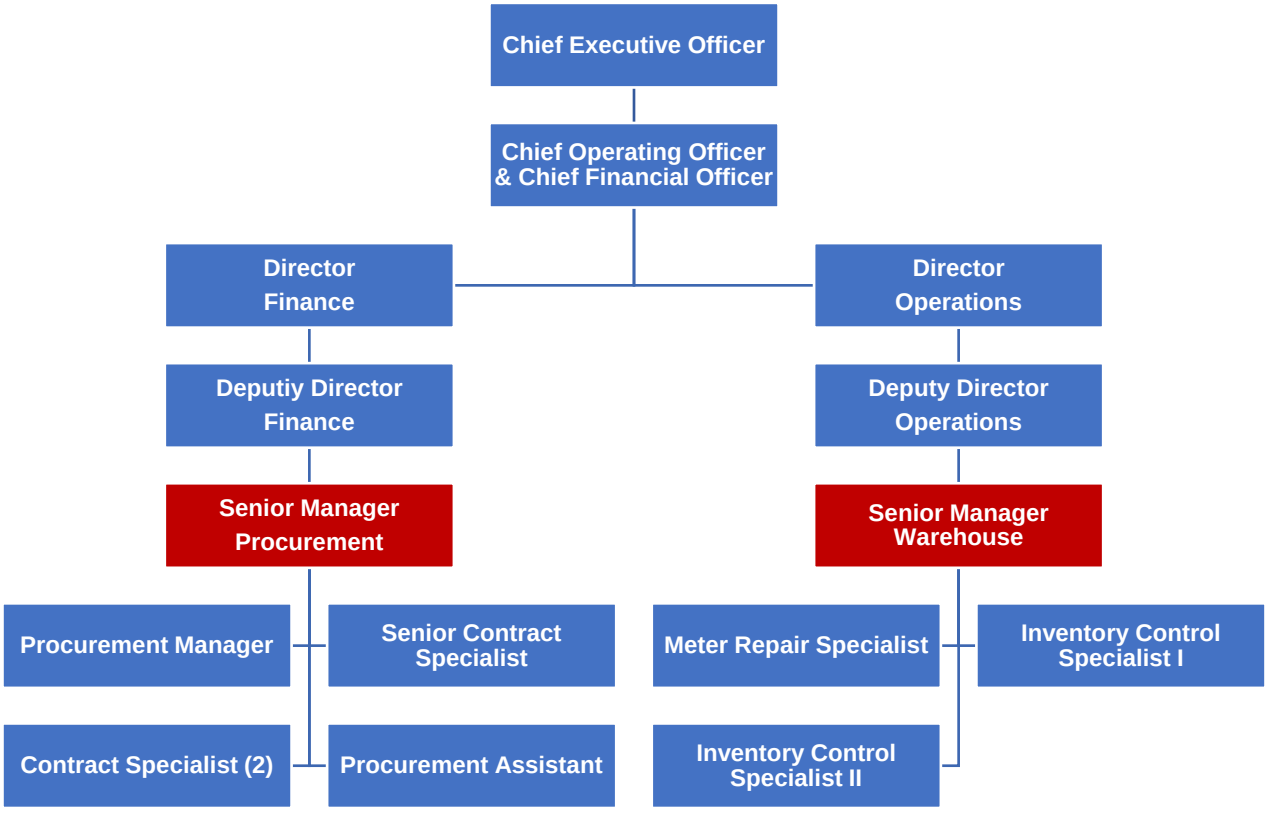
VIII. PURCHASING AND MATERIALS MANAGEMENT

Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under Pennsylvania's Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA.

The organizational structure for the procurement and materials management business units at the PWSA is shown in Exhibit VIII-1. The Senior Manager, Procurement (responsible for purchasing) and the Senior Manager, Warehouse (responsible for materials management) are highlighted in red.

Exhibit VIII-1
Pittsburgh Water & Sewer Authority
Procurement and Materials Management Business Units Organizational Structure
As of April 2022



Source: Data Request EM-34

The Central Warehouse maintains all materials needed by the company except for chemicals for the Water Treatment Plant (WTP). The WTP maintains chemicals for treatment as well as certain operations related materials. The Mission Street and Brilliant Yard locations carry pipes, valves, and fittings but do not have the variety and quantity of inventory of the Central Warehouse.

There are three software systems used for the purchasing and warehouse functions at the PWSA. *Panatracker* is used for scanning barcodes on materials being received into and going out of inventory. *Cogsdale* is the company's financial system which is used for purchase orders of materials and services. Lastly, *Bonfire* is an online bidding portal. The interactive portal allows vendors to view open solicitations and submit bids and proposals to the company.

Extensive changes were made to the procurement and materials management business units in 2018. Previously, these business units reported to the Chief Legal Counsel; however, in November of 2018, the organizational structure, as displayed in Exhibit VIII-1, was finalized. At this time, the procurement business unit began to develop formal standard operating procedures, policies, processes, boilerplates, and standard terms and conditions which had not previously existed. They also implemented an intranet website for company personnel to access needed forms to facilitate purchasing, material, and vendor related processes. In June of 2019, the PWSA no longer used full and part time external consultants to assist with the procurement function.

Spending limitations over the purchasing processes are dictated by two factors. Internally, the Delegation of Authority Policy (DOA Policy) dictates approval thresholds through which the PWSA's Board of Directors (PWSA Board) provides authority to the Chief Executive Officer (CEO) and sub delegations (approval on behalf of the prime delegate) to designated staff members to ensure accountability and responsibility in decision making. The established approval thresholds are displayed in Exhibit VIII-2 on the next page. Additional information regarding the PWSA's DOA Policy is available in Finding and Conclusion No. 2 in chapter III – Executive Management and Organizational Structure.

In addition, the PWSA is bound to bidding thresholds established by the MAA due to the PWSA's designation as a municipal authority. Bidding thresholds are detailed on the MAA's website[16] along with other laws and requirements that impact municipal authorities. The DOA Policy and MAA thresholds have been established separately and are independent of each other. All company projects must follow both the DOA Policy and MAA requirements, in parallel, throughout the life of the project.

[16] https://www.municipal authorities.org

Exhibit VIII-2
Pittsburgh Water & Sewer Authority
Delegation of Authority Thresholds

Approval Thresholds	Delegation of Authority by the PWSA Board to the CEO	Sub-Delegation by the CEO
< $ 25,000	CEO	Manager
$25,000.01 - $100,000	CEO	Department Director
$100,000.01 - $250,000	CEO	None
> $250,000	PWSA Board	None
Change Orders < 10% & cumulative contract < $250k	Reference approval thresholds above	Manager, Department Director, CEO
Change Orders > 10% & cumulative contract < $250k		
Change Orders < 10% & cumulative contract > $250k		
Change Orders > 10% & cumulative contract > $250k	PWSA Board	None

Source: Data Request MM-7

The PWSA has a Supplier Diversity Program (SDP) which directs each of its solicitations. In addition to the SDP's goals and reporting, the PWSA participates in outreach efforts including networking events and monthly meetings with community groups working with disadvantaged businesses. SDP participation was not tracked until 2020. The PWSA has SDP goals of contracting between 10% – 25% to qualifying parties. In both 2020 and 2021, the PWSA met the established goals for contracting approved contracts with 34% and 25% diverse business spending, respectively.

Findings and Conclusions

Our examination of the procurement and materials management functions included a review of materials management policies and procedures, purchasing, warehousing, inventory statistics, logistics and daily operations, etc. Based on our review, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional efforts to improving the efficiency and/or the effectiveness of its procurement and materials management functions by addressing the following:

1. The Pittsburgh Water & Sewer Authority is organized such that there is no direct, efficient hierarchy between the procurement business unit and the materials management business unit.

There is no direct hierarchy between the procurement (purchasing) and the materials management (warehouse) business units at the PWSA. Efforts between the two business units are based on mutual agreement through coordination and cooperation as opposed to defined chain of command. Although there is logic that warehouse operations belong to the Operations Department and that procurement operations belong to the Finance Department, there should be a point of final

authorization for decisions between the two business units. Under the described organizational structure, potential disagreements between the two groups would have to be decided between, at first, deputy directors followed by directors, and if no resolution could be reached, the Chief Operating Officer & Chief Financial Officer (COO&CFO).

There is no industry standard organizational structure for procurement and materials management business units. Typically, there is direct hierarchy between the two functions at other utilities. Generally speaking:

- At smaller sized utilities, procurement and materials management responsibilities are handled by the same person
- At medium sized utilities, the procurement group usually has final strategic planning and decision-making responsibilities with input from the materials management group — these business units report to finance-based directors at some utilities and operations-based directors at other utilities
- At larger sized utilities, both the procurement and materials management business units are typically organized under a director of supply chain

Without definitive control through chain of command, there is potential for disagreement over objectives between the procurement and materials management business units. Given the current organizational structure, ultimate resolution of this type of disagreement could potentially require intervention from the COO&CFO which is three hierarchical levels removed.

2. The Pittsburgh Water & Sewer Authority does not have appropriate inventory controls.

At the PWSA, materials are initially charged out of inventory stock when transferred to field crew and never tracked again from that point. Materials are not tracked when they are transferred to a service truck (rolling stock[17]) nor as they are placed into the water, wastewater, or stormwater systems. Once an item is checked out of the warehouse or a stockroom, it is no longer considered to be an item within the inventory system.

The PWSA conducts annual inventory counts at the Central Warehouse and stock rooms but does not use an industry accepted standard counting procedure such as ABC analysis where both turnover rates and the value of the items would deem certain items to get greater consideration during counts. Furthermore, there is no accounting for rolling stock. The company had a significant inventory adjustment on record in 2018 due to what the company identified as “inventory cleanup”. All other years had either no or minimal variance which is extremely unlikely. It should be noted, no count was conducted in 2020 due to the COVID-19 pandemic. Regardless, the inventory data was unmeaningful because of the charge out procedures. For example, if

[17] Rolling stock is stock that is placed on a service truck to be used during non-designated future repairs.

an item was charged out and then lost and never put into plant, the count under the current process would show no variance for that item.

Cameras are located at various locations in the company's system. Cameras are placed at several locations near the Central Warehouse and stock rooms, and the company will be installing additional cameras (See Finding and Conclusion No. 2 in chapter VII – Emergency Preparedness). At the time of audit fieldwork, however, there were no cameras installed or planned to be installed at the material storage areas in the Central Warehouse or stock rooms. This could result in not only theft of materials but inappropriate habitual "overstocking" of service trucks.

Appropriate inventory control should begin with a camera monitored stocking area and archived footage. The camera footage could be used to determine where missing or unaccounted for items might be. Bar code systems should be used not only to check out materials but also every time a transfer takes place between the Central Warehouse and other stockrooms or to a service truck and at installation into the water, wastewater, or stormwater systems. Periodic formal counts should be conducted to determine material shrinkage. Without these inventory controls in place, inventory turnover monitoring, which should be used as a gauge for efficient materials management practices, is rendered suspect. It should be noted that such weaknesses in internal control can promptly be found and addressed by an experienced internal auditor (See Finding and Conclusion No. 3 in chapter IV – Corporate Governance).

3. The purchasing activities at the Pittsburgh Water & Sewer Authority do not formally consider best practice factors to optimize ordering.

Appropriate economic order points (EOP) and economic order quantities (EOQ) can be calculated using industry established formulas that consider recent long- and short-term historical usage, quantities on hand, unit cost (which frequently depends on order quantity), and restocking lead times. Although the company does informally consider these factors when executing its purchasing strategy, these factors are not formally documented for each item.

As discussed in the Background of this chapter, the company uses *Panatracker* for barcode scanning, *Cogsdale* for the financial system, and *Bonfire* for the online bidding portal. The PWSA is anticipating implementation of *SAP* in late 2022 (See Finding and Conclusion No. 3 in chapter X – Information Technology). EOP and EOQ calculations can be performed manually, but the implementation of *SAP*, which will replace *Cogsdale*, includes highly effective automatic EOP and EOQ calculation capabilities.

Appropriate EOP and EOQ calculations will optimize material inventory levels to prevent excessive inventory levels while preventing stock outs. The financial benefit from using EOP and EOQ calculations could not be estimated during audit fieldwork due to the lack of defined emergency stock (See Finding and Conclusion No. 4) and the lack of appropriate inventory controls (See Finding and Conclusion No. 2).

4. The Pittsburgh Water & Sewer Authority's materials management business unit has not formally defined emergency stock.

The PWSA does not maintain a formal emergency item list. The company states that material inventory levels at the Central Warehouse and Brilliant Yard locations are maintained to be able to fix leaks on pipes ranging in size from 2-inch to 48-inch as well as to restore any customer with a disabled water supply. This covers the range of items necessary for emergency repair for the system, but no specific items have been labeled as emergency stock. Emergency stock is not simply items used in emergency repair; there are specific criteria and reasons for designating items as emergency stock as explained below:

- Although these items are usually slow moving with low to no turnover, the items cannot be considered obsolete and removed from inventory because they have been deemed necessary to maintain continuity of operations
- Because emergency stock tends to have infrequent use, but again is deemed necessary for continued operations, these items should not be included in inventory turnover calculations because it would skew the reported performance of the materials management business unit

The company stated that all inventory retained at the Central Warehouse and stock rooms is used for emergency repairs. The PWSA does not maintain any capital or routine maintenance stock at the warehouse or stock rooms. All capital projects are performed by contractors, and the company has not yet invested enough capital into its system to establish routine maintenance practices. Considering this situation, the emergency repair frequency is so high that the auditors estimate that material turnover would be high, but inventory turnover cannot be accurately calculated at this time due to a lack of defined emergency stock and inventory control issues (See Finding and Conclusion Nos. 2). Frequently and commonly used materials would not meet the definition of emergency stock.

Defining emergency stock items, along with appropriately calculated EOP and EOQ (See Finding and Conclusion No. 3) and other inventory controls (See Finding and Conclusion No. 2), will help the company determine the appropriate inventory levels at the Central Warehouse and stock rooms. Furthermore, documentation of the logic to designate an item as emergency stock as well as the determined ideal number of each emergency item to be kept on hand should be retained by the company. This would include details of the recent frequency of use, reason for use within the system, anticipated future needs, and availability to refresh stock. For example, due to volatility of supply chain processes caused by the COVID-19 pandemic, stocking timelines have become significantly longer and more challenging to schedule. Once optimized inventory levels have been established, appropriate turnover goals could then be determined to maximize materials management efficiency.

Recommendations

1. **Develop and establish a formal, direct hierarchy between the procurement and materials management business units as determined by best practices and the company's needs; adjust the company's organizational structure as necessary.**

2. **Develop and implement inventory control mechanisms based on formalized materials management procedures to track inventory more accurately and efficiently.**

3. **Establish appropriate EOP and EOQ based on relevant controlling factors to support an appropriate material turnover rate.**

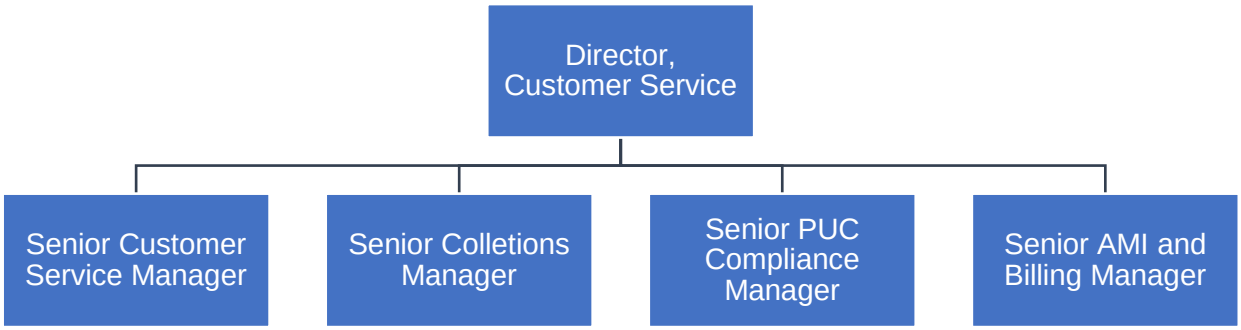
4. **Identify and create an emergency stock list and develop and implement procedures to routinely review and update the list to maintain its relevance.**

IX. CUSTOMER SERVICE

Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under the Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA. This chapter discusses the Customer Service Department organizational structure and respective roles and responsibilities at the PWSA.

Exhibit IX-1
Pittsburgh Water & Sewer Authority
Customer Service Department Organizational Structure
As of April 2022



Source: Data Request EM-34

The Director, Customer Service is responsible for the performance management of the Customer Service Department which includes the utilization of in-depth knowledge of billing systems, processes, and intrapersonal skills to drive success. The Senior Customer Service Manager is responsible for the provision of high-quality service to customers by managing, evaluating, and coaching contact center and emergency dispatch staff as well as providing regular reports on customer call quality. The Senior Advanced Metering Infrastructure (AMI) and Billing Manager oversees the day-to-day operations of editing and processing the metering and customer billings in a timely manner. The Senior PUC Compliance Manager responds to customer inquiries and addresses escalations of inquiries from the PUC, Office of Consumer Advocate, Better Business Bureau, and City's 311 Response Center as well as from local, state, and federal elected officials. The Senior Collections Manager is responsible for maintaining high-quality service to customers with past due billings and maximizing revenue collection.

During the PWSA's first base rate case (described more thoroughly in chapter II – Background), settlement agreement terms required the PWSA to make all reasonable efforts to meet or exceed call center performance standards and to take

steps to correct non-compliance where necessary. The PWSA tracks various metrics for call center performance. The following are examples of targets set to evaluate performance along with performance levels as of September 2021:

- Average Speed of Answer – Contact Center (Target of 1 minute) — *20 seconds*
- Average Speed of Answer – Dispatch (Target of 1 minute) — *12 seconds*
- Call Handling Rate – Contact Center (Target of 97%) — *98.9%*
- Call Handling Rate – Dispatch (Target of 97%) — *97.9%*
- Emails to the PWSA Processed within 48 Hours (Target of 98%) — *99.7%*

In 2015, the PWSA partnered with Sensus to install an AMI system. The project involved replacing water meters and meter reading devices at 81,000 endpoints. The new meter reading devices have been connected to the register heads on the water meters to transmit readings every 15 minutes to one of four data collectors. The meters provide readings down to one-tenth of a gallon of water and allow hourly readings to be transmitted to a regional network interface (RNI). The PWSA can access meter readings from the RNI when conducting research and for monthly billings. Hourly meter readings are also useful to the PWSA's Customer Service Representatives when assisting customers with high consumption.

In December of 2018, the PWSA upgraded to *Sensus Analytics* and launched a customer usage portal which allows customers to view usage in real time, set daily/weekly/vacation usage thresholds, and receive alerts via email or text when thresholds are exceeded. By implementing this technology, the PWSA experienced an improvement in its meter reading rate from 89% in 2017 to 97% in 2021.

The following is a list of the customer assistance programs available to customers of the PWSA:

- **Bill Discount Program (BDP)** – provides eligible customers, who are earning an annual income that is at or below 150% of the federal poverty level (FPL), with a 100% reduction of fixed monthly water and wastewater conveyance charges (approximately $36 per month); customers enrolled in the BDP earning an annual income that is at or below 50% of the FPL will also receive a 20% reduction of monthly volumetric charges

- **Arrearage Forgiveness** – provides customers, who are enrolled in a 60-month income-based payment arrangement and are earning an annual income that is at or below 150% of the FPL, with a $15 credit for each on-time monthly payment

- **Hardship Grant** – provides customers, who are earning an annual income that is at or below 150% of the FPL, with cash grants toward water/wastewater billings up to $300 per year

- **Lead Line Replacement Reimbursement Program** – assists customers with the cost of private lead service line replacement of those customers who choose to proactively hire a plumber to complete the work

- **ALCOSAN (Allegheny County Sanitary Authority) Clean Water Assistance Fund** – provides customers, who are earning an annual income that is at or below 150% of the FPL, with a quarterly grant for sewage treatment services

- **Allegheny County Emergency Rental Assistance Program** – assists Allegheny County tenants who are unable to pay rent due to the COVID-19 pandemic; program provides utility assistance for electricity, gas or fuel oil, sewage, trash removal, and/or water

- **Low-Income Household Water Assistance Program (LIHWAP)** – assists low-income families with overdue water bills — to qualify, a single-member household must have an income of $19,830 or less and each additional household member increases the earning threshold by $6,810 (e.g., a two-member household earning threshold would be $26,640[18]); LIHWAP crisis grants may be available for those who have experienced an emergency; such as past-due water bills, termination of service, or have received a notice that service will be shut-off within the next 60 days; by providing one crisis grant for drinking water service and one crisis grant for wastewater service, up to $2,500 each, to those who qualify

In December 2019, the PWSA hired Raftelis to perform a household affordability analysis. It was determined by 2010 census data that approximately 26,000 customers may be eligible for the BDP. Exhibit IX-2 shows the BDP enrollment for the period 2018 – March 2022. The trend indicates that the PWSA has made great strides since its inception. Exhibits IX-3 and IX-4 show the most recent enrollment in the available customer assistance programs and the amounts of assistance provided, respectively. Enrollment has been tracked since April 2021 and as shown, has increased in most of the programs over this period.

Exhibit IX-2
Pittsburgh Water & Sewer Authority
Bill Discount Program Enrollment
For the Years 2018 – 2021 and Year-to-Date as of March 2022

	2018	2019	2020	2021	March 2022
Bill Discount Program (Fixed)	NA	NA	NA	4,075	4,235
Bill Discount Program (Volumetric)	NA	NA	NA	1,142	1,204
Total	**2,530**	**2,987**	**4,306**	**5,217**	**5,439**
% Enrollment Increase (Year-Over-Year)		**15**	**31**	**17**	**4**

NA – not applicable
Source: Data Request CS-64

[18] $19,830 + $6,810 = $26,640

Exhibit IX-3
Pittsburgh Water & Sewer Authority
Customer Assistance Program Average Enrollment
Quarterly from April 2021 – March 2022

Customer Assistance Program	2nd Quarter 2021	3rd Quarter 2021	4th Quarter 2021	1st Quarter 2022
Bill Discount Program (Fixed)	3,611	3,831	4,038	4,188
Bill Discount Program (Volumetric)	921	998	1,111	1,180
ALCOSAN Clean Water Assistance Fund	NA	1,137	1,107	1,085
60-Month Payment Arrangement Requests	2,053	2,490	2,791	2,136
Arrearage Forgiveness	377	642	776	530
Hardship Grants	31	21	22	32
Lead Service Line Reimbursements	3	10	15	22
Emergency Rental Assistance Program	9	42	73	67
Low Income Household Water Assistance Program	NA	NA	NA	172

NA – not applicable
Source: Data Request CS-64

Exhibit IX-4
Pittsburgh Water & Sewer Authority
Amounts Awarded through Customer Assistance Programs
Quarterly from April 2021 – March 2022

Customer Assistance Program	2nd Quarter 2021	3rd Quarter 2021	4th Quarter 2021	1st Quarter 2022
Bill Discount Program (Fixed)	$73,249	$81,637	$89,046	$93,498
Bill Discount Program (Volumetric)	$24,211	$26,738	$28,293	$29,405
ALCOSAN Clean Water Assistance Fund	$39,795	$38,675	$38,710	$46,680
Arrearage Forgiveness	$16,950	$28,905	$34,905	$36,585
Hardship Grants	$25,074	$17,494	$17,711	$22,797
Lead Service Line Reimbursements	$13,480	$38,867	$39,474	$44,743
Emergency Rental Assistance Program	$17,790	$79,973	$147,383	$86,228
Low Income Household Water Assistance Program	NA	NA	NA	$275,414

NA – not applicable
Source: Data Request CS-64

Findings and Conclusions

Our examination of the customer service function included a review of the company's policies and procedures, staffing levels, management and reporting levels, performance levels, customer outreach and assistance programs, etc. Based on our review, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional effort to improving the efficiency and/or effectiveness of the customer service function by addressing the following:

1. Many customer service business processes were being addressed through ongoing litigation proceedings with the Pennsylvania Public Utility Commission.

The PWSA filed its Stage Two Compliance Plan (CP2) materials with the Pennsylvania Public Utility Commission (PUC or Commission) on April 9, 2021. CP2 covers many of the PWSA's customer service business processes. Among other processes, litigation will determine how the PWSA should handle the processes described in the Commission's regulations at 52 Pa. Code Chapter 56 which describes processes to ensure a utility is following Chapter 14 of the Pennsylvania Public Utility Code. This codification specifically addresses billing, collection, and termination standards and practices.

Per the May 20, 2021 PUC Order, at Docket Nos. M-2018-2640802 and M-2018-2640803, the Office of Administrative Law Judge must issue a Recommended Decision on matters raised in consideration of the CP2 no later than May 25, 2022. In addition, per Secretarial Letter, dated August 5, 2021, parties may then submit exceptions within 20 days of the Recommended Decision and reply to exceptions no later than 15 days thereafter or as otherwise directed by the Commission. The earliest a Final Order could be submitted would be July 2022.

The following are topics currently in litigation that are typically included in the auditors' customer service function review during a Management and Operations Audit:

- Credit checks
- Security deposits
- Contracts with third-party collection agencies
- Balance of amounts in arrears
- Non-access program (theft of service plan or procedures)

The PWSA presently does not perform credit checks, require security deposits, or utilize a third-party collection agency. In addition, the PWSA does not require customers to pay outstanding debt from prior service locations before establishing service at another location because of its ability to place liens against properties. Finally, the PWSA does not have a formal theft of service program outside of the following processes cited from their Non-Access Project Reference Guide:

> The PWSA identifies suspected incidences of possible theft of service with a monthly report of accounts with zero consumption for six months or more when the accounts are also coded as "on" at the curb stop. This report is analyzed by PUC Compliance personnel and is then given to Billing personnel to initiate their non-access process. Accounts may also be identified through contact with the customer. Restorations following termination for non-access are authorized once the customer schedules and holds an appointment to upgrade the water meter. In the case where consumption begins to register on the new water meter, the account is back-billed according to the average of metered consumption *before* the

lack of consumption and *after* the lack of consumption for a period not to exceed four years.

The PWSA's billing and collection practices have resulted in high arrearages both overall and over 90 days. More details on the PWSA's arrearages can be found in Finding and Conclusion No. 2. Exhibit IX-5 shows the yearly average arrearages over 90 days along with the associated percentage.

Exhibit IX-5
Pittsburgh Water & Sewer Authority
Percent of Amounts in Arrears Over 90 Days
For the Years 2017 – 2020 and Year-to-Date as of September 2021

	91-120 Days	121-180 Days	181+ Days	% Of Total Amounts Over 90 Days
2017	$2,355,176	$3,482,487	$33,723,778	**78**
2018	$1,677,425	$2,827,744	$34,703,302	**80**
2019	$1,240,221	$1,960,817	$34,018,800	**79**
2020	$1,481,977	$2,420,144	$33,321,167	**78**
Sept 2021 YTD	$1,689,561	$2,604,775	$31,992,049	**73**

Source: Data Request CS-28 and auditor analysis

Since the PWSA has come under PUC jurisdiction, the PUC has been working with the PWSA to develop a plan to work toward full compliance with Pennsylvania's public utility rules and regulations. A regulated utility must participate in active litigation proceedings and comply with the Commission's orders resulting therefrom. The PWSA was not required to comply with Chapter 14 of the PA Public Utility Code nor PUC regulations at Chapter 56 prior to the implementation of Chapter 32 of the Pennsylvania Public Utility Code which gave the Commission authority over the PWSA.

2. The Pittsburgh Water & Sewer Authority does not effectively track nor manage its arrearages.

There are many current business practices at the PWSA that have led to excessive arrearages, most importantly, the lack of aggressive collection processes as is described in Finding and Conclusion No. 1. In addition, due to current system constraints, the only reporting format that the PWSA could provide showed total arrearages by month and year that were grouped by days overdue (e.g., 61 – 90 days). The PWSA was unable to report the total monthly and yearly amounts in arrears by customer type (e.g., residential, commercial, etc.) nor by the portions of the arrearages backed by liens filed against the associated properties. The PWSA asserts this was due to lien records being maintained in individual legal records outside the main system. The PWSA's migration to *SAP* in August 2022 is expected to expand reporting capabilities moving forward.

The PWSA bills on behalf of the Allegheny County Sanitary Authority (ALCOSAN); see Finding and Conclusion No. 4 of chapter III – Executive Management and Organizational Structure for a full description of this arrangement. Per the servicing agreements with ALCOSAN, the PWSA is required to submit the total amounts billed on behalf of ALCOSAN without any regard for the PWSA's ability to collect on these billings. The PWSA has not historically tracked the amounts in arrears that resulted from billing on behalf of ALCOSAN. This arrangement requires the PWSA to bear the responsibility of collecting pass-through ALCOSAN charges, including its bad debt, while submitting to ALCOSAN the full amount billed without any relief for uncollectible amounts. This arrangement is inequitable and places undue financial burden on the PWSA while insulating ALCOSAN from its own credit/collection risk.

In October 2020, the PWSA hired Raftelis to estimate uncollectible billings on behalf of ALCOSAN which have been consolidated into the PWSA's arrearages and to project future uncollectable amounts of ALCOSAN's pass-through billings. Exhibits IX-6 and IX-7 show the consultant's estimated amounts of bad debt resulting from past and future billings on behalf of ALCOSAN.

Exhibit IX-6
Pittsburgh Water & Sewer Authority
Bad Debt from Past Billings on Behalf of ALCOSAN
For the Years 2017 – 2019: Actual and 2020: Budget

2017	$(964,216)
2018	$(2,032,565)
2019	$2,125,432
2020	$(1,540,994)

Source: Data Request CS-39

Exhibit IX-7
Pittsburgh Water & Sewer Authority
Forecasted Bad Debt from Future Billings on Behalf of ALCOSAN
For the Years 2021 – 2030

2021	$ (1,556,404)
2022	$ (1,571,968)
2023	$ (1,650,567)
2024	$ (1,733,095)
2025	$ (1,819,750)
2026	$ (1,910,737)
2027	$ (2,006,274)
2028	$ (2,106,588)
2029	$ (2,211,917)
2030	$ (2,322,513)

Source: Data Request CS-39

Limited reporting capabilities have resulted in less manageable, lump summed arrearages (See Finding and Conclusion No. 3 in chapter X – Information Technology). In addition, the PWSA has not historically tracked its portion of arrearages that have resulted from ALCOSAN's uncollectible billings. Consequently, the PWSA does not have an accurate record of ALCOSAN's bad debt that the PWSA has assumed. The PWSA should actively monitor aging receivables by customer classification, the amounts guaranteed by liens, and the amounts that would be appropriate for eventual write-off. Arrearages resulting from the PWSA's obligations to bill customers on behalf of ALCOSAN for sewage treatment charges should be tracked separately moving forward. Once collection process improvements are approved through the CP2 proceedings described in Finding and Conclusion No. 1, the PWSA should immediately begin to implement aggressive collection processes to reduce overall arrearages.

Recommendations

1. **Continue to participate in litigation proceedings and follow the subsequent Final Order to direct processes to work toward full compliance with Chapter 14 of the Pennsylvania Public Utility Code and Chapter 56 of the Commission's regulations.**

2. **Begin tracking arrearages by customer type and by amounts being pursued through liens, segregating those resulting from pass-through billings of ALCOSAN, to maintain better control. Furthermore, once litigation over collection practices with the PUC is finalized, implement aggressive collection efforts to reduce arrearages.**

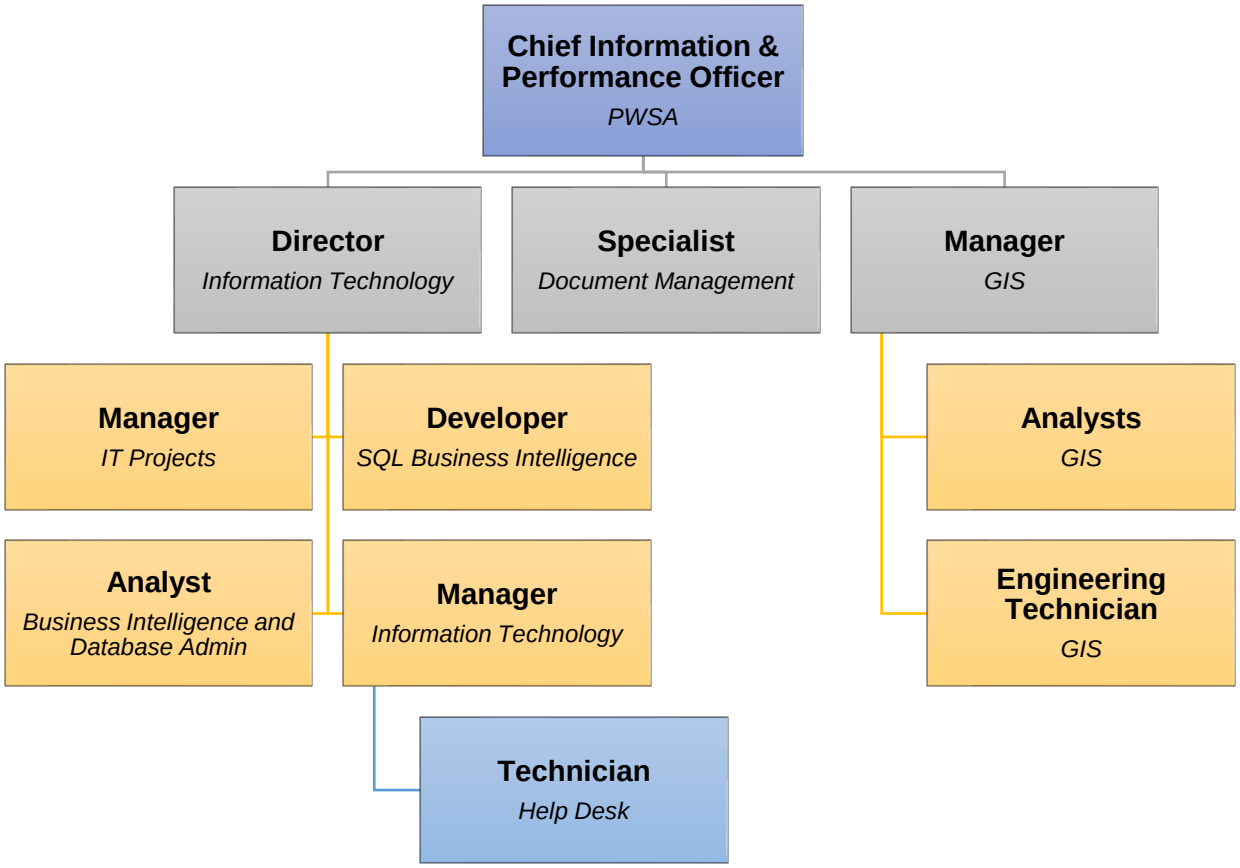
X. INFORMATION TECHNOLOGY

Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under the Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA.

The information technology (IT) function is controlled and managed by the Management Information System (MIS) Department. The Chief Information and Performance Officer (CIPO) oversees IT responsibilities with assistance from direct reports: Director of IT, Manager of Geographic Information Systems (GIS), and Specialist of Document Management. This organizational structure is detailed in Exhibit X-1.

Exhibit X-1
Pittsburgh Water & Sewer Authority
Management Information System Department Organizational Structure
As of April 2022



Source: Data Request EM-34

The PWSA's MIS Department consists of three business units committed to meeting the cyber and IT demands of the company. An overview of the responsibilities of the three business units are as follows:

- **Information Technology** – manage, maintain, and support all IT resources, system applications, IT infrastructures, hardware, and telecommunications; IT cyber security processes and methods; IT helpdesk and assistance to all users; and IT project management

- **Geographic Information Systems** – manage and maintain GIS data, mapping, and attribute updates; prepare maps and data for internal and external requests; utilize Environmental Systems Research Institute tools to deploy and support web and mobile applications; assist with field inspections of water and sewer assets and GPS surveying; provide added support for all project phases of construction contracts; and assist in data requests for retained documentation

- **Document Management** – organize, maintain, store, and retrieve records, both physical and digital; advise on record keeping best-practices; manage custody of physical records; dispose of outdated records and documents; and streamline record keeping practices across all departments

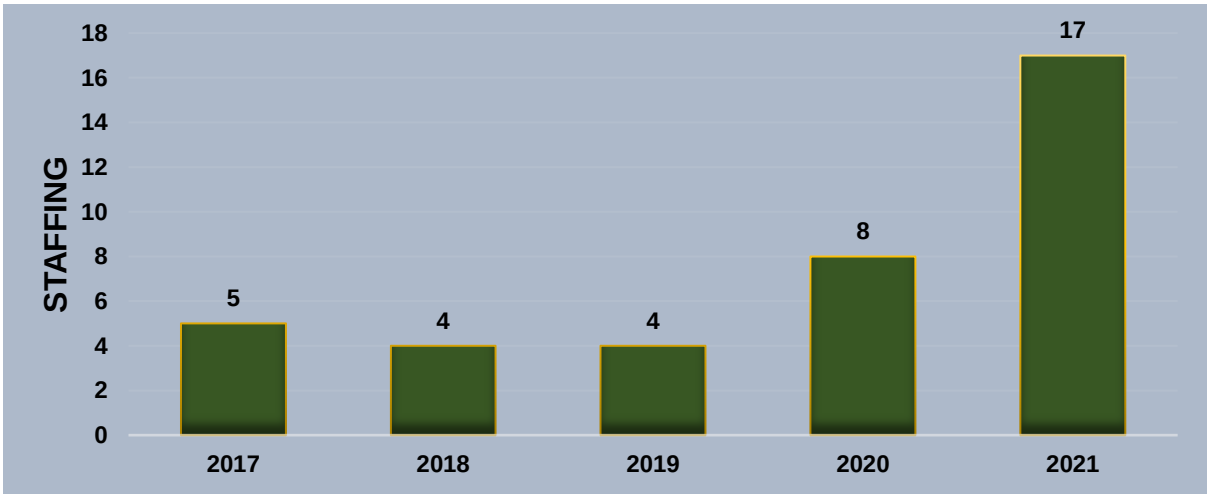
The PWSA establishes and tracks performance-based goals to determine the effectiveness of IT business processes. Departmental performance statistics are provided in management reports and are used to educate and communicate important aspects of IT and cyber security continuance. In addition, the Director of IT provides updates to the Security Steering Committee that meets monthly. Updates include discussions of cyber incidents and/or concerns, global and specific utility related events and threats related to cyber security and current IT projects, among other issues.

The company's cyber security functions are supported by an outside vendor with extensive industry experience. There are occasions when the company will engage with additional consultants to provide implementation support or best-of-industry IT services that coincide with the developed IT business strategy. The remaining IT and cyber security functions are the responsibility of staff under the CIPO and Director of IT.

MIS Department staffing levels since 2017 are displayed in Exhibit X-2. The PWSA has prioritized IT and cyber awareness as is evidenced through increased staffing. Also, the GIS business unit, which was previously part of the Engineering & Construction Department, was moved under the supervision of the CIPO.

To optimize business system functionality, existing systems need to be constantly updated and/or upgraded by implementing available emerging technologies. The PWSA has various projects underway to modernize equipment, streamline IT processes, conduct annual IT/cyber security audits, and strengthen IT security posture. Due to the sensitive nature, projects and audit results were reviewed but are not disclosed in this audit report.

Exhibit X-2
Pittsburgh Water & Sewer Authority
Management Information System Department Staffing
For the Years 2017 – 2021



Source: Data Request IT-07

Findings and Conclusions

Our examination of the information technology (IT) functional area included a review of the organizational structure, staffing levels, operational expenses, policies and procedures, cyber security measures, IT training techniques, and other related information. Based on our review of the company's IT efforts, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional efforts to improve the efficiency and/or effectiveness of the IT functions by addressing the following:

1. The Pittsburgh Water & Sewer Authority's information technology maturity is ranked below industry average.

In 2021, the PWSA engaged a third party to review IT strategy, framework, and overall IT capabilities to ensure its IT strategy was aligned with the company's business objectives and industry best practices. This assessment covered seven functional objectives over 40 functional activities. The PWSA's performance was based on two primary dimensions: importance and maturity. As a result of this review, the PWSA prepared an IT Strategy to improve its IT maturity rating by year-end 2023. The IT Strategy focuses on core business priorities such as infrastructure reliability, customer satisfaction, public health, diverse high-performing team, effective public utility, and financial stability.

In addition to the third-party assessment, the PWSA has utilized the Department of Homeland Security's Cyber Infrastructure Security Agency (CISA) to gain additional insight on cyber security and resilience. CISA offers a web-based assessment, Infrastructure Survey Tool[19] (IST), which focuses on the following areas:

[19] Source: Infrastructure Survey Tool | CISA

- Identifying facilities' physical security, security forces, security management, information sharing, protective measures, and dependencies related to preparedness, mitigation, response, resilience, and recovery
- Identifying areas for security improvements
- Creating facility protective and resilience measure indices that show a comparison to similar facilities that have completed IST assessments
- Tracking progress toward improving critical infrastructure security

The PWSA expressed that it intends to use CISA's IST as often as possible; however, the service has seen an increase in applications, and therefore, could not provide a follow-up date.

2. The Pittsburgh Water & Sewer Authority does not enforce mandatory information technology and/or cyber awareness training.

Many utilities, including water and wastewater, depend on several IT applications and industry control systems to control and monitor daily business operations (e.g., testing, treatment, supervisory control and data acquisition, customer information systems, etc.). While these applications improve water service and streamline business needs, their existence creates potential vulnerabilities for cyber related events, both intentional and unintentional.

The MIS Department and the human resources business unit jointly manage and administer IT trainings and related policies. The following web-based and subscription cyber security trainings are provided:

- Monthly cyber security computer-based training (CBT)
- Bi-monthly company-wide phishing simulations
- *CBT Nuggets*[20] platform for MIS members
- In-person cyber security trainings as desired

Even with these resources in place, participation and completion rates for IT and cyber security trainings are subpar ranging from 31% – 67% for all users. The PWSA does not require completion of trainings made available to its employees. By formalizing a cyber awareness training program, the PWSA will be able to require employees to become educated about cyber security issues and emerging threats and refresh users on company IT-related policies. The training program will become essential for the company to minimize risk and exposure to cyber threats and breaches.

[20] *CBT Nuggets* provides a variety of training; primarily in IT, project management, and office productivity topics — trainings are delivered through online streaming video (www.cbtnuggets.com).

3. The Pittsburgh Water & Sewer Authority's business software technology is outdated and is not meeting its business needs.

The PWSA operates numerous diverse software packages and applications, many of which are legacy, to support its daily operations. Using a decentralized management system has created problems across most of the PWSA's departments. The issues are caused by separate vendor databases being unable to integrate and share data across the different business units. In addition, the inability to integrate requires manual data extraction and analysis which is cumbersome and increases risk for human error.

The PWSA has begun work on a project, known as "Reinvesting to Improve Service and Efficiency" (RISE), which aims to eliminate these issues by implementing *Systems, Applications, and Products* (*SAP*) software and supplemental modules to integrate and streamline business services. Planning for the RISE project, led by the Director of IT, began in the third quarter of 2021, and is estimated to be completed by year-end 2022. As of March 2022, the PWSA was in the process of analyzing and determining which modules would best meet business needs with support from its vendor partners. With the implementation of *SAP*, the PWSA will be able to correct and address many limitations of the currently in-use software programs. These limitations include, but are not limited to, the following:

- **Finance** – manual uploading and billing, errors between financial software systems, limited access to capital and operating budget information, and duplicate financial and budget entries

- **Automated Metering and Billing** – manual tasking and entering service orders, inability to void and recalculate billings, account locking issues, and inability to reconcile Allegheny County Sanitary Authority pass-through billings

- **Collections** – inability to comply with rate case settlement for arrearage forgiveness program; manual counts of notices, postings, and terminations; delays in reporting of various payments

- **Contact Center** – inability to generate interaction reports automatically, difficulty with organized retention of customer call recordings, and limited customer process alerts

The PWSA will gain the essential tools to streamline and automate many business processes while eliminating time-consuming and error-inducing manual processes through implementation of *SAP*. Because of the many benefits to be realized, it is imperative that the PWSA takes the necessary steps to finalize the implementation in a timely manner.

4. The Pittsburgh Water & Sewer Authority has never conducted a social engineering audit to assess employee cyber awareness.

Social engineering audits provide an understanding of the effectiveness of cyber awareness training and IT policies set forth by a company. Such audits assess the knowledge level of employees' cyber awareness and if defined procedures are being followed. The results will provide and assist the MIS Department in ensuring the appropriate training opportunities are being offered to employees all the while highlighting areas in need of further support. For more information on cyber awareness training, see Finding and Conclusion No. 2.

It would be at the PWSA's discretion to determine the timing of such an audit. The auditors believe the PWSA should delay a social engineering audit until the recommendation for Finding and Conclusion No. 2 has been implemented and given time to mature.

Recommendations

1. Modernize IT architecture and processes to increase the PWSA's cyber maturity rating.

2. Enforce participation in a formalized cyber awareness training program which includes refresher training on IT policies, cyber security awareness, and remediation as necessary.

3. Dedicate the necessary resources to ensure the RISE project is completed in a timely manner.

4. Conduct a social engineering audit of the PWSA's employees' cyber awareness.

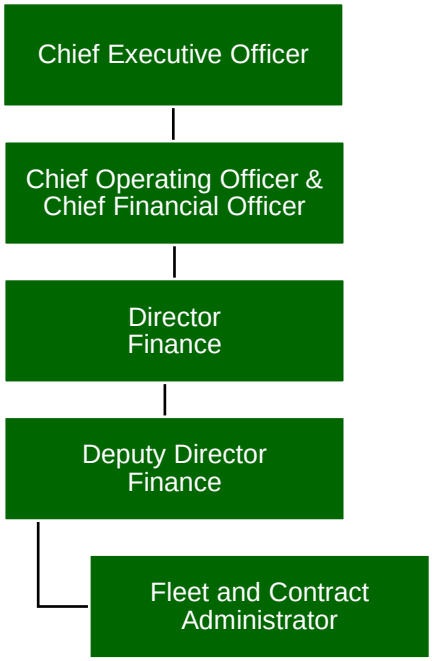
XI. FLEET MANAGEMENT

Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under Pennsylvania's Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA.

Exhibit XI-1 shows the organizational structure for the fleet management function. The Fleet and Contract Administrator is the sole employee who is responsible for fleet and related contract administration activities and has no reports. Note that this position is discussed further in Finding and Conclusion No. 2 of chapter XII – Human Resources.

Exhibit XI-1
Pittsburgh Water & Sewer Authority
Fleet Management Organizational Structure
As of April 2022



Source: Data Request EM-34

The Fleet and Contract Administrator is dedicated exclusively to fleet related issues. The responsibilities of the Fleet and Contract Administrator include:

- Establishment of fleet policies and procedures
- Coordination and scheduling of repairs and maintenance
- Purchasing and delivery of new vehicles/decommissioning retired vehicles
- Management of insurance, registration, inspections, etc.
- Interaction with vendors providing additional fleet needs (service, repairs, GPS, fuel, etc.)
- Preparation of fleet management budgets and requirements

Both the Director of Finance and the Fleet and Contract Administrator joined the PWSA in 2018, and the Deputy Director of Finance was hired in 2022. In 2018, policies and procedures, record keeping, and practices for the fleet management function were informal resulting in unreliable, inaccurate historical data. These inaccuracies were addressed in more recent years by those currently in these roles. As such, only current data and future planning was considered during this review and historical trending was deemed not worthwhile.

Numerous vehicle-related policies and procedures have been created and/or updated since 2018. Examples include: a vehicle operator handbook, maintenance procedures, safety related considerations (e.g., practices, vehicle decals, etc.), fueling procedures, accident reporting, and vehicle purchasing and decommissioning procedures.

Most vehicles are stationed at one of the seven company locations. Only a small number of vehicles are taken home daily by employees. This is due to the very compact service territory and frequent shop visits by field workers. Consequently, most vehicles meet their lifecycle limit in terms of years in service as opposed to miles on the odometer. The distribution of vehicles at the seven locations is displayed in Exhibit XI-2.

Exhibit XI-2
Pittsburgh Water & Sewer Authority
Vehicles by Location
As of March 2022

Location	No. Vehicles
Brilliant Yard	57
Mission Yard	32
Howard Street	36
Water Treatment Plant	40
Microfiltration Plant	2
Warehouse	4
Main Office	9
Total	**180**

Source: Data Request VE-19

Each business unit provides future vehicle needs to the Fleet and Contract Administrator and these needs are analyzed and prioritized during the first half of each year. In the second half of the year, the fleet-related financial planning aspects are examined as to which cars will be decommissioned and replaced, additional fleet to be added, and which technologies or systems will support fleet needs. At that time, vehicle designations are determined such as which employees will be assigned cars or use pool cars when needed and who will use personal vehicles.

The PWSA partners with the City and multi-party groups in utilizing third parties for some of the company's vehicle needs in addition to multiple contracts the PWSA has exclusively with third parties. Shared contracts with the City involve the City being initially billed by the contractor and the City subsequently billing the PWSA separately (See Finding and Conclusion No. 2 in chapter V – Financial Management for additional details). The PWSA also belongs to an organization that includes over 50,000 public agencies participating in vehicle purchasing opportunities at reduced rates for designated organizations. An overview of the lone-party or shared-party contracts are displayed in Exhibit XI-3.

Exhibit XI-3
Pittsburgh Water & Sewer Authority
Lone- and Shared-Party Contracts
As of January 2022

Parties	Service Provided by Contractor
PWSA	Certain types of heavy equipment maintenance and repair Tires Two-way radios Hydraulic hoses Crane cable and repair Vehicle decals Certain types of vehicle purchases through bidding Installation, reporting, and management of GPS
PWSA and City of Pittsburgh	Vehicle maintenance and repair Body shop repair Vehicle washing Fuel provision
PWSA, Various Government Agencies, Schools, Non-profit Entities, etc.	Vehicle purchasing Vehicle auctions

Source: Data Request VE-12

The PWSA has one electric vehicle on order for delivery in 2022. Final arrangements are also being made for the installation of a single direct current (DC) fast charger. The charging station will be located at the Water Treatment Plant (WTP). The PWSA will begin a pilot study for electric vehicle inclusion with this vehicle and DC charger in place. Current limitations at the PWSA facilities prevent additional electric vehicle implementation until resolution is established. Future renovations at the WTP are not yet finalized and the installation of more DC charging stations will depend on these plans. Various other shop locations are very limited in terms of available land while the main administrative office is leased with parking at a premium. With a review

of the results of the pilot study and with continuing advancements in electric vehicle technology, the company states it will strive for future opportunities for vehicle electrification. In the interim, the company has already purchased two hybrid vehicles and expects to add an additional six hybrid vehicles before year end 2022. The purchase of hybrid vehicles for 2023 will be finalized after a review of the announcement of that year's vehicles from the various manufacturers.

Findings and Conclusions

Our examination of the fleet management function focused primarily on a review of the vehicle and equipment acquisition process, including participation in group organizations and policies relative to competitive bidding; vehicle and equipment maintenance and repair procedures; and the process for monitoring vehicle and equipment utilization. Based on our review, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional efforts to improve the efficiency and/or effectiveness of the fleet management function by addressing the following:

1. A sizable number of the Pittsburgh Water & Sewer Authority's in-service vehicles are beyond the company's recognized lifecycle limits.

In 2005, the City of Pittsburgh (City) adopted lifecycle standards as proposed by its fleet maintenance vendor which were established from recommended principles of the National Association of Fleet Administrators (NAFA). The PWSA maintains fleet maintenance practices that were established by the City from when the entity that became the PWSA was still organized as a department of the City. This includes the same lifecycle standards for the PWSA as the City. Exhibit XI-4 displays the lifecycle standards used by the PWSA.

Based on these standards, there is a noticeable number of vehicles at the PWSA which are beyond lifecycle limits. Of the company's 180 vehicles, 26 (14%) were found to be past the lifecycle limit but still in service. Of these vehicles, 20 are scheduled to be replaced in 2022. The last among the vehicles past their lifecycle limits is scheduled to be replaced in 2025. Once this occurs, the Fleet and Contract Administrator has set a goal to maintain a replacement schedule that adheres to set lifecycle standards. The Fleet and Contract Administrator also stated that once there has been a period of non-COVID impacted operation normalization, further review and adjustments to the established lifecycle standards will be determined using tools the PWSA has purchased from the NAFA.

Exhibit XI-4
Pittsburgh Water & Sewer Authority
Fleet Lifecycle Limits
As of January 2022

Vehicle Type	Age	Miles/Hours
Pickup - gas	6	100,000
Pickup - diesel	8	125,000
Dump trucks	8	120,000
Tandem dump	10	120,000
Utility body - gas	6	100,000
Utility body - diesel	8	125,000
Van	6	100,000
Vactor	6	8,000 hrs.
Skid loader	10	N/A
Small crane - gas	6	100,000
Small crane - diesel	8	125,000
Large crane	10	120,000
Backhoe	6	6,000 hrs.
Flatbed SA	8	120,000
Flatbed TA	10	125,000
SUV	6	100,000
Automobile	6	100,000
Trailer	12	N/A

N/A – not applicable
Source: Data Request VE-13

Adherence to established lifecycle standards will efficiently minimize excessive maintenance expenses and maximize capital investment timing. Furthermore, ensuring the fleet is within its useful life will minimize service delays due to broken down equipment.

2. The Pittsburgh Water & Sewer Authority has not yet fully implemented a GPS system to better manage its fleet.

The PWSA began implementation of the *Geotab* GPS system in September 2021. The first trainings for the GPS system were provided in the weeks that followed its initial implementation. Both video and classroom formats have been made available through the vendor. The capabilities of the system are as follows:

- Real time tracking via a web-based interface (computer or mobile) which includes location, speed, braking, aggressive driving, idling, etc.
- Archiving of travel data unique to each vehicle
- Tracking error codes, which would generate a check engine or other notification, on vehicles systematically capable of providing this data — this information could be as granular as the windshield washer level dependent upon the vehicles' capabilities; with the modernization of the PWSA's fleet, this benefit could apply to most vehicles (See Finding and Conclusion No. 1)
- Alerting when GPS units are disconnected or not working

- Emailing periodic reports to designated users
- Generating accident reports for record retention which could be useful for legal defense

The implementation remaining for the GPS system is fine tuning/refining of the program, additional training, and planning methodologies of use for the various business units. Full integration of the system into daily company activities is anticipated by mid-year 2022.

The use of the GPS system should present immediate benefits to the company. GPS systems can assist the company in identifying improper use of vehicles, legal issues related to accidents, and vehicle maintenance needs. Automated report generation further simplifies these processes.

Recommendations

1. **Replace all vehicles which have exceeded the lifecycle limit and maintain the fleet within routinely reviewed and updated lifecycle standards going forward.**

2. **Implement *Geotab* and develop appropriate monitoring and reporting procedures to maximize investment value.**

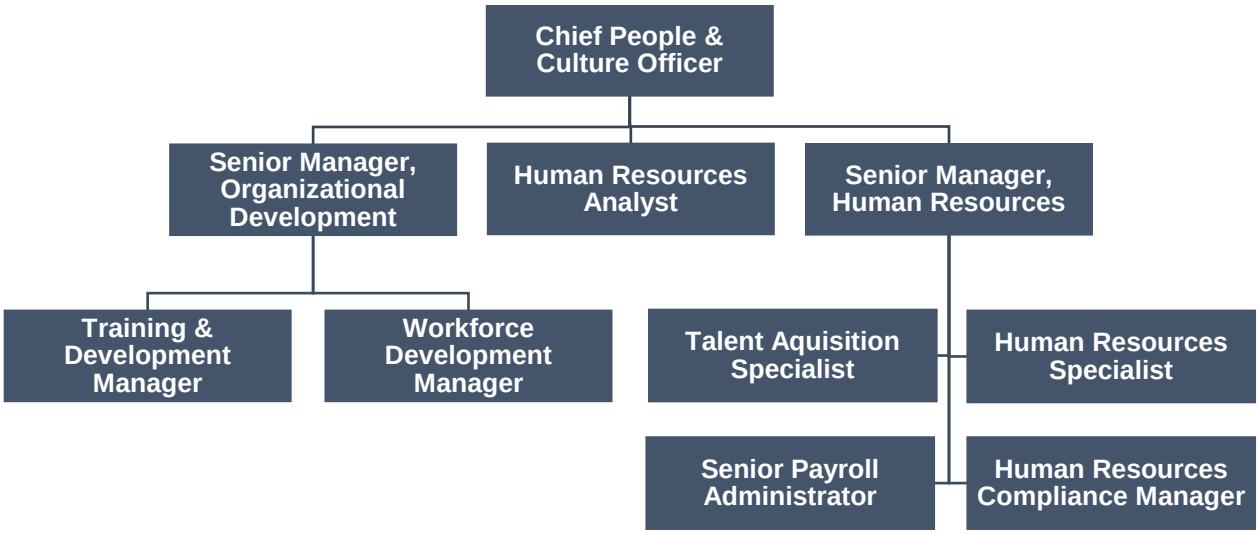
XII. HUMAN RESOURCES AND DIVERSITY

Background

As discussed in chapter II – Background, the Pittsburgh Water & Sewer Authority (PWSA) is a municipal authority organized by the City of Pittsburgh (City) on February 16, 1984. As such, the PWSA was a non-regulated entity operating under Pennsylvania's Municipal Authorities Act (MAA) of 1945 until Governor Wolf signed Act 65 of 2017 amending the Public Utility Code giving the Pennsylvania Public Utility Commission (PUC or Commission) regulatory jurisdiction over the PWSA. This chapter will discuss the human resources (HR) function including the status of the PWSA's corporate culture and the company's efforts to improve diversity and inclusion. In addition, this chapter will discuss the PWSA's safety function.

The HR function is under the direction of the newly established role of Chief People & Culture Officer as is shown in Exhibit XII-1. The Human Resources Department consisted of the traditional HR business units at the end of audit fieldwork in May 2022; however, there are plans over the next 12 – 24 months to hire additional staff that focus on diversity as well.

Exhibit XII-1
Pittsburgh Water & Sewer Authority
Human Resources Department Organizational Structure
As of April 2022



Source: Data Request EM-34

The Chief People & Culture Officer was hired in February 2021 as the Director, Human Resources. Over his first year with the PWSA, he aspired to extend the reach from general HR functions to include enhancement of corporate culture as well as prioritization toward diversity and inclusivity. Although many functional areas within the PWSA have been in a holding pattern as the Executive Leadership Team defines its

strategic planning process, as was described in detail in Finding and Conclusion No. 1 in chapter III – Executive Management and Organizational Structure, the Human Resources Department has been forging a steady path of growth and development. The Chief People & Culture Officer brought with him a vast knowledge of and extensive experience with advanced HR functions and has developed a five-year plan to mature this functional area.

One of the first steps taken by the PWSA to mature the HR function, was the installation of a new HR Information System (HRIS). The new HRIS went live on March 29, 2021 and was made mandatory for use by all employees on April 26, 2021. The main achievement of this project was to digitize all HR processes which was crucial for continuity during the COVID-19 pandemic. The PWSA has been strategically rolling out the various modules of the new HRIS to maximize its potential value to the company without overwhelming the employees. In January 2022, the PWSA deployed the learning management system (LMS) module through which employees performed annual compliance and policy awareness agreements.

Through development of the Human Resources Department Strategic Plan 2022 – 2026, the HR mission was defined to be:

- An effective partner by providing efficient and solution-focused services for staff
- Dedicated to attracting, developing, rewarding, and retaining a talented and diverse workforce
- Supportive of the organization's mission, vision, and values by fostering a culture of diversity, equity, and inclusion

In addition, HR identified the five following strategic focus areas:

- **Engagement** – strategic partnerships, engagement and recognition strategy, and diversity and inclusion
- **HR Excellence** – organizational structure; communications; and metrics, analytics, and insight
- **Talent Management** – performance management design, leadership development, professional development, and succession planning
- **Talent Attraction** – recruitment, orientation and onboarding, and workforce development
- **Efficiency & Effectiveness** – business process refinement, integrated leadership, key performance indicators, and unified talent management

The HR leadership team has made specific action plans to advance within the above strategic focus areas over the plan period. These specific goals tackle some basic HR functions, such as implementing a performance review process and establishing reporting metrics to monitor departmental progress, as well as some highly advanced HR functions such as developing enhanced workforce development programs considering data analytics and establishing a merit-based compensation plan.

The PUC has encouraged utilities to proactively improve diversity in their workforce and procurement efforts for more than two decades. Originally in February 1995, and updated as of January 2021, the Commission adopted Chapter 69 regulations which encourage utilities to include diversity efforts as a component of their business strategy. Since March 1997, the PUC has encouraged utilities to file annual reports that identify their efforts in improving diversity in their workforce and procurement efforts. The PWSA has willingly complied with this filing process as it has been working with the PUC to come into full compliance as a regulated utility under PUC jurisdiction. More information regarding the PWSA's diversity procurement efforts is available in chapter VIII – Purchasing and Materials Management.

Although the Human Resources Department has not yet established a diversity & inclusion (D&I) function, there were achievements made within this area throughout 2021 and into 2022. The PWSA created and implemented a formal Diversity, Equity, and Inclusion Policy and provided D&I and anti-harassment awareness training.

The PWSA's safety function is in its infancy because it was only insourced as of September 2020.The PWSA has started to increase staff of the Safety & Security Department as of January 2022. The safety function had not been prioritized under the prior leadership team. As of January 2022, the Safety & Security Department has been separated in terms of budget and reporting structure to support its efforts in developing and maturing the safety culture. Exhibit XII-2 shows the organizational structure of the Safety & Security Department.

Exhibit XII-2
Pittsburgh Water & Sewer Authority
Safety & Security Department Organizational Structure
As of April 2022

Source: Data Request EM-34

The Senior Manager, Safety & Security is a strategic planning position to provide oversight to each of the safety and security functions. The safety function is described more thoroughly in this chapter, and the security function is discussed in chapter VII – Emergency Preparedness.

The three manager roles within the Safety & Security Department have only been filled as of the beginning of 2022, so specific responsibilities are still being developed and matured. The Workplace Safety Manager is responsible for the field service safety aspects, the Emergency Planning & Water Production Manager is responsible for the safety and emergency preparedness operations of the water treatment processes, and the Security Manager is responsible for the general company-wide emergency preparedness aspects. These manager roles were included to ensure that the Senior Manager, Safety & Security could focus on the strategic planning processes while the managers could focus on the day-to-day operations of the designated safety and security functions. The Senior Manager, Safety & Security hopes to continue to build the department with support roles under each of the three department managers as the department matures and the company continues to prioritize the safety culture.

Findings and Conclusions

Our examination of the human resources (HR) function included a review of assigned responsibilities, policies and procedures, HR information systems capabilities, training and employee development, compensation and benefits, diversity programs, and safety initiatives. Based on our review, the Pittsburgh Water & Sewer Authority (PWSA) should initiate or devote additional effort to improving the efficiency and/or effectiveness of the HR function by addressing the following:

1. The Pittsburgh Water & Sewer Authority does not have a formal documented succession plan.

As was discussed more thoroughly in Finding and Conclusion No. 1 in chapter III – Executive Management and Organizational Structure, the PWSA has experienced high employee turnover for many years within its staff and leadership team. The frequent changes in key executive roles have resulted in inconsistent planning processes and a lack of continuity in company goals, objectives, and procedures.

The Chief Executive Officer (CEO) was able to verbalize his intentions toward succession planning; however, the company has yet to formalize a documented succession plan. The Chief People & Culture Officer indicated that the development of the updated mission and vision as well as the company's core values was the foundational step necessary for the company to then be able to focus on initiatives such as the development of a documented succession plan.

Effective January 1, 2021, the PWSA converted its organizational structure from one with the head executive title being an executive director supported by a deputy executive director to a chief organizational structure with the CEO at the top supported by five additional chiefs of specific business functional areas (See Exhibit III-1 in chapter III – Executive Management and Organizational Structure). The supporting leadership structure below the chief level is a director level which is further supported by an additional deputy director level. The CEO explained that the newly established chief organizational structure naturally lends to general succession within the leadership

team. Although this is not an unreasonable statement, it is not sufficient to expect general succession will transpire in practice.

A company should, at a minimum, maintain a formal, documented succession plan for top management. Considering the PWSA's organizational structure, it would be minimally necessary to include the chief, director, and deputy director positions. This document should list a ranking of two to three current candidates, either internal and/or a description of desired external hires, as well as a detailed developmental plan for each internal candidate to progress toward the considered position. The development plan would include necessary training to augment job knowledge and general leadership skills, on-the-job experiences/job shadowing that would benefit the candidate through exposure to tasks of the considered position, and a timeline depicting current state through full eligibility. Best practice would extend this plan to include middle management layers as well.

Although the newly established chief organizational structure has built-in succession steps such as the director positions in support of the chief positions and the deputy director positions in support of the director positions, relying on those parameters for succession puts the company at risk for failing to recognize necessary developmental processes that should be ongoing to prepare candidates for promotion, and it fails to ensure that each employee in a specific support role even has the desire to advance into higher levels of responsibility. In addition, without a formal documented succession plan, there is a potential gap in preparation for hiring needs for positions for which there are not the recommended two to three potential internal candidates.

2. The Pittsburgh Water & Sewer Authority has not performed an analysis to determine how many positions have only one person trained and eligible to perform specific job tasks.

Circumstances were identified where only one employee within the PWSA was trained and eligible to perform specific job tasks. For example, the Fleet and Contract Administrator was the sole employee responsible for fleet and related contract administration activities and has no direct reports to assume duties in his absence. This position reports to the Director of Finance who does not engage in these daily work activities in any way. The leadership team indicated that workforce redundancy and succession planning are top priorities; however, they had yet to take any formal steps to ensure these processes are secure (See Finding and Conclusion No. 1).

Just as there can be single points of failure within the system assets of a utility, there can also be human resource single points of failure when only one person is trained and eligible to perform specific, pivotal job tasks. As a best practice, companies should routinely perform analysis to ensure that through resignation, retirement, transfer, or dismissals, a human resource single point of failure cannot occur. In smaller utilities, there may be small departments with few employees; however, the company must continue to maintain employee skill, knowledge, and eligibility through cross-training to ensure all necessary daily work tasks can be performed regardless of

who is unable to be in attendance for a day or longer. Management must also be ready and able to step in to perform pivotal work tasks of those they supervise as a last resort.

3. The Pittsburgh Water & Sewer Authority's safety performance is below industry average per the Bureau of Labor Statistics.

The PWSA hired a full-time employee dedicated to overseeing safety initiatives in September 2020. Prior to internally staffing that position, the company used a safety consulting firm, Compliance Management International (CMI), to provide guidance with safety-related issues and initiatives. The current Senior Manager, Safety & Security was a prior employee of CMI that had performed consulting work for the PWSA since 2014 before being hired internally. The PWSA continued to use CMI as safety program support throughout 2021.

Exhibit XII-3 shows the PWSA's safety performance as demonstrated through Occupational Safety and Health Administration (OSHA) reportable metrics. The first metric presented is the OSHA Rate which represents annual safety performance by calculating the number of OSHA recordable incidents per 100 employees. OSHA recordable injuries are accidents that result in medical treatment beyond first aid, at least one day of either lost time or restricted duty excluding the day of injury, or a fatality. The second metric is the Lost Time Rate which is a similar to the OSHA Rate except it only considers OSHA recordable incidents that resulted in at least one additional day of work missed after the day of the injury. The third metric, Days Away/Restricted or Transferred (DART) Rate, represents the number of recordable incidents that resulted in days away from work; restricted work activity; and/or job transfer that the company has experienced per 100 employees over the calendar year. Lower values indicate better performance for each metric. As Exhibit XII-3 portrays, the PWSA has experienced a positive trend of safety performance improvement over time which is an important first step in developing a prioritized safety culture.

Exhibit XII-3
Pittsburgh Water & Sewer Authority
Historic Safety Performance
For the Period 2018 – 2021

Year	OSHA Rate	Lost Time Rate	DART Rate
2018	7.87	1.50	2.25
2019	6.40	1.29	3.23
2020	6.66	1.27	4.12
2021	6.19	2.06	3.24

Source: Data Requests HR-24 and HR-37

The PWSA created targets for these safety metrics for 2021. The targets were primarily developed considering historic performance; however, it was noted that the PWSA also considered benchmark data available through the American Water Works Association (AWWA) for the OSHA Rate metric. Exhibit XII-4 was included to show the company's performance in reference to its established targets.

Exhibit XII-4
Pittsburgh Water & Sewer Authority
Safety Performance Target vs. Result
For the Calendar Year 2021

Metric	Target	Result
OSHA Rate	6.10	6.19
Loss Time Rate	1.10	2.06
DART Rate	3.60	3.24

Source: Date Request HR-37

Due to limitations in the availability of AWWA benchmarking data, the auditors were unable to verify the PWSA's safety performance as compared to similar utilities through that source. The 2020 Bureau of Labor Statistics indicated that average safety performance for utility companies similar to the PWSA had an OSHA Rate of 3.00 and a DART Rate of 2.20. The PWSA's safety performance did not meet industry average, nor were its annual targets set at or above industry average.

As was described in the Background of this chapter, the PWSA's Safety & Security Department is relatively immature. The PWSA will need to continue to dedicate funding and authority to the safety function's leadership team to see performance that meets and preferably exceeds industry average.

4. The Pittsburgh Water & Sewer Authority does not have procedures in place to effectively monitor fleet vehicle safety usage behaviors.

The PWSA has invested in and is in the process of installing a GPS monitoring system into its fleet vehicles as was discussed more thoroughly at Finding and Conclusion No. 2 in chapter XI – Fleet Management. Data that could be provided by the GPS monitoring system would be useful within the PWSA's safety program; however, current vehicle sharing practices would not allow for appropriate and meaningful observation.

Most of the PWSA's fleet vehicles remain at company locations to be shared by operations employees as would be needed to address maintenance and repairs. Vehicle sharing, in and of itself, is not a concern if accurate driving records are maintained. As of the end of audit fieldwork in May 2022, the PWSA was not digitally retaining a reliable driving log of this nature.

Companies that utilize fleet monitoring devices have found it beneficial to observe driving behaviors to determine if employees are complying with vehicle safety expectations. This data can be analyzed to determine if more robust policy and/or procedure enforcement is necessary, and/or if additional training is needed. Companies can also implement good behavior recognition programs to proactively encourage appropriate driving behaviors. It is imperative for data to be available per individual driver to allow for the most meaningful review.

Although the PWSA's safety records indicated only seven injuries related to vehicle use during the audit period, a provided report showed that the company experienced close to $50,000 of vehicle incident repair costs in 2021, alone. Each instance of careless or inappropriate use of vehicles has the potential to become an injury and/or an increased cost in vehicle damage repair. Proactively monitoring fleet vehicle usage to incorporate into a proactive safe driving plan can minimize risk of injury and excess cost.

Recommendations

1. **Develop a formal, documented succession plan which covers the chief, director, and deputy director positions, at a minimum, to be extended to include the middle management layers as is reasonably feasible.**

2. **Perform a human resource single point of failure analysis to determine what positions need immediate support and then develop a plan to cross-train and/or hire staff to ensure ample coverage is available for all pivotal work tasks.**

3. **Strengthen the underlying safety culture through continuous reinforcement messaging and consistent enforcement of safety policies and procedures. Set challenging yet attainable safety targets at industry average performance levels or higher and continuously perform root cause analysis of safety incidents to gain awareness of safety practices in need of support through procedure enhancement and/or additional training.**

4. **Develop procedures to digitally retain accurate fleet vehicle driver records so that GPS monitoring device data can be used to effectively monitor vehicle driving behaviors for use in safety programs.**

XIII. ACKNOWLEDGEMENTS

We wish to express our appreciation to the officers and staff of the Pittsburgh Water & Sewer Authority for their cooperation and assistance.

This audit was conducted by Craig Bilecki, Timothy Kerestes, Melissa Lawrence, and Eric McKeever of the Management Audit Division of Pennsylvania's Public Utility Commission's Bureau of Audits.

XIV. APPENDIX

Appendix A Water and Wastewater – Financial and Operating Data and Statistics

Pittsburgh Water and Sewer Authority: Water Utility
Financial and Operating Data & Statistics

DATA AND STATISTICS	2018	2019	2020	2021	Compound Growth
OPERATING REVENUE ($)					
Water Customers **WITHIN** Municipal Limits	$ 93,334,449	$ 106,800,148	$ 101,381,390	$ 118,983,346	8.4%
Water Customers **OUTSIDE** Municipal Limits	2,953,008	1,002,555	1,031,662	1,010,896	-30.0%
Wholesale Water Sales for Resale	2,618,425	2,808,412	2,909,892	3,185,330	6.8%
Total Operating Revenue	**$ 98,905,882**	**$ 110,611,115**	**$ 105,322,944**	**$ 123,179,572**	**7.6%**
OPERATING EXPENSES ($)					
Source of Supply or Collection Expense	$ 579,344	$ 558,857	$ 538,425	$ 611,391	1.8%
Water Purchased	-	-	-	-	NM
Purification or Treatment Expense	12,938,478	15,379,280	15,693,886	15,324,792	5.8%
Pumping Expense	4,141,858	3,533,214	3,437,394	3,947,723	-1.6%
Transmission and Distribution Expense	17,365,121	22,023,115	23,411,893	26,338,038	14.9%
General Office Expense	8,115,834	11,999,230	11,286,527	10,397,841	8.6%
General Office Salaries	3,811,091	4,903,503	6,132,515	7,041,066	22.7%
Taxes	-	-	-	-	NM
Depreciation	9,758,388	10,366,226	13,346,371	15,320,550	16.2%
Other Expense (Specify)					
Engineering & Environmental Compliance	4,544,003	7,064,668	4,479,782	3,223,635	-10.8%
City of Pittsburgh Reimbursement	2,946,360	1,194,390	2,573,559	2,290,581	-8.0%
Non-City Subsidy	3,814,015	1,337,970	385,916	119,792	-68.4%
Total Operating Expenses	**$ 68,014,492**	**$ 78,360,453**	**$ 81,286,268**	**$ 84,615,409**	**7.6%**
Water Distribution (Million Gallons)					
Water Customers **WITHIN** Municipal Limits	6,884	7,532	6,823	6,912	0.1%
Water Customers **OUTSIDE** Municipal Limits	212	64	66	57	-35.5%
Wholesale Water Sales for Resale	817	812	850	897	3.2%
Total Water Distribution	**7,913**	**8,408**	**7,739**	**7,866**	**-0.2%**
Customers at Year End					
WITHIN Municipal Limits	78,896	78,646	78,861	78,905	0.0%
OUTSIDE Municipal Limits	1,708	1,699	1,615	1,619	-1.8%
Total Customers at Year End	**80,604**	**80,345**	**80,476**	**80,524**	**0.0%**

Pittsburgh Water and Sewer Authority: Wastewater Utility
Financial and Operating Data & Statistics

DATA AND STATISTICS	2018	2019	2020	2021	Compound Growth
OPERATING REVENUE ($)					
Wastewater Customers **WITHIN** Municipal Limits	$ 65,567,685	$ 67,468,606	$ 64,775,545	$ 69,168,839	1.8%
Wastewater Customers **OUTSIDE** Municipal Limits	-	-	-	-	NM
Total Operating Revenue	**$ 65,567,685**	**$ 67,468,606**	**$ 64,775,545**	**$ 69,168,839**	**1.8%**
OPERATING EXPENSES ($)					
Source of Supply or Collection Expense	$ 10,123,555	$ 10,509,480	$ 14,603,259	$ 18,475,275	22.2%
Water Purchased	-	-	-	-	NM
Purification or Treatment Expense	-	-	-	-	NM
Pumping Expense	33,217	32,042	30,871	35,054	1.8%
Transmission and Distribution Expense	-	-	-	-	NM
General Office Expense	5,410,556	7,999,486	7,524,351	6,931,894	8.6%
General Office Salaries	2,540,728	3,269,002	4,088,343	4,694,044	22.7%
Taxes	-	-	-	-	NM
Depreciation	7,136,182	7,644,007	8,311,973	9,064,779	8.3%
Other Expense (Specify)					
Engineering & Environmental Compliance	3,029,335	4,709,779	2,986,522	2,149,090	-10.8%
City of Pittsburgh Reimbursement	1,964,240	796,260	1,715,706	1,527,054	-8.0%
Non-City Subsidy	-	-	-	-	NM
Total Operating Expenses	**$ 30,237,813**	**$ 34,960,056**	**$ 39,261,025**	**$ 42,877,190**	**12.3%**
Sewage Conveyance (Million Gallons)					
Wastewater Customers **WITHIN** Municipal Limits	6,178	7,349	6,693	6,923	3.9%
Wastewater Customers **OUTSIDE** Municipal Limits	-	-	-	-	NM
Total Sewage Conveyance	**6,178**	**7,349**	**6,693**	**6,923**	**3.9%**
Customers at Year End					
WITHIN Municipal Limits	107,100	106,678	105,802	106,600	-0.2%
OUTSIDE Municipal Limits	-	-	-	-	NM
Total Customers at Year End	**107,100**	**106,678**	**105,802**	**106,600**	**-0.2%**

NM - not meaningful
Source: Annual Reports to the Pennsylvania Public Utility Commission (2018 through 2021)

Pennsylvania Public Utility Commission
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Harrisburg, PA 17120
1-800-692-7380
www.puc.pa.gov