CAPITAL REGION WATER
WASTEWATER SYSTEM
2024 CONSULTING ENGINEER'S ANNUAL REPORT

Final Report
Dated September 24, 2024

Prepared for:
Capital Region Water
Dauphin County, Pennsylvania

GANNETT FLEMING

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1.0 INTRODUCTION

Gannett Fleming, Inc. (GF) has prepared this Wastewater System Consulting Engineer's Annual Report for Capital Region Water (CRW) as required by Section 7.11 of the Trust Indenture between CRW and The Bank of New York Mellon Trust Company, N.A. originally dated May 1, 2017. This Annual Report is being submitted to comply with the following requirements, as outlined in the Indenture:

> *"It shall be the duty of the Consulting Engineers, in addition to the other duties prescribed elsewhere in this Indenture, to prepare and file with the Authority and with the Trustee on or before 90 days prior to the beginning of each Fiscal Year hereafter, a report setting forth the following:*
> *a. Their advice and recommendations as to the proper maintenance and repair of the operating and wastewater delivery infrastructure of the Sewer System during the next Fiscal Year;*
> *b. Their advice and recommendations as to the Capital Additions that should be made during the next Fiscal Year and their estimate of the amounts of money necessary for such purpose; and*
> *c. Their finding whether the operating and wastewater delivery infrastructure of the Sewer System have been maintained in good repair and sound operating condition and their estimate of the amount, if any, required to place such operating and wastewater delivery infrastructure in such condition and the details of such expenditures and the approximate time required therefor."*

The CRW fiscal year runs from January 1 through December 31. The wastewater system is owned and operated by CRW and includes an Advanced Wastewater Treatment Facility (AWTF), a conveyance system, and wastewater and stormwater collection systems located within the City of Harrisburg (City) limits. The wastewater system includes approximately 33miles of sanitary sewers, 40 miles of stormwater sewers, and 87 miles of combined sanitary and stormwater sewers.

The wastewater collection system serves customers located within the City. The conveyance and treatment systems provide wastewater conveyance and treatment services to the City and Suburban wholesale customers. Suburban wholesale customers are located in Susquehanna Township, Lower Paxton Township, Swatara Township, Paxtang Borough, Penbrook Borough, and Steelton Borough (treatment only, the Steelton Borough has it's own collection and conveyance system that flows directly to the AWTF).

1.1 Report Methodology and Limitations

In preparing this Annual Report, Gannett Fleming reviewed existing records and documents prepared by or on behalf of CRW to understand, assess, and report on the technical information contained therein as it relates to the Annual Report. The major relevant documents provided by CRW and reviewed as part of the Annual Report include, but are not necessarily limited to, the following:

- 2023 Municipal Wasteload Management (Chapter 94) Report and Semi-Annual Report on Consent Decree Implementation, dated March 2024;
- Design and Operational Parameters Associated with the Wastewater System;
- Monthly Treatment Plant Operating Data (January 2023 through December 2023);
- Historic Wastewater System Expenses (FY 2023); and
- Budgeted FY 2024 Wastewater System Expenses.

The review also included discussions with representatives of CRW and performance comparisons to other comparable wastewater systems and related industries. In addition, on July 29, 2024 and August 1, 2024, Gannett Fleming staff conducted visual site inspections of select components of the Wastewater System, including the Advanced Wastewater Treatment Facility, and all five (5) lift stations located in the Collection System.

This Annual Report summarizes the findings of the inspections, the data and document reviews, and discussions with CRW staff. Gannett Fleming has not independently verified the accuracy of the information provided by CRW and others. However, it is believed such sources are reliable and the information obtained to be appropriate for the analysis undertaken and the conclusions reached herein. In addition, the scope did not include review of any pending or threatened litigation against CRW.

In completing this Annual Report for CRW, Gannett Fleming is not serving in the role of a "municipal advisor" under the regulations of the Securities and Exchange Commission. As such, Gannett Fleming is not recommending any action regarding municipal financial products or the issuance of municipal securities; and is not acting as a registered municipal advisor to CRW and does not owe a fiduciary duty to CRW pursuant to Section 15B of the Securities Exchange Act of 1934, as amended by the Dodd-Frank Wall Street Reform and Consumer Protection Act, with respect to the information and material prepared in connection with this Annual Report. CRW should discuss any information and material prepared in connection with this Annual Report with any and all internal and external financial and other advisors that they may deem appropriate before acting on this information and material.

2.0 DESCRIPTION OF WASTEWATER SYSTEM

2.1 Overview

CRW is a municipal authority that owns and operates an AWTF, a conveyance system, and a wastewater and stormwater collection system within City limits. The AWTF is an activated sludge treatment process that employs biological nutrient removal technology to achieve nitrogen and ammonia requirements. Overall, the wastewater system includes separate sanitary sewers, separate stormwater sewers, and combined sanitary and stormwater sewers. All discharges to surface waters from the AWTF and CSOs are permitted under NPDES Permit Number PA0027197. A summary of the major wastewater system facilities is provided in *Table 1*. The wastewater collection system provides service to customers located within the City. The conveyance and

treatment systems provide wastewater conveyance and treatment services to the City and Suburban wholesale customers. The Suburban wholesale customers account for approximately 59% of the flows to the AWTF.

Table 1. Summary of Major Wastewater and Stormwater System Facilities

Facility	Description	Design Hydraulic Capacity (mgd)	Design Peak Capacity (mgd)	2023 Average Flow [(1)] (mgd)	2023 Peak Flow (mgd)
Advanced Wastewater Treatment Facility	High Purity Oxygen Activated Sludge Plant	45.0	75.4	18.5	81.7[)]
Front Street Pump Station	Pump Station	---	60.0	12.6	48.3
Spring Creek Pump Station	Pump Station	---	28.9	4.9	20.9
City Island North Pump Station	Pump Station	---	0.432	0.006	0.014
City Island South Pump Station	Pump Station	---	0.432		
Market Street Pump Station	Pump Station	---	Unavailable	Unavailable	Unavailable

[(1)] Flows as reported in the 2023 CRW Municipal Wasteload Management (Chapter 94) Report.

A map of the wastewater system's infrastructure, including stormwater pipe, interceptor sewers, force mains, gravity sewer mains, and pump stations, is shown in *Figure 1*.

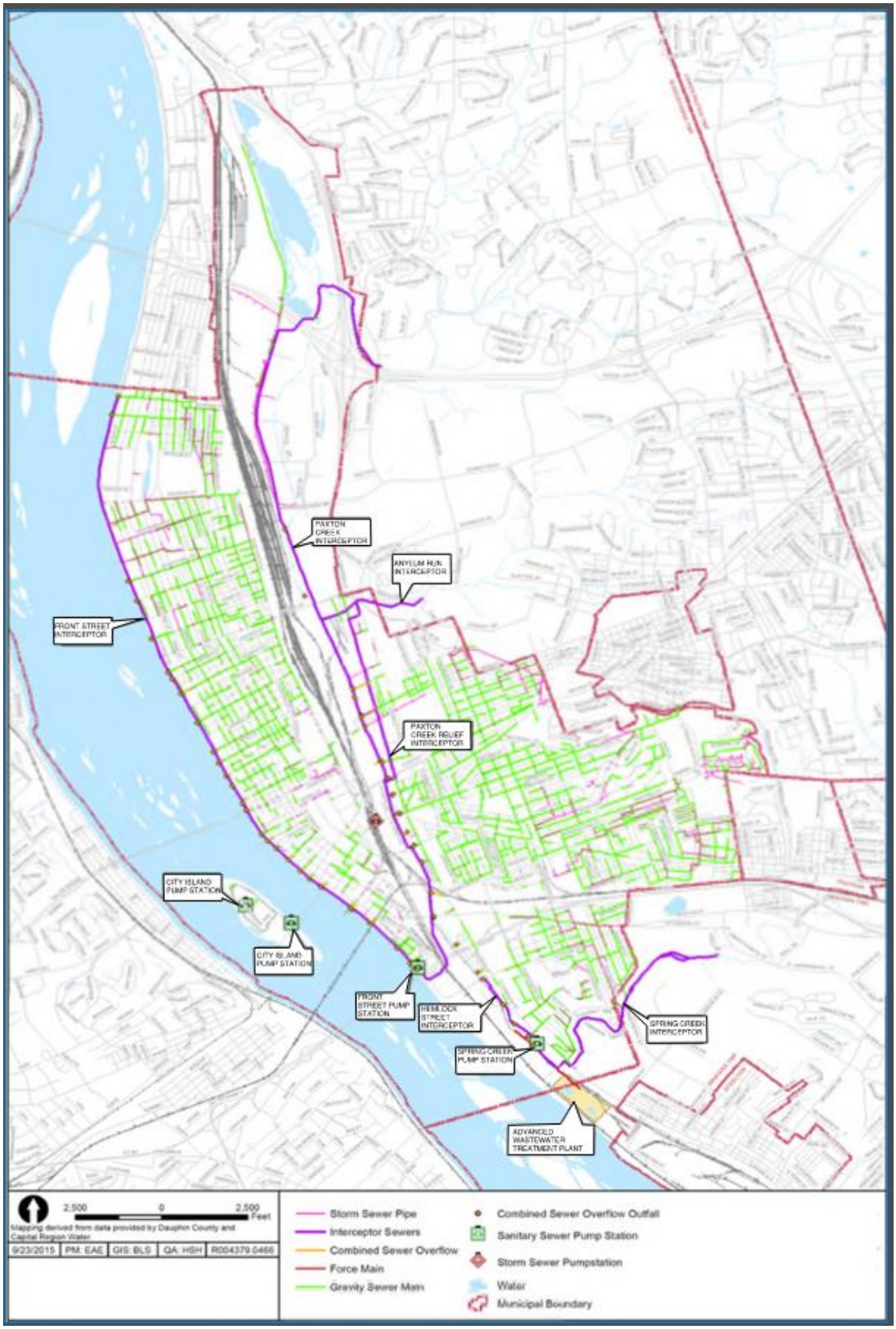


Figure 1. Wastewater System Infrastructure Map

2.2 Wastewater Treatment Plant

The AWTF is a high purity oxygen activated sludge WWTP that is permitted for an Annual Average Design Flow of 45.0 million gallon per day (MGD). The treatment process consists of preliminary treatment, including ¼-inch mechanical screening and vortex grit removal; primary clarifiers; high purity oxygen multi-stage BNR activated sludge bioreactors; secondary clarifiers, and chlorine gas disinfection. Solids treatment includes gravity thickening, two-stage anaerobic digestion, and dewatering via a belt filter press. A process flow diagram is shown in *Figure 2*. The dewatered biosolids cake is permitted for land application under General Permit PAG-08-3597.

CRW operates a hauled waste program that accepts septage, landfill leachates, and select industrial wastes. Hauled waste less than 3-4% TS is discharged prior to grit removal and hauled sludges with higher solids content are discharged directly into the Primary Digesters. There was a total of 22 million gallons of hauled waste treated at the AWTF in 2023.

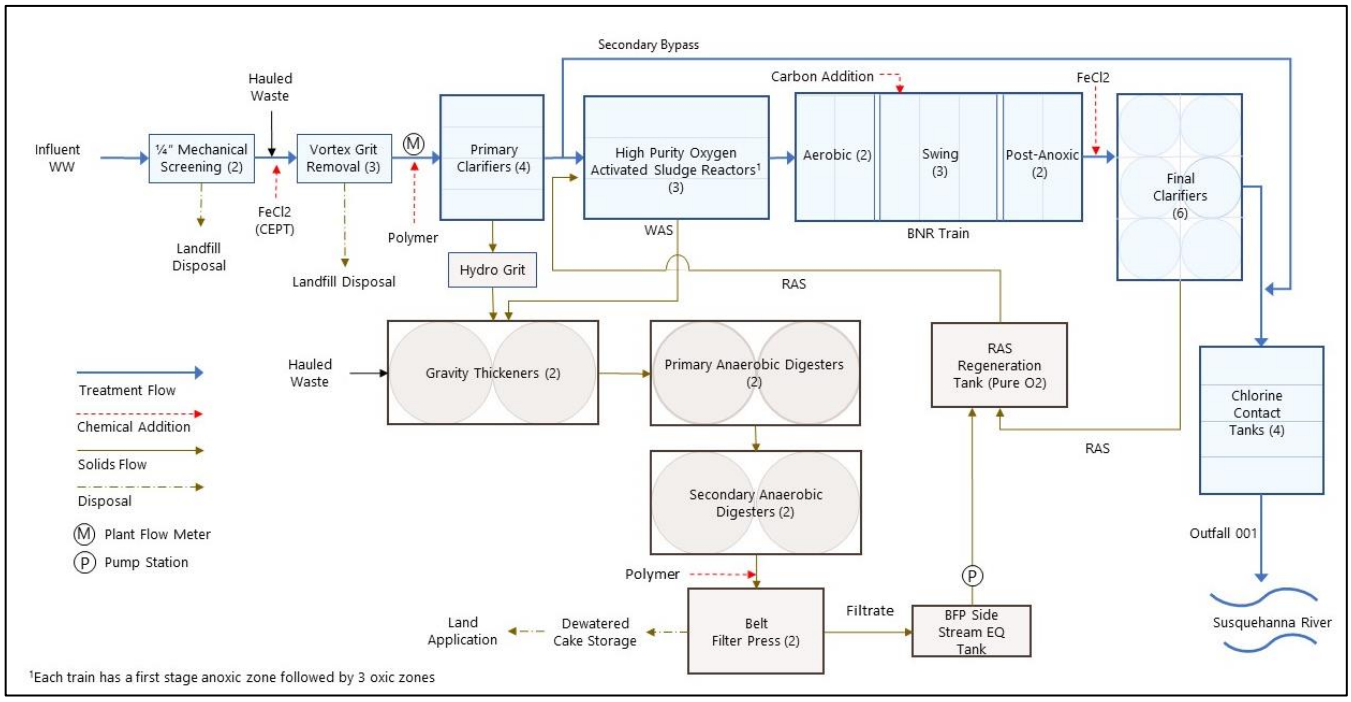


Figure 2. CRW AWWTF Process Flow Diagram

2.3 Wastewater Pump Stations

CRW maintains four (4) wastewater pump stations: Front Street, Spring Creek, City Island North, and City Island South, as well as the Market Street stormwater pump station.

The Front Street Sewage Pump Station, located at 830 South Front Street, receives combined sewage flows from the 42-inch by 42-inch Front Street interceptor and 60-inch diameter Paxton Creek interceptor. The Pump Station was constructed in the late 1950s. Rehabilitation of the Front

Street Pump Station was completed on August 1, 2022, which replaced the aging infrastructure at the station and increased peak capacity to 60 mgd. Improvements included replacement of pumps, bar screens, screenings conveyance equipment, controls, and associated improvements to electrical, HVAC, and building systems to meet current code requirements. The Pump Station conveys flow approximately 6,100-feet to the AWTF through a 48-inch diameter cast iron force main joined by the contribution of Spring Creek Pump Station into the force main approximately 2,000-feet upstream of the AWTF. The 2023 annual average daily flow was 12.6 mgd with peak daily flow of 48.3 mgd.

The Spring Creek Pump Station was originally constructed in 1959 and has a peak design capacity of 28.9 mgd. In 2023, it conveyed an average daily flow of 4.9 mgd to the AWTF with a peak daily flow of 20.9 mgd. The pump station is located just southwest of the intersection of South Cameron Street and Magnolia Street and serves the southern portions of the wastewater collection system. It conveys combined wastewater from the Spring Creek Interceptor and the Hemlock Street Interceptor to the AWTF. Wastewater enters the station through a 24-inch diameter cast iron interceptor on the east side of the station and a 27-inch diameter reinforced concrete pipe interceptor on the south side. The station is equipped with three (3) pumps that discharge through a 24-inch diameter cast iron line, which ultimately connects to the 48-inch diameter force main from the Front Street Pump Station. The Spring Creek Pump Station also has a permitted combined sewer overflow (CSO) chamber that relieves the system during high flow events. The Spring Creek Pump Station is nearing the end of its useful life, and CRW has begun the study and design phases for the pump station replacement.

The City Island North Pump Station is located at the north end of City Island in the City. Wastewater is conveyed from the City Island South Pump Station and southern portion of City Island to the CRW collection system in Harrisburg. Currently CRW operates the pump station but has not accepted ownership of the pump station.

The City Island South Pump Station is located near the center of City Island in the City. It conveys wastewater from the southern portion of City Island to the CRW collection system in Harrisburg. The pump station currently is bypassed and flow is being diverted to the City Island North Pump Station. This is due to the lack of pumping requirements out of both facilities as pumping is not required at both pump stations to accommodate service flow requirements. Currently CRW operates the pump station but has not accepted ownership of the pump station.

CRW also operates the Market Street Pump Station, which conveys stormwater from a railroad underpass to Paxton Creek.

2.4 Wastewater Conveyance

There are six (6) interceptors in the wastewater conveyance system, which convey collected wastewater from the City and Suburban customers to the AWTF. The interceptors are summarized in *Table 2*. Three (3) of these interceptors convey combined wastewater from trunk lines, and each

trunk line has an associated CSO regulator structure and outfall. The other three (3) interceptors only convey sanitary wastewater. In addition, the wastewater conveyance system also includes approximately 33 miles of sanitary sewers, 40 miles of stormwater sewers, and 87 miles of combined sanitary and stormwater sewers.

Table 2. Conveyance System Summary

Interceptor	Type	Size (in)	Length (mi)	Material	Number of CSO Outfalls	CSO Discharge Receiving Waters
Front Street	Combined	39x36; 40; 42	3.95	Concrete, VCP	27	Susquehanna River
Paxton Creek	Combined	59x48; 60	5.53	Concrete	26	Paxton Creek
Hemlock Street	Combined	24	0.52	Concrete, VCP	5	Paxton Creek
Spring Creek	Sanitary	24-36	2.03	Concrete, CMP, DIP	0	N/A
Paxton Creek Relief	Sanitary	48	1.15	Concrete	0	N/A
Asylum Run	Sanitary	24	0.67	Concrete, VCP	0	N/A

2.5 Combined Sewage Overflows (CSOs)

CRW operates and maintains 59 CSO regulator structures located along the Front Street, Paxton Creek, and Hemlock Street interceptor sewers, which ultimately direct combined wastewater (sanitary wastewater and stormwater) to the AWTF. The CSO regulators discharge to a total of 58 CSO outfalls (two regulators share an outfall). The receiving waters are the Susquehanna River for regulator structures along the Front Street interceptor and Paxton Creek (a tributary of the Susquehanna) for regulators along the Paxton Creek and Hemlock Street interceptors. Additionally, the Front Street and Spring Creek Pumping Stations have emergency stormwater outfalls that will only activate during a mechanical failure of the pump station or if the station's capacity is exceeded during large storms, for a total of 60 CSO outfalls.

During dry weather conditions, the CSO regulator structures divert all the combined wastewater from the trunk sewer lines to the interceptor sewers. During wet weather, the rate and volume of the sanitary and stormwater flow from the system of collector sewers increases significantly and can exceed the capacity of the downstream interceptor sewers and the AWTF. When this occurs, the CSO regulator structures (oftentimes called diversion structures) divert a controlled volume of flow to the interceptor, while untreated excess combined wastewater is discharged to receiving waters. *Appendix A - Wastewater System Service Area Map* summarizes the location, downstream interceptor, and receiving water for each CSO outfall.

3.0 WASTEWATER COLLECTION AND CONVEYANCE SYSTEM PERFORMANCE

3.1 Service Area and Customer Base

The wastewater system provides service to City residential and retail customers as well as suburban community wholesale customers. The suburban communities account for approximately half of the revenues of the conveyance and treatment systems and include Susquehanna Township, Lower Paxton Township, Swatara Township, Paxtang Borough, Penbrook Borough, and Steelton Borough, all of which are located in Dauphin County. A map of the wastewater system's service area is included in *Appendix B*.

CRW maintains approximately 16,334 active connections within the City. Suburban communities are billed on a wholesale basis with their allocation based on an estimate of individual account data for customers located in these communities. Some suburban customers are billed based on metered water consumption, while others are billed based on the estimated number of equivalent dwelling units within their customer base. During FY 2023, suburban communities were billed for approximately 2.152 billion gallons of wastewater flow. The number of customers and billed wastewater flow by class for customers located within the City are shown in *Table 3*. The total billed wastewater flow for Suburban communities is also shown in the table. This information is based on FY 2023 customer and billing data as provided by CRW.

Table 3. FY 2023 Customer Information

Description	Accounts	Billed Wastewater Flow (x1,000 gal)
City of Harrisburg		
Residential	14,677	765,798
Commercial	1,467	340,236
Industrial	21	66,407
Public / Institutional	169	213,919
Total	16,334	1,386,360
Suburban Communities		
Penbrook Borough	N/A	68,585
Paxtang Borough	N/A	35,471
Swatara Township	N/A	441,353
Lower Paxton Township	N/A	806,389
Susquehanna Township	N/A	667,210
Steelton Borough	N/A	133,010
Total	N/A	2,152,018
Combined Total	**N/A**	**3,538,378**

3.2 Sanitary Sewer Overflows

CRW maintains a combined sanitary and stormwater system, which conveys wastewater and stormwater runoff during periods wet weather. Regulators and diversion chambers divert excess flow to Paxton Creek or the Susquehanna River during wet weather events. Wet weather events occur when the combined flow exceeds the dry weather peak flow capacity. CRW's NPDES Permit authorizes discharges from regulators and diversion chambers; however, it does not authorize overflows from sanitary sewers or discharges from other than identified combined sewer regulators and diversion chambers. A summary of the Sanitary Sewer Overflow (SSO) events and combined sewer unauthorized discharges during the 2023 reporting period are listed in *Table 4*. This information is summarized from the 2023 Municipal Wasteload Management (Chapter 94) Report.

Table 4. 2023 Sewer System Overflows and Unauthorized Discharges

Date	Location	SSO or UD	Issue	Duration (Hrs.)
1/24/23	2407 Kensington St.	UD	Basement Backup, Grease/Wipes in Main	1
3/21/23	Front Str. Interceptor at Chestnut St.	UD	Broken bypass pumping pipe	1
4/27/23	1512 Naudain St.	UD	Basement Backup, Grease/Wipes in Main	2
10/12/23	501 Maclay St.	UD	Basement Backup, Grease/Wipes in Main	8
11/3/23	AWTF	SSO	Power outage results in primary clarifier overflow	4
12/19/23	2237 Swatara St.	UD	Basement Backup, Grease/Wipes in Main	2

3.3 Partial Consent Decree

Capital Region Water entered into a modified partial Consent Decree (CD) with the Department of Justice (DOJ), United States Environmental Protection Agency (EPA), and the Pennsylvania Department of Environmental Protection (DEP) for the management of their combined, sanitary, and storm sewer systems, as well as their pumping stations and Advanced Wastewater Treatment

Facility. The Date of Lodging for the modified partial CD was February 13, 2023. The modified partial CD became effective when it was entered by the Court on August 25, 2023. These dates serve as the starting points for multiple deadlines within the partial CD. In 2022, CRW fulfilled its partial Consent Decree requirements for deadlines due during this reporting period, including the following:

- Completed the date of Lodging of Consent Decree
- Completed the updated Water Quality Modeling Plan
- Completed the table of Deliverables (List of Deadlines)
- Completed the Public Notification Plan
- Completed the Updated Sensitive Areas / Priority Areas Report
- Completed the Semi-Annual Report/ Annual MS4 Report & Meeting
- Completed the modification of select CSO Regulators (FSP)
- Completed the AWTF Primary Digester Rehabilitation
- Completed the Decentralized Green/Grey Controls - Phase 3 Project

3.4 Wet Weather Program

CRW's progress during 2023 under its Wet Weather Program included the following accomplishments:

- Continued to expand the development of the sewer maintenance management system, including the GIS and Cityworks systems, including development of training protocol for all Cityworks users and is incorporating additional reporting related to maintenance and regulatory activities within the sewer system from the Cityworks data. CRW continues to update their GIS database, and recent additions include incorporating capital projects.
- CRW continued to implement their CSO Hotline with the status of CSO events and continued to conduct public outreach, education, and notification programs.
- CRW received a new MS4 permit in 2020. CRW partnered with Lower Paxton Township and Susquehanna Township to prepare a Joint Pollutant Reduction Plan which was approved by PADEP in 2020. Minimum control measure implementation continued through 2023.
- Continued to monitor eight (8) precipitation gauging sites as well as gauge-adjusted radar rainfall, four (4) flow meters monitoring flow from the satellite communities, and eight (8) combined sewer interceptor flow meters.
- Continued making strides to further the development and implementation of its Green Stormwater Infrastructure (GSI) Program, now known as Stormwater Control Measures (SCMs).

CRW assumed responsibility for street sweeping activities in 2013. The street sweeping activities were subcontracting out until August 2020, where CRW began handling the duties inhouse. CRW had purchased three (3) street sweepers and typically operates two (2) sweepers daily. Sweepings

are dewatered and dried at the AWTF and then hauled to landfill for disposal. Since 2021, citizen complaints have decreased dramatically due to the program. During heavy rain events, street sweeping is cancelled, and staff perform checks of storm inlets around the city to make sure they are not blinded by trash or debris.

3.5 Nine Minimum Controls Plan

CRW developed a detailed approach to achieve future compliance with each of the Nine Minimum Controls (NMCs), which was submitted in the August 2015 NMC Plan and has been updated annually. In many cases, the compliance measures have already been implemented, such as daily CSO regulator inspections. In other areas, additional information is required to implement some of the NMCs, and CRW has undertaken efforts necessary to collect the data. Efforts related to the NMC Plan that have been completed include the following:

- Prepared the NMC Plan Update (Version 10.0 dated March 2024);
- Identified critical trunk sewers and completed manhole inspection data review;
- Refined the sewershed and catchment delineations using the manhole investigation data;
- Updated the GIS system with collection system manhole investigation and rapid assessment data;
- Advanced CRW's risk-based asset condition/criticality rating system to be used to establish priorities for closed circuit televisual (CCTV) inspections and subsequent cleaning and repair projects.
- Completed an internal force main inspection and found no critical deficiencies. Routine force main monitoring continues.
- Continued to implement and optimize Cityworks for the management of complaints and service requests and operations and maintenance of AWTF and pumping stations;
- Continued to perform daily regulator inspections at each regulator.

3.6 Operations and Maintenance Manual

CRW reviewed ongoing maintenance and operation efforts and developed improved practices for compilation in the new Operations and Maintenance (O&M) Manual. The O&M Manual defines the critical equipment and facilities for the AWTF and collection/conveyance systems. The O&M Manual also includes detailed procedures with checklists, for the following system components: CSO regulators, outfalls and backflow prevention gates, pump stations, interceptors, force mains, collection system and manholes, and inlets and catch basins. The O&M Manual also outlines emergency procedures, citizen complaint tracking, sinkhole remediation, and education programs. The O&M Manual document was originally submitted on August 10, 2015, and the latest version (V7.0) was released in March 2023.

3.7 Data Management Systems

CRW has developed and implemented a Cityworks™ data management system for their sewer system. This software is the recordkeeping tool for maintenance activities and assists in the reporting requirements of the partial Consent Decree. From January to December 2023 the following items have been documented in Cityworks for sewer system maintenance and inspection activities:

- 11,445 Inlets Cleaned
- 28 SCM Inlets Cleaned
- 218 Inlets Repaired
- 4 Inlets Replaced
- 1,377 Inlets Inspected
- 17 Wastewater Liable Sinkholes Repaired
- 4 CRW Liable Backups
- 15 Dry Weather CSO Events
- 33,166 Ft Flushed Pipe
- 73,934 Ft CCTV

4.0 WASTEWATER TREATMENT PLANT PERFORMANCE

4.1 AWTF Operations

Effluent limits established under NPDES Permit No. PA0027197 for the CRW AWTF Outfall No. 001 to the Susquehanna River are included in *Table 5*. A summary of the WWTP operating data for calendar year 2023 is provided in *Appendix C*. *Appendix D* provides a graphic representation of key NPDES Permit and other parameters. Effluent limits established under the NPDES Permit are included in *Appendices C* and *D* for comparison with operating data. Overall, WWTP final effluent quality was exceptional during the review period, and the AWTF continued to operate at a high standard. Based on the data supplied by CRW staff and reported to PADEP, the monthly average and maximum week average effluent parameters were in compliance with NPDES Permit limits throughout the period, with the exceptions noted below.

During 2023, the average daily flow to the AWTF was 18.5 million gallons per day (mgd). A maximum average monthly flow of 22.2 mgd was reported in December 2023, and a maximum day flow of 72.4 mgd occurred on April 30, 2023. The annual average hydraulic loading to the WWTP during this period was approximately 41% of the design WWTP Annual Average Flow of 45.0 mgd.

The collection system organic loading to the AWTF averaged 144 milligrams per liter (mg/L) (22,197 lbs/day) as Biochemical Oxygen Demand (BOD_5) throughout 2023 with a maximum month organic loading of 27,491 lbs/day in April 2023. The maximum month organic loading to the WWTP during this period was approximately 40% of the WWTP's Design Organic Capacity of 68,257 lbs/day. Final effluent Carbonaceous BOD_5 ($CBOD_5$) averaged 3 mg/L (463 lbs/day) during this same period.

The collection system total suspended solids (TSS) averaged approximately 182 mg/L (28,081 lbs/day) during 2023. Final effluent TSS averaged 5mg/L (771 lbs/day) throughout 2023. Based on WWTP loadings, this equates to an approximately 97.3% TSS removal efficiency.

During 2023, the collection system raw influent Ammonia Nitrogen (NH_3-N) averaged approximately 16 mg/L (2,469 lbs/day). The average NH_3-N concentration in the final effluent was 1 mg/L (154 lbs/day) during this period. Based on WWTP loadings, NH_3-N removal efficiency was 94.6% over this same period.

Table 5. NPDES Permit Discharge Limitations for WWTP Outfall No. 001

	Discharge Limitations								Monitoring Requirements	
	Mass Units (lbs)		Mass Units (lbs/day)		Concentrations (mg/L)				Minimum Measurement Frequency	Required Sample Type
Discharge Parameter	Annual	Monthly	Monthly Average	Weekly Average	Minimum	Monthly Average	Weekly Average	Inst. Max.		
Flow (mgd)	XXX	XXX	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (s.u.)	XXX	XXX	XXX	XXX	6.0	XXX	XXX	9.0	3/Week	Grab
Dissolved Oxygen	XXX	XXX	XXX	XXX	5.0	XXX	XXX	XXX	1/Day	Grab
Total Residual Chlorine	XXX	XXX	XXX	XXX	XXX	0.5	XXX	1.6	1/Day	Grab
$CBOD_5$	XXX	XXX	7,860	12,577	XXX	25	40	50	3/Week	24-hour Comp
Total Suspended Solids	XXX	XXX	9,433	14,149	XXX	30	45	60	1/Day	24-hour Comp
Ammonia-Nitrogen (May 1 to Oct 31)	XXX	XXX	3,458	XXX	XXX	11	XXX	22	1/Day	24-hour Comp
Ammonia-Nitrogen (Nov 1 to Apr 30)	XXX	XXX	Report	XXX	XXX	Report	XXX	Report	1/Day	24-hour Comp
Total Phosphorus	XXX	XXX	629	XXX	XXX	2.0	XXX	4.0	1/Day	24-hour Comp
Fecal Coliform (5/1 to 9/30)	XXX	XXX	XXX	XXX	XXX	200	XXX	XXX	1/Day	Grab
Fecal Coliform (10/1 to 4/30)	XXX	XXX	XXX	XXX	XXX	2,000	XXX	XXX	1/Day	Grab
Kjeldahl-N	Report	XXX	XXX	XXX	XXX	Report	XXX	XXX	1/Week	24-hour Comp
Nitrate-Nitrite as N	Report	XXX	XXX	XXX	XXX	Report	XXX	XXX	1/Week	24-hour Comp
Total Nitrogen	Report	Report	XXX	XXX	XXX	Report	XXX	XXX	1/Month	24-hour Comp
Net Total Nitrogen	688,575	XXX	XXX	XXX	XXX	XXX	XXX	XXX	1/Month	Calculation
Net Total Phosphorus	91,810	XXX	XXX	XXX	XXX	XXX	XXX	XXX	1/Month	Calculation

The AWTF also has TN and TP annual mass load limits implemented in its NPDES Permit. The limits are enforced on a 12-month "Compliance Year" basis from October 1 through September 30. The mass load limits identified in the current NPDES Permit are 688,575 lbs total nitrogen and 91,810 lbs total phosphorous per compliance year respectively. A TN loading of

365,952 lbs/year as reported for Compliance Year 2023, which is about 53% of the NPDES Permit TN limit. Likewise, a TP loading of 78,207 lbs/year was reported for Compliance Year 2023, which is about 85% of the annual mass load limit. The AWTF was well within the TP and TN nutrient load limits during Compliance Year 2023.

The chlorine gas disinfection system performed satisfactorily throughout the period. The maximum monthly summertime Fecal Coliform geometric mean between May 2023 and September 2023 was 11 colonies/100 milliliter (mL), well below the summer NPDES Permit limit of 200 colonies/100 mL. Likewise, the maximum monthly wintertime Fecal Coliform geometric mean between January-April 2023 and October-December 2023 was 284 colonies/100 mL, well below the winter NPDES Permit limit of 2,000 colonies/100 mL.

4.3 Solids Handling

Solids generated at the AWTF are processed through a high rate 2-stage Anaerobic Digester system and dewatered via Belt Filter Presses (BFPs). Primary Sludge from the primary clarifiers and Waste Activated Sludge (WAS) from the biological process are pumped to one of two (2) Gravity Thickeners. Co-thickened WAS and Primary Sludge is then pumped directly into one of two (2) Primary Anaerobic Digesters. The Primary Digesters provide volatile solids reduction stabilization. Flow is hydraulically displaced from the Primary Digesters to the two (2) Secondary Digesters, which are unheated and unmixed. Feed sludge from the Secondary Digesters is dewatered on the BFPs, as necessary.

An average of 180,000 gallons per day (gpd) of thickened solids, equating to approximately 43,973 lbs/day (dry solids), were processed by the anaerobic digestion system between January and December 2023. Based on reported temperature and solids retention time records, the theoretical volatile solids destruction was estimated to be approximately 56% in the Primary Anaerobic Digesters.

Approximately 58.4 Mgals of digested feed sludge were dewatered through the Belt Filter Presses in 2023. At an average concentration of 1.6% Total Solids (TS), this equates to approximately 3,651 dry tons of biosolids. Dewatered biosolids generated by CRW are land applied for beneficial use on qualified farmland. Biosolids hauling to the farms is provided by a contracted hauler. The 15,102 wet tons of biosolids produced by CRW requires approximately 760 acres of beneficial use (assuming an average of 20 wet tons applied per acre). CRW has approximately 1,327 qualified acres, which provides a buffer of 568 acres.

4.4 Hauled Waste Program

The hauled waste program provides an additional source of revenue for the AWTF. A total of 25 hauled waste generators were served in 2023. The hauled waste received at the AWTF consists of landfill leachate, municipal sludge from wastewater treatment plants, residential septage/holding tank wastes, and other process wastewater (primarily food, restaurant, and composting wastes).

The hauled waste program provided a total revenue of $230,471 for the 2023 operating year.

A summary of the volume and average percent total solids (%TS) from the main categories of hauled wastes received throughout 2023 is shown in *Table 6*. Additionally, the discharge location within the AWTF for each category is listed.

Table 6. CRW 2023 Hauled Waste Summary

Hauled Waste	Discharge Location	Gallons/ Year	% TS
Process WW	Headworks	5,714,560	1.1
Landfill Leachate	Headworks	9,443,530	2.5
Septage/Holding Tank	Headworks	2,719,050	0.9
Municipal Sludge	Thickeners	4,159,110	1.9
Total		**22,036,250**	**---**

4.5 Industrial Pretreatment Program

CRW operates a USEPA-approved Industrial Pretreatment Program in conjunction with the requirements of Code of Federal Register Title 40 Part 403. The Program is intended to ensure that industrial users comply with federal state, and local pretreatment program effluent discharge limitations and regulations. Industrial user compliance minimizes interference to the conveyance and treatment system, passthrough of pollutants through the AWTF to the receiving stream, contamination of biosolids which could limits disposal or reuse options, and the exposure of personnel to chemical, explosion or fire hazards. Presently, seven (7) Significant Industrial Users (SIUs) are regulated through the CRW's Municipal Industrial Pretreatment Program, as outlined in *Table 7*. Of these SIUs, one (1) is considered a Categorical Industrial User (CIU).

Table 7. Municipal Industrial Pretreatment Program Permitted Industries

Industrial User	Description	Categorical Standards	
		Classification	Categorical Standard
Boyd State Hospital, LLC	Landfill Leachate	---	---
Harrisburg Dairies, Inc.	Fluid Milk Products and Drinks	---	---
Harrisburg Creamery Company	Ice Cream Products and Novelties	---	---
Lancaster County Solids Waste Management Authority	Landfill Leachate	---	---
Norfolk Southern Railway	Fueling Pad Spill Pan Runoff	---	---

Company			
Rebert E. Young Water Services Center	Water Treatment Residuals	---	---
Swatara Township Landfill	Landfill Leachate	---	---

Inspection and sampling activities performed during the year included facility inspections, self-monitoring inspections, and compliance sampling. During 2023, no permitted industrial users were on a formal compliance schedule for non-compliance. However, there were two (2) Letters of Violation (LOV) issued during the 2023 calendar year. LOVs were issued for continued improper completion of SMR as well as not sampling for PCB's and Molybdenum and an LOV was sent at the end of the first quarter requesting an explanation of the violation and a corrective action plan to be received within 30 days.

5.0 WASTEWATER SYSTEM CONDITION ASSESSMENT

5.1 Overview

CRW staff aim to ensure the entire Wastewater System is properly operated and maintained. The cost to provide routine and preventative maintenance is included in CRW's annual operating budget. CRW uses a proactive preventative maintenance program and a systematic replacement policy for inventory parts to minimize downtime.

Additionally, CRW has developed a comprehensive asset management program for the wastewater system which will further enhance preventative maintenance and increase system reliability. Asset registries have been developed for all CRW treatment plants, pumping stations, storage facilities, and the DeHart Dam facility. CRW has developed a risk register for CRW's buried assets and established high- level replacement, rehabilitation, and condition assessment cost estimates.

Development of the Wastewater Collection System Asset Management Plan was completed in January 2020. The plan provided CRW with strategies for operations, maintenance, capital investments, and funding.

5.2 Condition Assessment

Gannett Fleming conducted a limited condition assessment of the key components of CRW Wastewater System, which included a review of existing information provided by CRW, discussions with CRW staff, and visual observations during field visits held on July 29, 2024 and August 1, 2024. Based on the type of facilities, available documents related to the facilities, and previous experience with similar facilities, a representative sample of facilities was inspected on a limited

basis to visually confirm the information provided, identify any apparent capital improvement needs, and discuss reliability and O&M performance with the operation and maintenance staff. No field investigations were conducted for buried infrastructure.

The condition assessment of the facilities in the Wastewater System was based on numerical ratings for the following criteria: 1. Appearance of mechanical, structural, and electrical components; 2. Reliability; 3. O&M performance; 4. Capacity; and 5. Regulatory compliance.

Based on the evaluations using the above categories, an overall risk rating was assigned to each of the major assets. The risk ratings for each of the five (5) categories above are outlined in *Table 8*.

Table 8. Summary of Rating System

Numerical Rating	Interpretation of Rating	Description
1	Little to no risk	Relatively new and in good physical and operating condition.
2	Some risk	Good condition, no known capital requirements.
3	Moderate risk	Aged or worn but generally in good operating condition may require capital investment within five years.
4	Significant risk	Operational but nearing end of life and/or requires investment to bring to full operating condition.
5	High risk	Should be on high priority for renewal and/or replacement.

Table 9 presents a summary of the risk ranking for each of the major facilities based on a review of the available information and limited visual inspections.

Table 9. Major Assets Risk Rating

Major Asset	Risk Rating	Change from Prior Year
Advanced Wastewater Treatment Facility (AWTF)	2.0	No Change
Pump Stations and CSO Regulators Front Street Pump Station (1.0) Spring Creek Pump Station (3.0) City Island North Pump Station (2.0) City Island South Pump Station (2.0) Market Street Stormwater Pump Station (2.1) Combined Sewer Overflow Regulators (2.0)	2.1	No Change
Interceptor Sewers Front Street Interceptor (2.0) Paxton Creek Interceptor (4.8) Hemlock Street Interceptor (3.0) Spring Creek Relief Interceptor (3.0) Asylum Run Interceptor (3.0)	3.1	Reduced (Front Street Interceptor)
Collection System	3.0	No Change
Separate Stormwater Collection System	3.0	No Change
Overall System Rating	2.7	No Change

Overall, the Wastewater System is in fair condition; however, some components are aged and will require investigation and capital investment to preserve the asset and maintain appropriate system performance and delivery of services.

The following provides a summary of the current condition of the major components, the rational for the risk scores assigned, and the improvements needed to address moderate, significant, and high risks.

5.2.1 AWTF

The AWTF appears to be in fair overall physical condition based on the available documents and an inspection by Gannett Fleming on July 29, 2024 and August 1, 2024. However, some capital investments and minor additional O&M expenditures should be made within the next five (5) years to ensure continued compliance with effluent limits and reduce operating costs.

An energy audit was performed for the AWTF in July 2017. The audit was intended to outline a comprehensive list of energy efficiency improvements that CRW could perform to reduce overall energy consumption. Based on the results of the audit, CRW has been implementing select energy efficiency improvements at the AWTF over the past several years. The next phase of these improvements is the AWTF Energy Recovery Improvements project, which will be advertised for

bid which began construction in early 2024 and project completion date late 2025. The project will modify existing piping in the waste activated sludge (WAS) and return activated sludge (RAS) pump stations to allow for RAS to be wasted instead of mixed liquor suspended solids (MLSS). By wasting RAS instead of MLSS, the pumping requirements will be significantly reduced due to the increased solids concentration of the RAS compared to the MLSS.

Additionally, CRW is in the process of implementing improvements to the existing primary clarifiers. Some work has been completed by CRW staff while the structural repairs will be completed under a capital construction project in 2024-2025. The improvements to be made include the following:

- Structural repairs and rehabilitation of all clarifier tanks
- Primary clarifier mechanism replacement of all tanks (inclusive of main and cross collector drive units, chain and flight scrapers, influent gates, effluent weirs).
- Replacement of miscellaneous piping, valves, and actuators.
- Primary sludge pump replacement (2 units).
- Replacement of decant pump in the decant pump vault.

In March 2017, a Biosolids Facilities Existing Conditions Report was completed by Whitman, Requardt & Associates (WRA). The purpose of this report was to provide an assessment of the current conditions of the solids treatment and handling systems at the AWTF. Based on the Biosolids Facilities Existing Conditions Report, WRA submitted in June 2017, a Preliminary Biosolids Facilities Improvement Plan for CRW, which included several recommendations as part of the improvement plan, including:

- Process modifications to separately thicken waste activated sludge and primary sludge;
- Upgrade of the primary digesters;
- Replacement of gravity thickener facilities;
- Upgrade of the dewatering facilities;
- Construction of a hauled waste facility;
- Replacement of the boiler building;
- Replacement of the combined heat and power (cogeneration) system equipment; and
- Replacement of the gas collection, storage and pretreatment systems.

CRW completed the Primary Digester Rehabilitation project, with the first digester on-line in 2020 and the second digester on-line in July 2022. The project also included an electrical building to help facilitate the replacement of old electrical gear and provide a central power distribution facility to serve the southern part of the AWTF. This electrical building was completed in 2021. The digesters have been functioning great since the completion of the improvements; however, they are working with the mixer manufacturer to identify why the mixers in each digester have experienced a failure in the mechanical mixing system.

CRW intends to prioritize work on the secondary digesters following completion of the primary digester improvements. Remaining biosolids facility projects will be evaluated for priority as the above projects are completed.

5.2.2 Pump Stations

CRW owns, operates and maintains three (3) wastewater pump stations: Front Street, Spring Creek and Market Street. Both the City Island North and City Island South pump stations are operated and maintained by CRW, but they are owned by the City of Harrisburg.

Upgrades were completed at the Front Street Pump Station in 2021 which included replacement of pumps, bar screens, screenings conveyance equipment, controls, and associated improvements to electrical, HVAC, and building systems to meet current code requirements.

The Spring Creek Pump Station appears to be in poor overall physical condition based on the available documents and an inspection by Gannett Fleming on August 1, 2024. Many of the pump station components are near the end of their useful life, including the pumps, HVAC system, and electrical and control systems. Capital investments should be made within the next five years to ensure continued operation and to reduce operating costs. A study has begun to evaluate the station and to provide direction for a long-term solution. The station design upgrade is scheduled for 2025, with construction beginning in 2026.

The City Island North Pump Station was not inspected by Gannett Fleming but appears to be in good overall physical condition based on the available documents. Currently CRW operates the pump station but has not accepted ownership of the facility.

The City Island South Pump Station was not inspected by Gannett Fleming but was reported to be in good overall physical condition based on the available documents and discussions with staff. The pump station continues to be bypassed and flow is being diverted to flow by gravity to the City Island North Pump Station. This is due to the lack of pumping requirements out of both facilities as pumping is not required at both pump stations to accommodate service flow requirements. Currently CRW operates the pump station but has not accepted ownership of the pump station.

The Market Street Pump Station is only used to pump stormwater, wastewater connections were removed years ago. The station appeared to be in good to fair overall physical condition; however, some additional O&M expenditures should be made within the next five (5) years to ensure continued operation and to reduce operating costs. Based on previous inspections of the Pump Station, recommended rehabilitation includes concrete repairs of the floor surfaces in the generator building, along the east side of the exterior of the building, and at the stairs leading to the entrance to the Pump Station and new pumps.

5.2.3 Collection System

CRW wastewater collection system includes approximately 160 miles in total including 33 miles of sanitary sewers, 40 miles of stormwater sewers, and 87 miles of combined sanitary and stormwater

sewers. Approximately 80% of the collection system was installed prior to 1940. Regulators and diversion chambers allow for a portion of the wet weather flows to be treated at the AWTF with excess flows diverted to the Paxton Creek or the Susquehanna River during wet weather events.

The collection system was not inspected by Gannett Fleming during its July 2024 field visit; however, CRW completed several inspection efforts associated with its collection system. In April 2017, CRW issued a Collection System Rapid Assessment Findings and Recommendations Report, where the findings of the assessments performed in 2012, 2015, and 2016 were summarized and recommendations were provided. The Report recommended that CRW complete the immediate sewer repairs that were identified and to continue to televise the collection system over the next 4 to 6 years. The information from this Report was used as a baseline to populate CRW's GIS system for high level condition assessment and CRW continues to gather more accurate and thorough information via CCTV inspections. This information is then coalesced into CRW's Sewer Collection System Asset Management Program (AMP); CRW is implementing Info Asset Planner as the software to help prioritize work. Priorities for sewer pipe repairs change annually as CRW continues to CCTV the collection system. The highest priorities are addressed under their emergency and maintenance sewer contracts and others are addressed through annual Sewer System Improvement Projects.

CRW completed CCTV inspections of 6 miles of collection system sewer in 2023, as part of the comprehensive prioritized CCTV inspection of the collection system being conducted from 2016-2024.

In 2021, Herbert, Rowland & Grubic, Inc. (HRG) was retained by CRW to evaluate potential cost savings for the Arsenal Boulevard Area Sewer Improvements – Phase 1 project prepared by CDM Smith. The original estimate for the work was valued at $4.4M. Through their evaluation of the bid documents and review of available information with several utility contractors to identify construction risks and overall constructability, HRG identified four (4) recommendations for consideration to potentially save approximately $2.2M. These four recommendations were incorporated into the project re-design performed by HRG. The project is already under construction with an estimated completion date early 2025.

CRW has complete 7 annual CCTV projects, including the 2023 project that inspected 14 miles of collection and conveyance pipe. The goal of this work was to obtain quality CCTV to aid CRW in the development of future Sewer System Improvement Projects separate from those originally captured in the Rapid Assessment Reports.

5.2.3.1 Sewer Interceptors

The May 2017 "Capital Region Water Interceptor Cleaning and Rehab Improvements Update" memorandum prepared by CDM Smith provided CRW with an update of the interceptor cleaning and rehabilitation improvements. As the interceptor cleaning was completed, additional inspections of the interceptors were conducted providing better detail and evaluation of the

existing conditions than the initial inspections. In some cases, this resulted in expanding the scope of proposed improvements for sewer and manhole rehabilitation. Additional areas were recommended for rehabilitation within the Paxton Creek Interceptor and the Front Street Interceptor. The opinion of probable construction cost for the Paxton Creek Interceptor was estimated to be $7.3 million, $1.6 million for the Asylum Run Interceptor, $9.4 million for the Front Street Interceptor, and $2.5 million for the Spring Creek Interceptor. CRW completed rehabilitation and replacement of the Asylum Run Interceptor in 2018 (substantial completion was issued in January 2019). Currently there is an ongoing study for the upgrade improvements of the Spring Creek Pump Station (estimated completion date end of 2024), the schedule and design of the Spring Creek Interceptor improvements that feeds the pump station will be developed after the completion of the study.

The Paxton Creek Interceptor rehabilitation project was initiated in 2017 utilizing spin-cast applied geopolymer due to the irregular shape of the pipe. Construction was halted when the condition of the pipe worsened and efforts to control active leakage was beyond the scope of the project. In November 2019, JMT issued a memo which reviewed alternate rehabilitation technologies and recommended slip lining due to potential cost savings of above ground feature restoration. At this time, the current CIP shows construction beginning in 2026; however, the project approach is still unknown pending the Paxton Creek Stream De-channelization project in coordination with PennDOT, Dauphin County, and the City of Harrisburg. Until a schedule for the creek project is determined, preliminary design will not proceed.

In March 2019 CDM Smith performed a two-phase evaluation of the rehabilitation/lining alternatives under consideration for the Front Street Interceptor. Phase 1 of this project included rehabilitation of approximately 1,730 LF was completed under CRW's emergency and maintenance contract in October and November 2019. In August 2020, CRW engaged AECOM to develop contract documents to rehabilitate the remaining non-circular portion of the Front Street Interceptor (14,400-LF) with Cured-In-Place-Pipe. The Front Street Interceptor Project, Phase 2 (14,400 LF) was completed in the Fall 2023.

5.2.3.2 CSO Outfalls and Regulators

CRW operates and maintains 59 CSO regulator structures discharging to 58 outfalls located along the Front Street, Paxton Creek, and Hemlock Street Interceptors, which ultimately direct combined flows of wastewater and stormwater to the AWTF. During dry weather, the CSO regulators divert all of the combined flows from the trunk sewer lines to the interceptor sewers. During wet weather, the CSO regulator structures divert a controlled volume of flow to the interceptors, while untreated excess combined flow is discharged to receiving waters. In addition to the CSO regulator structures and outfalls, there are two additional CSO outfalls at the Front Street pumping station and the Spring Creek pumping station that activate only during mechanical failure of the pump stations or if the pump station capacities are exceeded.

Each CSO regulator and diversion chamber is inspected by CRW once per day, 7 days per week to ensure proper operation, identify combined sewer overflows, identify river intrusion into the interceptor system, identify and correct operational problems, and to identify and schedule required maintenance. CRW continues to develop recommendations for early action projects to address critical structural deterioration and river intrusion. There are two (2) remaining CSO outfalls scheduled for repair that will be repaired in combination with the Paxton Creek Interceptor rehabilitation project.

6.0 PLANNING AND MANAGEMENT

6.1 Management and Staffing

CRW is governed by a five-member Board of Directors (Currently there is one vacancy on the board) whose members are appointed by the Mayor of Harrisburg and approved by City Council. A management team headed by the Chief Executive Officer is responsible for technical and administrative operations of CRW, as well as the implementation of programs, policies, and procedures, and the execution of contracts upon approval by the Board. In addition to providing wastewater services, CRW also provides drinking water services. CRW operates as one entity; however, CRW separately tracks and records the provision of services associated with the drinking water and wastewater utilities that it manages and operates.

CRW's organizational chart is made up of eight (8) departments as well as an Executive Team. The eight departments are: Finance, Engineering, Drinking Water Operations, Wastewater Operations, Shared Services, Strategic Initiatives, Human Resources, and Safety and Risk Management.

6.2 Organizational Structure Description

The Wastewater and Drinking Water Departments are responsible for operation and maintenance (O&M) of facilities, permit compliance, tracking and reporting, energy management, monitoring, long-term planning, repair and construction, and assistance in budget preparation and tracking. There are 58 positions in the Wastewater Department, with 54 positions filled as of September 15, 2024. The Wastewater Operations organizational chart is included in *Figure 3*.

The services provided by the other departments at CRW are summarized below:

- Executive Team - legal services;
- Finance - accounting, payroll, and benefits;
- Shared Services - provides office management, information technology, billing and customer service, and procurement services;
- Engineering - provides engineering support, project management, construction and project coordination, asset, and GIS management services, and operates a stormwater and wet weather control program;
- Human Resources – recruiting and retaining staff, employee engagement, and managing benefits;

- Safety and Risk Management – compliance with safety laws and regulations, assesses and mitigates potential risks to employee and community safety; and
- Strategic Initiatives - diversity and inclusion, community relations, community outreach, and external affairs.

When all positions are filled, the combined total staffing levels for these departments will be a total of 48 positions (2 for Executive excluding department heads, 9 for Finance, 18 for Shared Services, 10 for Engineering, 3 for Human Resources, 1 for Safety and Risk Management, and 5 for Strategic Initiatives). As of August 2023, there are a total of 42 positions currently filled. Personnel expenses associated with these departments are allocated to each of the utilities based on budgeted time allocated to each of the services. CRW's FY 2023 Wastewater System budget, which will be further discussed in Section 6, includes estimated costs associated with the current and future staffing levels for employees dedicated to the Wastewater System and the Wastewater System's share of costs associated with staff positions under the Shared Services, Engineering, Strategic Initiatives, Finance Department, Human Resources, and Risk and Safety Departments as well as the Executive Team, which all provide support to CRW's water and wastewater utilities. These employees are all employees of CRW, with the majority belonging to a collective bargaining unit.

The organizational structure of CRW provides strong opportunities for economies of scale through the sharing of shared services, engineering, finance, and executive services between the water and wastewater utilities. The structure is generally consistent with similar-sized, combined utilities and it appears that all required Wastewater System functions of CRW are adequately staffed without excessive vacancies.

Additionally, changes in the hauled waste program made due to COVID-19 were made permanent due to their success. These changes included haulers collecting their own samples for analysis and using a drop box to submit paperwork to limit contact between drivers and CRW operations staff.

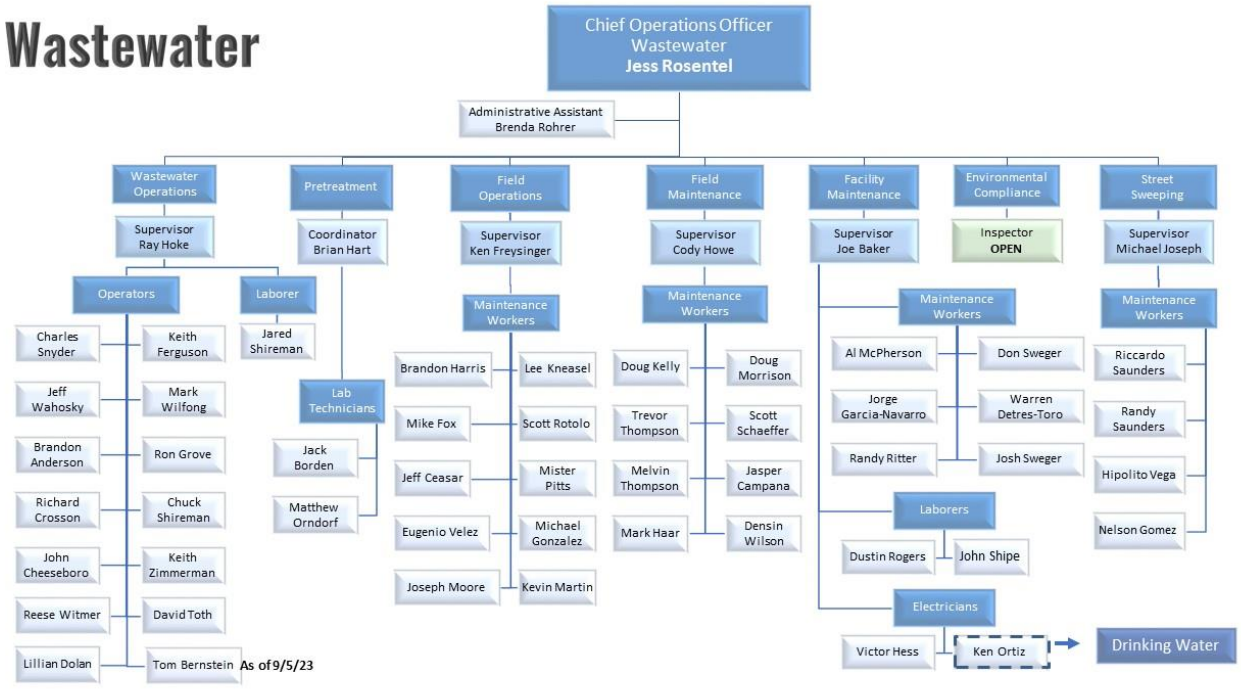


Figure 3. Wastewater Operations Division Organizational Chart

6.3 Capital Improvement Plan

CRW maintains and updates a Capital Improvement Plan (CIP) that identifies the major planned projects and initiatives for the Wastewater System. The CIP includes projects that are required to replace aging infrastructure, enhance or expand services to customers, provide resiliency and redundancy, and increase cost effectiveness and efficiency. Portions of the CIP are related to repair and replacement of assets that are beyond their useful life and other portions address requirements under the Consent Decree, the CSO LTCP, and other regulatory driven projects. CRW's most current 5-year CIP is summarized in *Table 10*. The following is a brief discussion of the capital projects and a summary of the review findings.

Table 10. CRW 5-Year Wastewater Capital Improvement Plan

Location	Description	Fiscal Year 2024	2025	2026	2027	2028
AWTF	Primary Digester Cleanout					$ 200,000
AWTF	AWTF Energy Recovery Improvements - Construction	$ 11,620,000	$ 11,000,000	$ 2,000,000		
AWTF	AWTF Energy Recovery Improvements - Eng/Cont Mgmt	$ 720,000	$ 720,000	$ 180,000		
AWTF	Primary Clarifier Improvements - Construction	$ 2,400,000	$ 4,811,000			
AWTF	Primary Clarifier Improvements - Eng & Const Mgmt	$ 200,000	$ 200,000			
AWTF	Primary Digester Insulation				$ 500,000	
AWTF	Garage Door Replacements (Heavy Equip Garage plus Old Maint Garage)	$ 75,000				
AWTF	Secondary Digesters Conversion					$ 500,000
AWTF	HPO Tank Repa	$ 100,000				
AWTF	Switchgear and New Line for Cyro Compressors	$ 315,000				
AWTF	Belt Filter Press Rehab.	$ 50,000				
AWTF	New Field Equipment Building	$ 300,000	$ 3,000,000			
AWTF	AWTF Administrative Building Improvements	$ 292,500	$ 3,225,000			
AWTF	Invent Mixers	$ 25,000				
AWTF	Pump Rebuild and Replacement - General	$ 100,000	$ 70,000	$ 72,000	$ 74,000	$ 76,000
AWTF	Truck Scale Replacement	$ 100,000				
AWTF	Diluent Water Flow Meter Replacement	$ 7,000				
AWTF	AWTF SCADA Firmware & PLC Upgrade	$ 23,000				
AWTF	Automated External Defibrillators (AEDs					$ 4,959
AWTF	Bandsaw	$ 12,000				
AWTF	Lab Equipment	$ 30,000	$ 15,000	$ 7,500	$ 8,000	$ 8,500
AWTF	Gas Fired Unit Heaters	$ 100,000				
AWTF	Wash Bay Hot Water Pressure Washer	$ 7,500				
AWTF	AWTF Laptops	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
AWTF	Gravity Thickeners - Equipment Replacement		$ 190,000	$ 190,000		
AWTF	Dewatering Upgrade					$ 1,000,000
AWTF	Other Plant Upgrades - Placeholder			$ 100,000	$ 100,000	$ 100,000
	Total Advanced Wastewater Treatment Facility	**$ 16,487,000**	**$ 23,241,000**	**$ 2,559,500**	**$ 692,000**	**$ 1,899,459**
Collection	Collection System Rehab	$ 1,740,000	$ 1,699,500	$ 3,271,845	$ 3,400,000	$ 3,532,000
Collection	Collection System Rehab - Construction			$ 1,000,000	$ 1,000,000	$ 1,000,000
Collection	Collection System Rehab - Eng & Const Mgmt	$ 377,000	$ 444,000			
Collection	Collection System Rehab - Construction	$ 5,800,000	$ 7,000,000			
Conveyance	Paxton Creek Interceptor - Construction				$ 3,030,300	$ 6,060,600
Conveyance	Paxton Creek Interceptor - Engineering & Construction			$ 2,000,000	$ 303,030	$ 606,060
Conveyance	Paxton Creek Interceptor - Eng & Const Mgmt	$ 100,000	$ 100,000			
Conveyance	Arsenal Blvd. - Construction	$ 4,389,000				
Conveyance	Arsenal Blvd. - Eng & Const Mgmt	$ 231,000				
Collection	Other Multi-Model CCTV Investigations (0065	$ 500,000				
Conveyance	Front St. Interceptor Rehab P2 - Construction	$ 289,000				
Conveyance	Front St. Interceptor Rehab P2 - Construction					
Conveyance	Front St. Interceptor Rehab P2 - Eng & Const Mgmt	$ 35,000				
Collection	Ww I-83 Sewer Conflict Work - Betterment - Engineering	$ 234,000	$ 200,000	$ 200,000	$ 50,000	$ 50,000
Collection	Ww I-83 Sewer Conflict Work - Betterment - Construction			$ 565,000	$ 688,000	
Collection	Ww I-83 Sewer Conflict Work - Betterment - Construction					
Conveyance	Spring Creek Interceptor Rehab/Storage/Pump Station	$ 500,000	$ 1,400,000	$ 4,700,000	$ 4,700,000	$ 4,700,000
Collection	Broad St. Market Sewer Main Replacements	$ 847,000				
Collection	Street Restoration	$ 217,485	$ 224,009	$ 230,729	$ 237,651	$ 244,781
Conveyance	CSO Signage	$ 600				
Collection	Check Valuve Replacement Return Sludge Pump Station	$ 125,000				
Collection	ADS Echo Level Sensors	$ 50,000				
Collection	Collection System Rehab	$ 49,440	$ 50,920	$ 52,440	$ 54,000	$ 55,600
Collection	Ww I-83 CSO Diversion Pipe - Construction		$ 6,000,000	$ 6,504,290	$ 2,531,809	
Collection	Ww I-83 CSO Diversion Pipe - Eng & Const Mgmt	$ 200,000	$ 120,000	$ 100,000		
Collection	Fleet Renewal	$ 594,800	$ 946,500	$ 424,000	$ 167,000	$ 650,000
Collection	Fleet Renewal	$ 600,000				
Conveyance	4 Inch Trash Pumps		$ 24,000	$ 25,600		
Conveyance	10 Inch Trash Pumps		$ 40,000			
Conveyance	CSO Regulator Modifications	$ 1,155,000				
	Total Collection System	**$ 18,034,325**	**$ 18,248,929**	**$ 19,073,904**	**$ 16,161,790**	**$ 16,899,041**
	Total Wastewater Cappital Improvement Plan	**$ 34,521,325**	**$ 41,489,929**	**$ 21,633,404**	**$ 16,853,790**	**$ 18,798,500**

CRW's capital plan is in general alignment with Gannett Fleming' observed requirements for the Wastewater System. Once the improvements to the Paxton Creek Interceptor and improvements to the Spring Creek Pump Station that is fed by the Spring Creek Interceptor are finalized, the capital plan should be revised as necessary. CRW generally has a good understanding of capital project needs and should prioritize projects based on urgency and affordability. CRW may proceed to reschedule and reprioritize various projects to balance the capital needs over the next several

years. It is recommended that CRW update its cost estimates and capital funding plans for these projects as additional information becomes available.

6.3.1 AWTF Upgrades

In March 2016, CRW completed an upgrade to its AWTF, adding biological nutrient removal in order to comply with the Chesapeake Bay Tributary Strategy and meet new NPDES permit discharge requirements.

6.3.2 Pump Station Capital Improvements

CRW plans to evaluate options for potential upgrades of the Spring Creek Pumping Station in FY 2026 to determine if additional improvements will be made to the existing Spring Creek Pump Station

6.3.3 Conveyance Capital Improvements

CRW has included several conveyance capital improvements in its CIP for FY 2025 shown in *Table 10*. These include the Paxton Creek, Spring Creek, Asylem Run and Hemlock sewer improvements.

The Paxton Creek Interceptor rehabilitation experienced unexcepted high costs due to difficult site conditions and was stopped in December 2018. The project approach is pending the Paxton Creek Stream De-channelization Project in coordination with PennDOT, Dauphin County, and the City of Harrisburg. Until a schedule for the creek project is determined, preliminary design will not proceed.

CRW will evaluate the schedule and design for Spring Creek Interceptor improvements after the upgrades of the Spring Creek Pump Station are confirmed.

In addition, collection system cleaning, rehabilitation, and replacement work is expected to be an ongoing annual capital need. In addition to the conveyance capital improvements, CRW plans to implement multiple CSO Long Term Control Plan related capital projects, including green stormwater infrastructure projects, as shown on the "SW" line in *Table 10*.

6.4 Financial Overview

The Trust Indenture (Section 7.12) requires CRW to adopt a Wastewater System budget each year. CRW typically adopts a finalized budget in November, two (2) months prior to the start of the new fiscal year. CRW utilizes the capital plan and O&M recommendations in this Annual Report to assist in establishing the budget. However, it should be noted that this Annual Report only serves to provide advice and recommendations regarding capital additions and amount of funds that should be expended to meet incremental O&M expenses. CRW must then establish a realistic

funding and financing plan that serves to meet these goals, which may necessitate reprioritization of projects and programs.

A summary of CRW's historical actual O&M expenses for Fiscal Years 2022 through FY 2023 as well as the budgeted O&M expenses for FY 2024 are shown in *Table 11* (as provided by CRW). These expenses were reviewed and determined to be in general alignment with overall O&M needs of the Wastewater System.

Table 11. Historical Wastewater and Stormwater System Operation and Maintenance Expenses

	Actual Expenses		Budgeted Expenses
O&M Expense Descriptions	**FY 2022**	**FY 2023**	**FY 2024**
Salaries and Wages	3,595,983	3,824,546	4,083,112
Benefits and Taxes	2,122,719	1,911,882	2,138,079
Contracted and Professional Services	1,771,698	2,753,346	2,207,247
Repairs, Maintenance, and Supplies	681,166	633,828	611,671
Electricity	955,066	875,038	9,27,000
Chemicals	471,237	569,672	529,800
Water	237,536	212,582	241,000
Refuse	1,106,248	753,424	759,000
Insurance	453,374	437,955	582,217
Administrative Fee	3,089,391	3,371,864	3,745,401
Street Sweeping	103,599	148,809	273,120
Other Operating Expenses	372,478	323,223	354,623
Total Annual O&M Expenses	**14,960,495**	**15,816,169**	**16,452,470**

7.0 CONCLUSIONS

Based on Gannett Fleming's review of the Wastewater System and associated information provided by CRW, the following primary conclusions are offered:

1. In 2022, the AWTF had no hydraulic or organic overloads recorded as the monthly average flow did not exceed the design capacity and no hydraulic or organic overload conditions are expected through 2027.

2. Based on Gannett Fleming' field inspections and review of documentation, the AWTF, Spring Creek Pump Station, Front Street Pump Station, City Island Pump Stations, Market Street Pump Station, and combined sewer overflow regulators are generally in good condition with no known capital requirements above that specified in the 5-Year Capital Improvement Plan.

3. CRW's Capital Plan is in general alignment with Gannett Fleming' observed requirements for the Wastewater System. CRW generally has a very good understanding of capital project needs and should prioritize projects based on urgency and affordability. Once CRW completes the evaluation of improvements to the Spring Creek Pump Station and Spring Creek Interceptor, the capital plan should be revised.

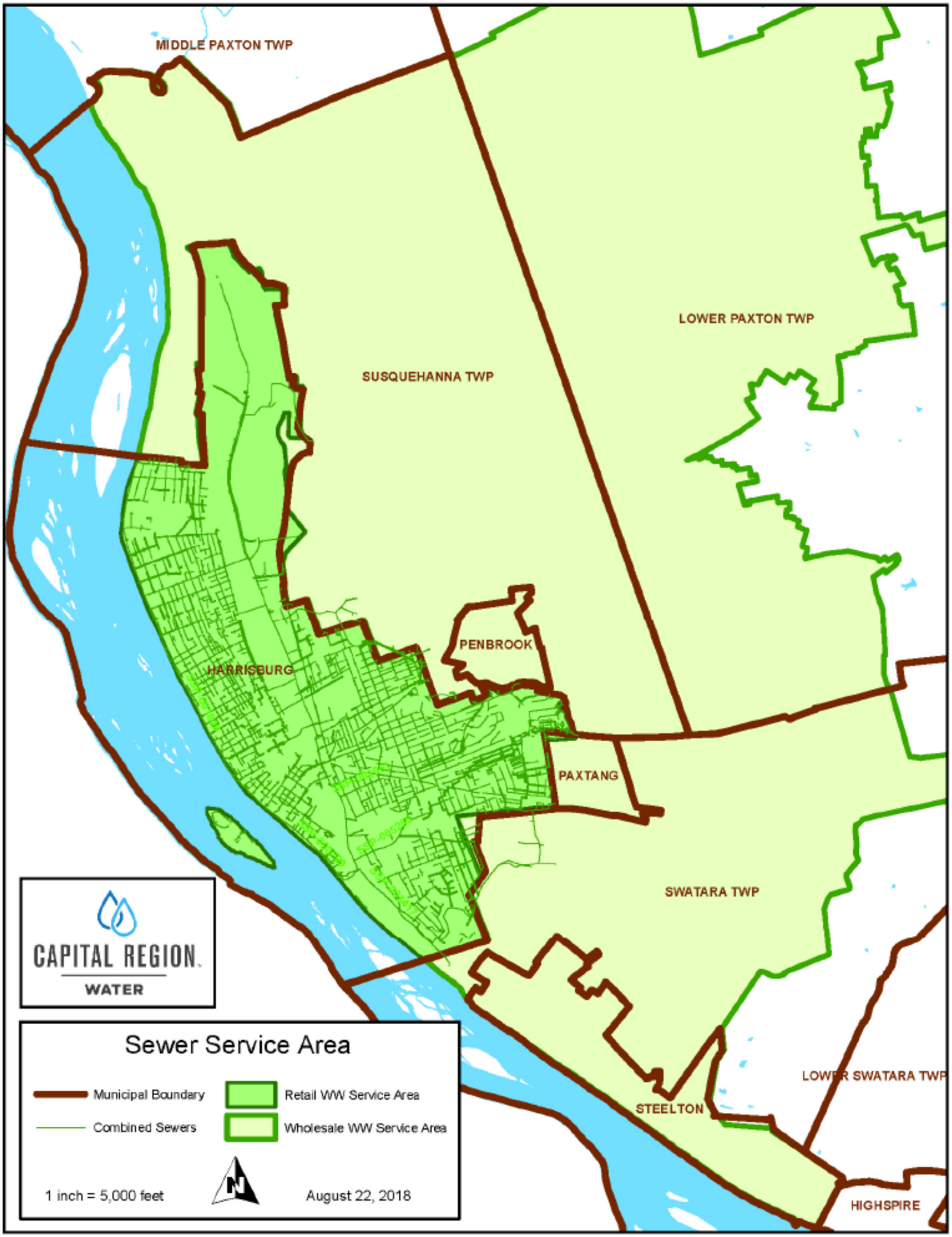
This Annual Report summarizes the work completed up to the date of the issuance of this Report. Changed conditions occurring or becoming known after such date could affect the material presented to the extent of such changes. Gannett Fleming has no responsibility for updating this CEAR for changes that occur after the date of this report.

In preparation of this Annual Report, Gannett Fleming has relied upon financial, engineering and operational data, and assumptions prepared by and / or provided by CRW. In addition, information and projections have been provided by other entities working on behalf of CRW. We believe such sources are reliable and the information obtained to be appropriate for the review undertaken and the conclusions reached in this CEAR. To the best of our knowledge, information and belief, the information does not omit material facts necessary to make the statements herein. However, Gannett Fleming has not independently verified the accuracy of the information provided by CRW and others. To the extent that the information is not accurate, the findings and recommendations contained in this Annual Report may vary and are subject to change.

Gannett Fleming devoted effort in making such opinions consistent with that degree of care and skill ordinarily exercised by members of the same profession currently practicing under same or similar circumstances and the time and budget available for its work in its efforts to endeavor to provide such opinions. The opinions are based on information provided by and consultations with CRW. No responsibility was assumed for inaccuracies in reporting by CRW or any third-party data source used in preparing such opinions. Gannett Fleming's opinions represent its professional judgment. Neither Gannett Fleming nor its parent corporation, or their respective subsidiaries and affiliates, makes any warranty, expressed or implied, with respect to such opinions.

Appendix A

Wastewater System Service Area Map


MIDDLE PAXTON TWP
LOWER PAXTON TWP
SUSQUEHANNA TWP
PENBROOK
HARRISBURG
PAXTANG
SWATARA TWP
LOWER SWATARA TWP
STEELTON
HIGHSPIRE
CAPITAL REGION
WATER
Sewer Service Area
Municipal Boundary
Combined Sewers
Retail WW Service Area
Wholesale WW Service Area
1 inch = 5,000 feet
August 22, 2018

Appendix B

Permitted Combined Sewer Overflow List

Capital Region Water
Combined Sewer Overflow (CSO) System
Calendar Year 2022

CSO No.	Interceptor	Latitude	Longitude	Location	Receiving Waters	Drainage Area (acres)
CSO-002	AWTF	40 15 3.99	-76 52 25.23	Front Street PS	SUSQUEHANNA RIVER	
CSO-003	AWTF	40 14 40.85	-76 51 41.47	Spring Creek PS	PAXTON CREEK	
CSO-004	FS	40 18 0.42	-76 54 14.54	FRONT & VAUGHN	SUSQUEHANNA RIVER	34
CSO-005	FS	40 17 54.57	-76 54 17.1	FRONT & LEWIS	SUSQUEHANNA RIVER	74
CSO-006	FS	40 16 35.48	-76 53 57.1	FRONT & GEIGER	SUSQUEHANNA RIVER	19
CSO-007	FS	40 16 33.32	-76 53 55.57	FRONT & PEFFER	SUSQUEHANNA RIVER	16
CSO-008	FS	40 16 28.93	-76 53 52.48	FRONT & MUENCH	SUSQUEHANNA RIVER	40
CSO-009	FS	40 16 20.1	-76 53 46.26	FRONT & HAMILTON	SUSQUEHANNA RIVER	67
CSO-010	FS	40 16 11.13	-76 53 40.48	FRONT & REILY	SUSQUEHANNA RIVER	42
CSO-011	FS	40 16 7.54	-76 53 38.31	FRONT & CALDER	SUSQUEHANNA RIVER	31
CSO-012	FS	40 16 3.58	-76 53 35.63	FRONT & VERBEKE	SUSQUEHANNA RIVER	25
CSO-013	FS	40 16 0.7	-76 53 33.45	FRONT & CUMBERLAND	SUSQUEHANNA RIVER	16
CSO-014	FS	40 15 55.29	-76 53 29.41	FRONT & BOAS	SUSQUEHANNA RIVER	30
CSO-015	FS	40 15 53.19	-76 53 28.24	FRONT & FORSTER	SUSQUEHANNA RIVER	20
CSO-016	FS	40 15 45.67	-76 53 22.73	FRONT & LIBERTY	SUSQUEHANNA RIVER	8
CSO-017	FS	40 15 29.65	-76 53 0.49	FRONT & MARKET	SUSQUEHANNA RIVER	6
CSO-018	FS	40 15 22.65	-76 52 49.07	FRONT & MULBERRY	SUSQUEHANNA RIVER	31
CSO-019	FS	40 15 18.41	-76 52 42.49	FRONT & PAXTON	SUSQUEHANNA RIVER	41
CSO-020	FS	40 15 6.17	-76 52 27.56	FRONT & HANNA	SUSQUEHANNA RIVER	16
CSO-021	Pax	40 17 19.12	-76 53 12.65	CAMERON & SCHUYLKILL	PAXTON CREEK	149
CSO-022	Pax	40 16 58.75	-76 53 5.58	FORREST & CAMERON	PAXTON CREEK	20
CSO-023	Pax	40 16 29.84	-76 52 47.74	CAMERON & CALDER	PAXTON CREEK	16
CSO-024	Pax	40 16 27.36	-76 52 47.15	HILL CHAMBER T.R.W.	PAXTON CREEK	158
CSO-025	Pax	40 16 21.75	-76 52 44.67	N. CAMERON & CUMBERLAND	PAXTON CREEK	10
CSO-026	Pax	40 16 21.53	-76 52 44.59	S. CAMERON & CUMBERLAND	PAXTON CREEK	51
CSO-027	Pax	40 16 21.47	-76 52 44.83	9TH & CUMBERLAND	PAXTON CREEK	8
CSO-028	Pax	40 16 18.63	-76 52 43.42	9TH & HERR	PAXTON CREEK	54
CSO-029	Pax	40 16 7.56	-76 52 37.2	E. CAMERON & NORTH	PAXTON CREEK	43
CSO-030	Pax	40 16 7.92	-76 52 37.69	W. CAMERON & NORTH	PAXTON CREEK	40
CSO-031	Pax	40 16 2.64	-76 52 35.02	CAMERON & STATE	PAXTON CREEK	220

Capital Region Water
Combined Sewer Overflow (CSO) System
Calendar Year 2022

CSO No.	Interceptor	Latitude	Longitude	Location	Receiving Waters	Drainage Area (acres)
CSO-032	Pax	40 15 57.56	-76 52 33.45	W. CAMERON & WALNUT	PAXTON CREEK	14
CSO-033	Pax	40 15 57.66	-76 52 33.17	E. CAMERON & WALNUT	PAXTON CREEK	20
CSO-034	Pax	40 15 51.71	-76 52 30.58	S. MARKET & CAMERON	PAXTON CREEK	62
CSO-037	Pax	40 15 51.8	-76 52 31.27	10TH & MARKET	PAXTON CREEK	77
CSO-038	Pax	40 15 46	-76 52 28.03	10TH & CHESTNUT	PAXTON CREEK	19
CSO-039	Pax	40 15 42.02	-76 52 25.43	S. MULBERRY & CAMERON	PAXTON CREEK	21
CSO-040	Pax	40 15 42.16	-76 52 25.51	N.MULBERRY & CAMERON	PAXTON CREEK	12
CSO-041	Pax	40 15 41.93	-76 52 25.72	W. MULBERRY & CAMERON	PAXTON CREEK	12
CSO-042	Pax	40 15 36.99	-76 52 22.62	N. KITTATINNY & CAMERON	PAXTON CREEK	6
CSO-043	Pax	40 15 36.88	-76 52 22.55	S. KITTATINNY & CAMERON	PAXTON CREEK	6
CSO-044	Pax	40 15 27.64	-76 52 19.3	CAMERON & BERRYHILL	PAXTON CREEK	47
CSO-045	Pax	40 15 20.17	-76 52 18.49	S. PAXTON STREET	PAXTON CREEK	10
CSO-046	Pax	40 15 20.26	-76 52 18.55	N. PAXTON STREET	PAXTON CREEK	9
CSO-048	Pax	40 15 11.52	-76 52 10.24	10TH & SHANNON	PAXTON CREEK	766
CSO-049	FS	40 17 3.64	-76 54 11.52	FRONT & SCHUYLKILL	SUSQUEHANNA RIVER	28
CSO-050	FS	40 16 57.74	-76 54 8.56	SENECA & SUSQUEHANNA	SUSQUEHANNA RIVER	42
CSO-051	FS	40 16 46.03	-76 54 2.95	WOODBINE & GREEN	SUSQUEHANNA RIVER	79
CSO-052	FS	40 15 43.81	-76 53 20.26	FRONT & STATE	SUSQUEHANNA RIVER	22
CSO-053	FS	40 15 41.57	-76 53 17.27	FRONT & SOUTH	SUSQUEHANNA RIVER	10
CSO-054	FS	40 15 38.06	-76 53 12.63	FRONT & PINE	SUSQUEHANNA RIVER	8
CSO-055	FS	40 15 34.55	-76 53 8.11	FRONT & LOCUST	SUSQUEHANNA RIVER	14
CSO-056	FS	40 15 31.96	-76 53 4.66	FRONT & WALNUT	SUSQUEHANNA RIVER	10
CSO-057	FS	40 15 23.84	-76 52 50.89	FRONT & CHERRY	SUSQUEHANNA RIVER	16
CSO-058	FS	40 15 10.79	-76 52 32.53	FRONT & TUSCARORA	SUSQUEHANNA RIVER	22
CSO-059	Pax	40 15 36.96	-76 52 22.61	E. KITTATINNY & CAMERON	PAXTON CREEK	154
CSO-060	HS	40 15 3.1	-76 52 2.12	SALMON STREET	PAXTON CREEK	16
CSO-061	HS	40 15 1.16	-76 52 0.12	10TH & SYCAMORE	PAXTON CREEK	56
CSO-062	HS	40 14 53.23	-76 51 52.5	SHANOIS STREET	PAXTON CREEK	10
CSO-063	HS	40 14 47.16	-76 51 48.39	CAMERON & HANOVER	PAXTON CREEK	40
CSO-064	HS	40 14 43.38	-76 51 43.34	CAMERON & MAGNOLIA	PAXTON CREEK	11

Appendix C

Wastewater Treatment Plant - Operations Summary Tables

Capital Region Water
Advanted Wastewater Treatment Facility Operations Summery
Callendar Year 2023

PARAMETER	NPDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG	TOTAL
FLOW															
Average Daily Flow, mgd	Report	22.0	16.8	19.3	19.1	20.3	16.2	21.0	16.0	17.8	15.7	15.2	22.2	18.5	---
Maximum Day Flow, mgd		36.1	21.8	39.3	72.4	52.5	27.3	35.3	21.1	46.1	36.1	45.2	51.2	72.4	<-- Max
Max. Day to Ave. Daily Flow Ratio		1.64	1.30	2.04	3.79	2.59	1.69	1.68	1.32	2.59	2.30	2.97	2.31	2.18	---
Instantaneous Maximum Flow, mgd		71.3	57.6	72.3	80	61.2	67.3	78.5	80.2	80.1	80.2	80.2	81.7	74.2	---
Flow from Suburban Customers		13.4	10.3	11.6	11.0	12.1	10.3	13.6	10.0	10.6	10.2	10.0	13.3	11.4	---
% Flow from Suburban Customers		61%	61%	60%	58%	60%	64%	65%	63%	59%	65%	66%	60%	62%	---
Precipitation, inches		2.45	1.01	2.56	5.89	0.20	4.25	6.38	2.23	5.80	2.33	2.72	5.88	3.48	41.7
BIOCHEMICAL OXYGEN DEMAND															
Raw Influent BOD (Avg.), mg/L	Report	97	139	114	198	165	193	145	161	160	162	179	133	154	---
Raw Influent BOD Loading (Avg.), lbs/day	Report	17,798	19,476	18,350	31,540	27,935	26,076	25,395	21,484	23,752	21,212	22,691	24,625	23,361	---
Effluent CBOD (Ave. Month), mg/L	25	4	3	4	4	3	3	3	3	3	3	3	3	3	---
Effluent CBOD Loading (Ave. Month), lbs/day	7860	681	469	596	821	507	470	580	395	488	377	417	693	541	---
SUSPENDED SOLIDS															
Raw Influent TSS, mg/L	Report	156	222	173	187	175	212	168	185	180	176	197	152	182	---
Raw Influent Loading TSS, lbs/day	Report	28,623	31,105	27,846	29,788	29,628	28,643	29,424	24,686	26,721	23,045	24,973	28,142	27,719	---
Raw Influent VSS, mg/L		136	198	154	164	153	186	146	163	157	155	173	133	160	---
Raw Influent Loading VSS, lbs/day		24,953	27,742	24,788	26,124	25,903	25,130	25,570	21,751	23,307	20,295	21,931	24,625	24,343	---
VSS / TSS Influent Ratio, %		87%	89%	89%	88%	87%	88%	87%	88%	87%	88%	88%	88%	88%	---
Effluent TSS (Ave. Month), mg/L	30	8	3	3	4	4	6	4	4	6	5	5	4	5	---
Effluent Loading TSS (Ave. Month), lbs/day	9433	1447	412	582	1043	660	954	827	588	958	717	704	847	812	---
% TSS Reduction		94.9	98.7	97.9	96.5	97.8	96.7	97.2	97.6	96.4	96.9	97.2	97	97.1	---
AMMONIA NITROGEN															
Raw Influent, mg/L		17	21	17	16	13	15	12	14	15	17	18	13	16	---
Raw Influent Loading, lbs/day		3,027	2,970	2,752	2,469	2,269	2,000	2,137	1,922	2,227	2,226	2,282	2,407	2,391	---
Effluent, mg/L	(2)	1.9	1.2	1.4	1.6	0.4	1.1	0.5	0.9	0.3	0.3	0.3	0.4	0.9	---
Effluent Loading, lbs/day	(2)	359	168	248	258	74	150	86	118	53	39	50	80	140	---
% Reduction		88.1	94	91	90	97	93	96	94	98	98	98	97	94.4	---
TOTAL NITROGEN															
Raw Influent, mg/L		26.4	33.1	26.3	29.9	25.6	30.2	22.9	23.9	24	29	55	29	30	---
Raw Influent Loading, lbs/day		4,844	4,638	4,233	4,763	4,334	4,080	4,011	3,189	3,563	3,797	6,972	5,369	4,483	---
Effluent, mg/L		5	4	5.7	4.3	3.7	5.2	4.5	4.2	6.3	9	12.4	11.5	6	---
Effluent Loading, lbs/day		993	548	846	652	861	717	730	542	942	1,076	2,004	2,195	1,009	---
% Reduction		79.5	88.2	80	86.3	80.1	82.4	81.8	83	73.6	71.7	71.3	59.1	78	---
Effluent Loading, lbs/month		-	-	-	-	-	-	-	-	-	-	-	-	-	---
TOTAL PHOSPHORUS															
Raw Influent, mg/L		2.9	4.2	3.5	3.8	3.5	4.0	3.1	3.6	3.6	3.6	3.8	2.8	3.5	---
Raw Influent Loading, lbs/day		518	590	543	535	530	529	527	479	498	463	458	485	513	---
Effluent, mg/L	2	0.8	1.6	1.2	1.6	1.4	1.6	1.7	1.6	1.6	1.6	1.6	1.1	1.5	---
Effluent Loading, lbs/day	629	152	222	194	237	215	223	300	220	218	208	191	192	214	---
% Reduction		70.7	62.3	64.3	55.7	59.4	57.8	43.1	54.1	56.2	55.1	58.3	60.4	58.1	---
Effluent Loading, lbs/month		4,726	5,973	6,021	7,102	6,657	6,689	9,303	6,820	6,536	6,461	5,720	5,952	6497	---
DISINFECTION															
Chlorine Residual, Average (mg/L)	0.5	0.22	0.18	0.2	0.22	0.43	0.44	0.45	0.37	0.39	0.39	0.16	0.2	0.30	---
Chlorine Residual, Max Day (mg/L)	1.6	0.57	0.32	0.28	0.4	0.59	0.54	0.82	0.53					0.51	---
Fecal Coliform (Geo. Mean), MPN/100 ml	(3)	25	3	5	3	2	2	4	7	11	49	48	16	15	---
Fecal Coliform (Max. Instan.), MPN/100 ml	(3)	1,990	37	460	5,200	54	190	31	64	435	6,739	2,420	2,420	6739	<-- Max
Notes:															

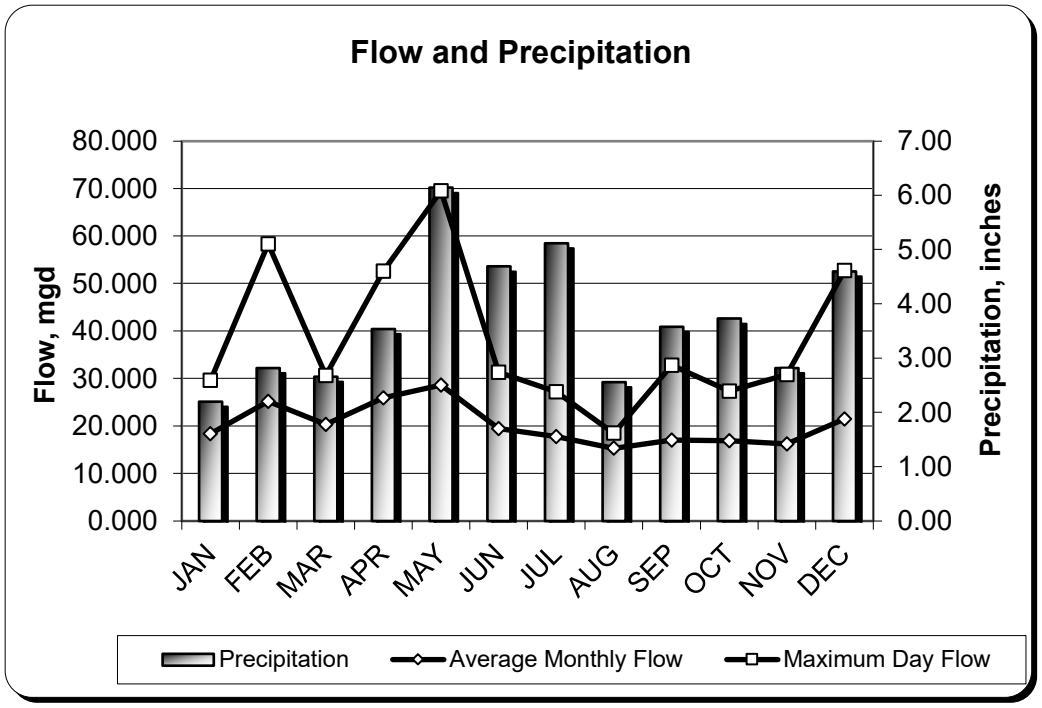
PARAMETER	NPDES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG	TOTAL
DISSOLVED OXYGEN															
Effluent, mg/L (Min.)	5.0	8.0	8.3	7.8	6.0	7.6	6.5	6.1	6.6	6.7	7.0	8.1	7.6	6.00	<--Min
pH															
Influent, s.u. (Min.)		7.1	7.1	7.2	7.1	7.3	7.2	7.1	7.3	7.2	7.3	7.4	7.4	7.1	<--Min
Influent, s.u. (Max.)		7.5	7.4	7.5	7.4	7.6	7.5	7.7	7.6	7.9	7.6	7.7	7.6	7.9	<--Max
Effluent, s.u. (Min.)	6.0	7.2	7.1	7.1	7.1	7.2	7.2	7.1	7.2	7.2	7.2	7.1	7.1	7.1	<--Min
Effluent, s.u. (Max.)	9.0	7.8	7.7	7.9	7.9	7.9	7.8	7.8	7.8	8.0	7.9	7.9	7.8	8.0	<--Max
BIOREACTOR OPERATIONS															
Activated Sludge Process															
MLSS, mg/L		2,103	2,294	2,374	2,076	2,165	2,438	2,148	2,420	2,240	2,373	2,386	2,474	2,291	---
MLVSS, mg/L		1,700	1,909	1,935	1,712	1,724	1,961	1,688	1,853	1,720	1,841	1,891	1,990	1,827	---
% VSS		0.81	0.83	0.82	0.82	0.80	0.80	0.79	0.77	0.77	0.78	0.79	0.80	0.80	---
Settleable Solids, mL/L		289	398	404	288	351	431	255	214	193	171	222	285	292	---
Sludge Volume Index, mL/gm		137	174	170	139	162	177	119	88	86	72	93	115	128	---
Return Activated Sludge															
RAS, mgd		16.4	13.7	14.7	14.3	14.5	13.9	15.4	13.5	14.8	17.3	16.7	16.8	15.2	---
RAS to Forward Flow Ratio		0.75	0.82	0.76	0.75	0.71	0.86	0.73	0.84	0.83	1.10	1.10	0.76	0.83	---
RAS TSS, mg/L		4,866	5,186	5,270	4,485	4,998	5,329	4,923	5,593	5,889	4,808	4,690	5,475	5,126	---
RAS VSS, mg/L		3,938	4,214	4,293	3,695	3,981	4,295	3,825	4,282	4,636	3,734	3,720	4,399	4,084	---
SOLIDS HANDLING AND DISPOSAL															
GRAVITY THICKENER															
Feed Sludge															
Primary Waste Sludge, mgd		0.44	0.44	0.44	0.44	0.43	0.43	0.43	0.42	0.44	0.44	0.44	0.45	0.44	159.29
Waste Activated Sludge, mgd		1.03	0.90	0.93	1.25	1.26	0.80	1.19	0.80	0.81	0.92	0.80	0.81	0.96	349.52
Waste Activated Sludge, lbs/day		18,048	17,125	18,354	21,694	22,787	16,266	21,354	16,106	15,169	18,208	15,880	16,610	18,133	---
Hauled Sludge, lbs/day		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Combined, mgd		1.47	1.33	1.37	1.69	1.69	1.23	1.62	1.22	1.26	1.36	1.24	1.26	1.39	508.87
Feed Sludge, % TS		0.27	0.36	0.48	0.40	0.39	0.46	0.35	0.38	0.35	0.38	0.35	0.38	0.38	---
Thickened Sludge															
Thickened Sludge, % TS		2.70	2.94	3.40	2.80	2.70	2.10	2.00	1.90	4.00	4.70	5.00	6.00	3.35	---
Thickened Sludge, mgd		0.15	0.16	0.19	0.24	0.24	0.27	0.28	0.24	0.11	0.11	0.09	0.08	0.18	57.43
Thickened Sludge, lbs/day		33,000	40,040	54,330	56,400	55,130	47,010	47,140	38,670	36,410	43,540	35,660	40,350	43,973	---
Thickened Sludge, lbs/month		1,023,076	1,121,213	1,684,088	1,692,028	1,708,949	1,410,394	1,461,377	1,198,733	1,092,156	1,349,762	1,069,814	1,250,758	1,338,529	16,062,348
BELT FILTER PRESS															
Feed Sludge															
Secondary Digester, mgd		0.18	0.18	0.13	0.18	0.14	0.17	0.16	0.18	0.15	0.17	0.14	0.12	0.16	57.76
Feed Sludge, % TS		1.47	1.46	1.47	1.38	1.48	1.43	1.50	1.78	1.90	1.60	1.80	1.90	1.60	---
Feed Sludge, dry lbs/month		656,625	511,537	461,536	601,331	521,108	606,410	592,007	722,669	708,316	686,682	644,015	589,471	608,476	7,301,707
Dry Cake (lb/month)		415,481	336,771	323,798	361,360	393,843	456,008	475,473	426,639	448,000	474,000	454,000	314,000	406,614	4,879,373
Dry Cake (tons/month)		208	168	162	181	197	228	238	213	224	237	227	157	203	2,439.69
Wet Cake (tons/month		1,261	1,059	1,038	1,160	1,221	1,420	1,486	1,261	1,325	1,463	1,428	981	1,258	15,101.79
% Total Solids		16.5	15.9	15.6	15.6	16.1	16.1	16.0	16.9	16.9	16.2	15.9	16.0	16.1	---

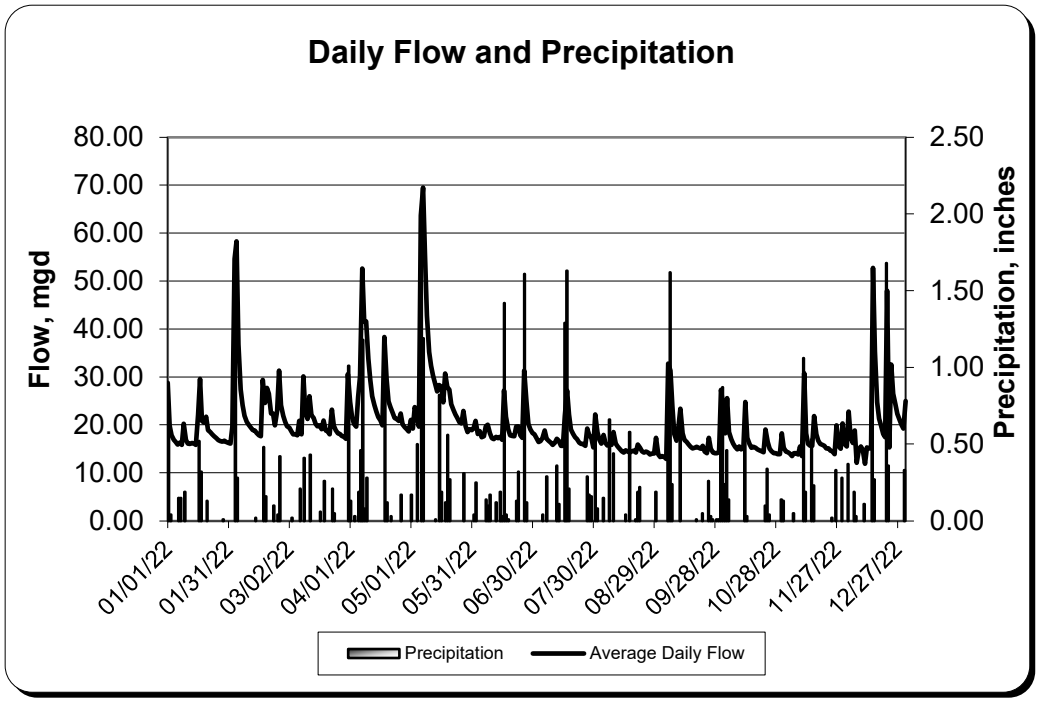
Notes:

Appendix D

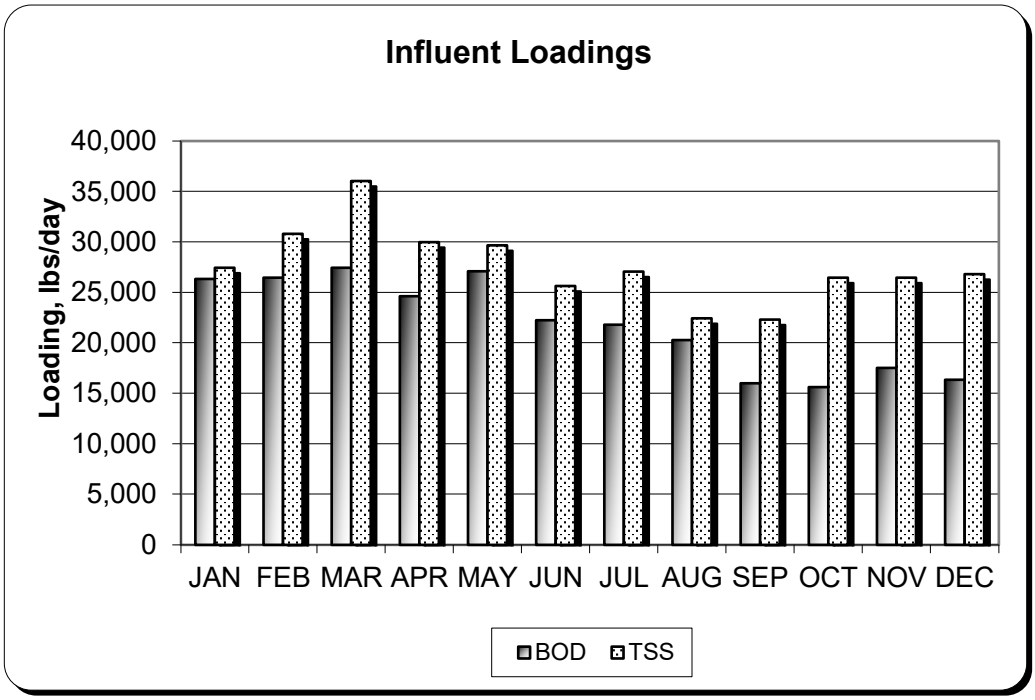
Wastewater Treatment Plant - Operations Summary Graphs

Capital Region Water
Wastewater Treatment Plant
Calendar Year 2022

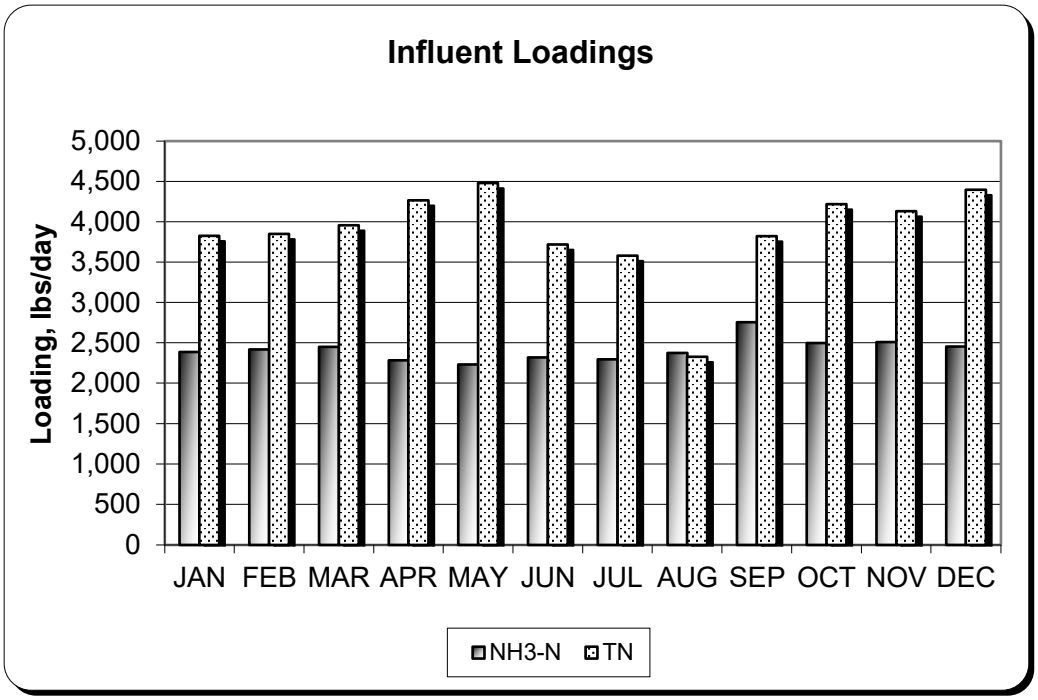




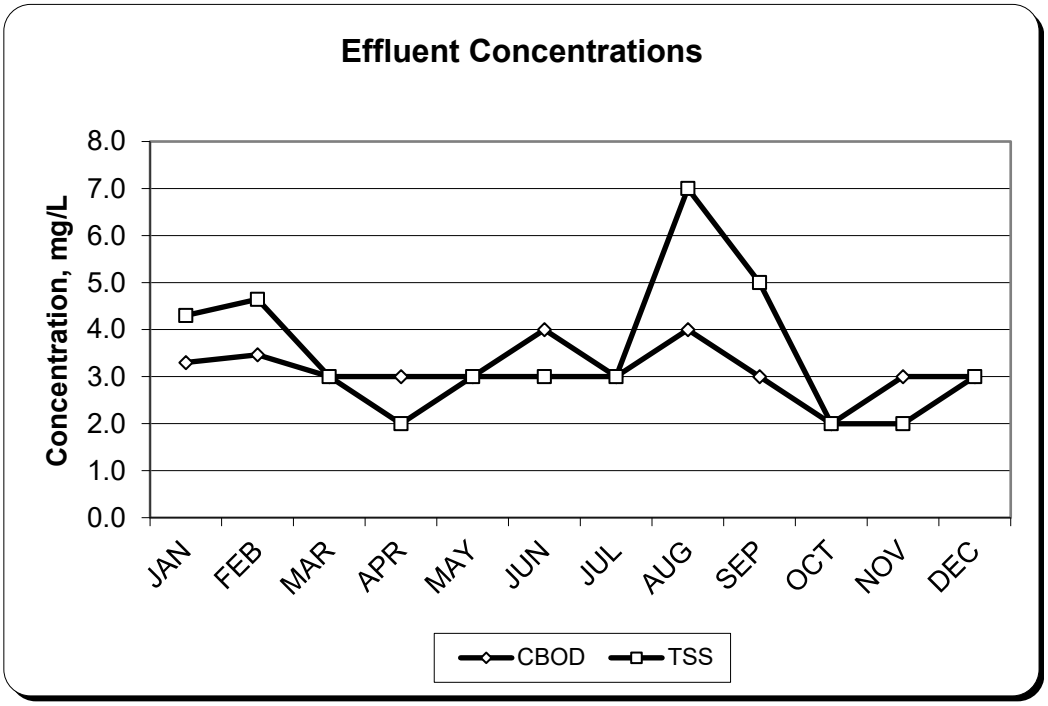
Capital Region Water
Wastewater Treatment Plant
Calendar Year 2022



Average Annual Design Organic Loading: 18,743 lbs BOD/day

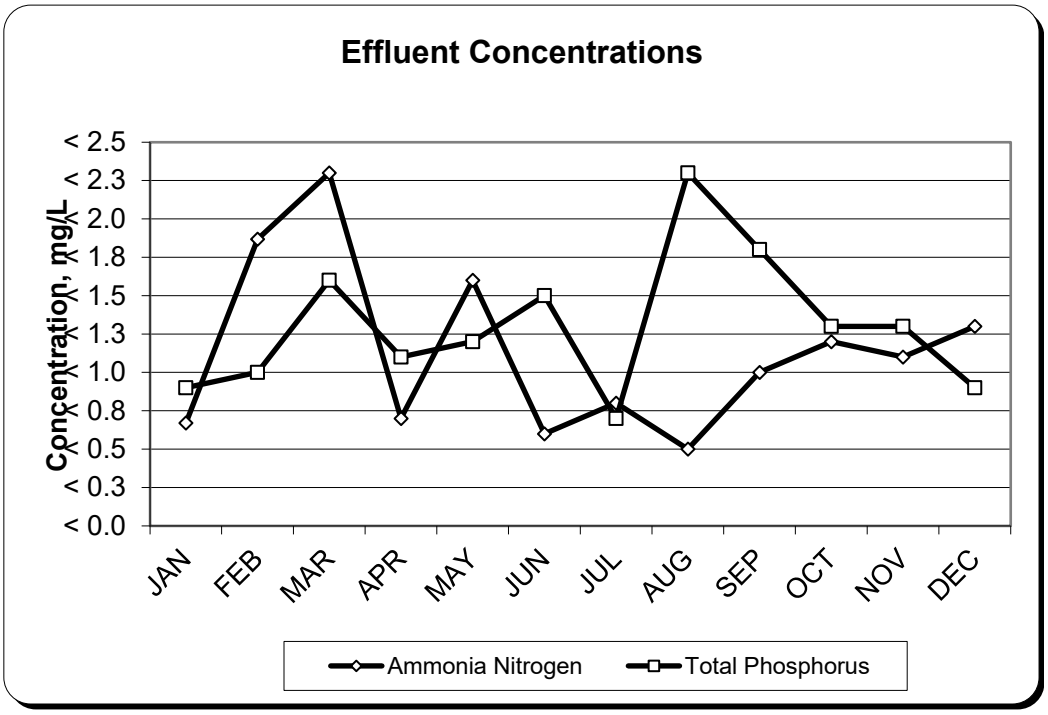


Capital Region Water
Wastewater Treatment Plant
Calendar Year 2022

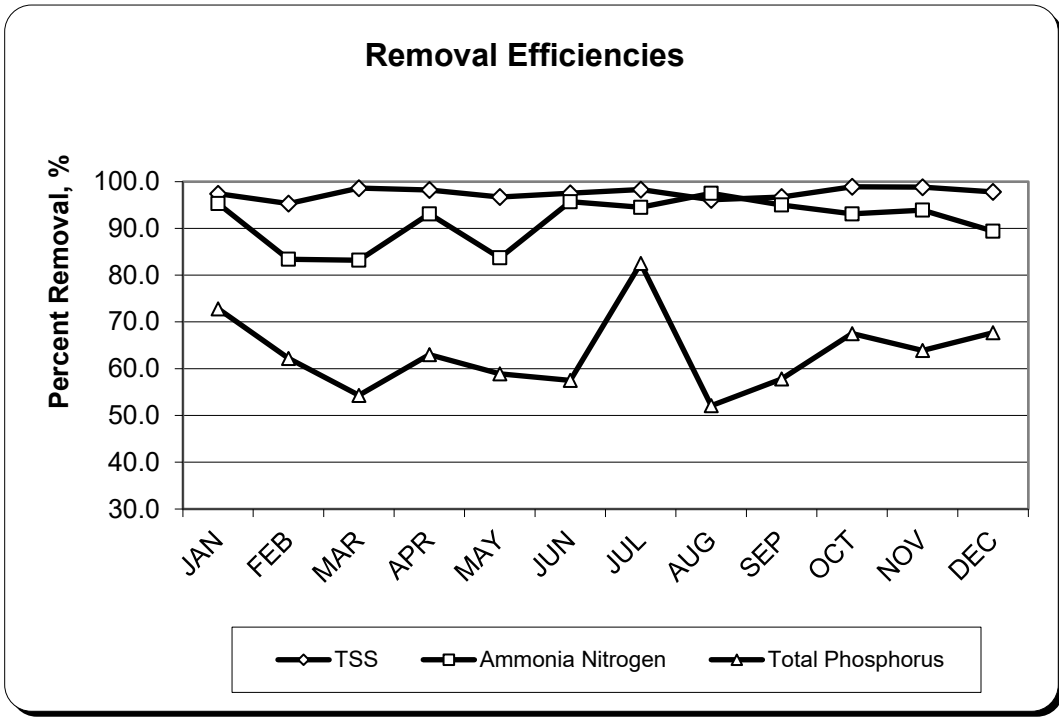


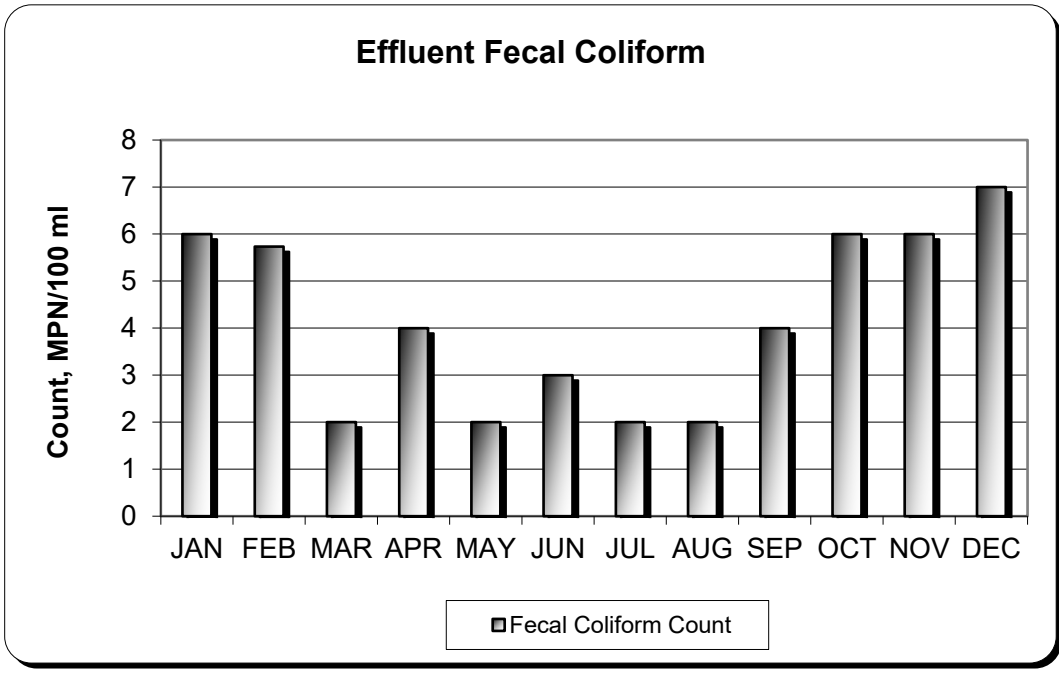
CBOD Monthly Average Discharge Limit: 25 mg/L

TSS Monthly Average Discharge Limit: 30 mg/L



Capital Region Water
Wastewater Treatment Plant
Calendar Year 2022





Fecal Coliform Monthly Geometric Mean Limit: 200 MPN/100 ml (May 1 thru Sept. 30)
2,000 MPN/100 ml (Oct.1 thru Apr. 30)

Capital Region Water
Wastewater Treatment Plant
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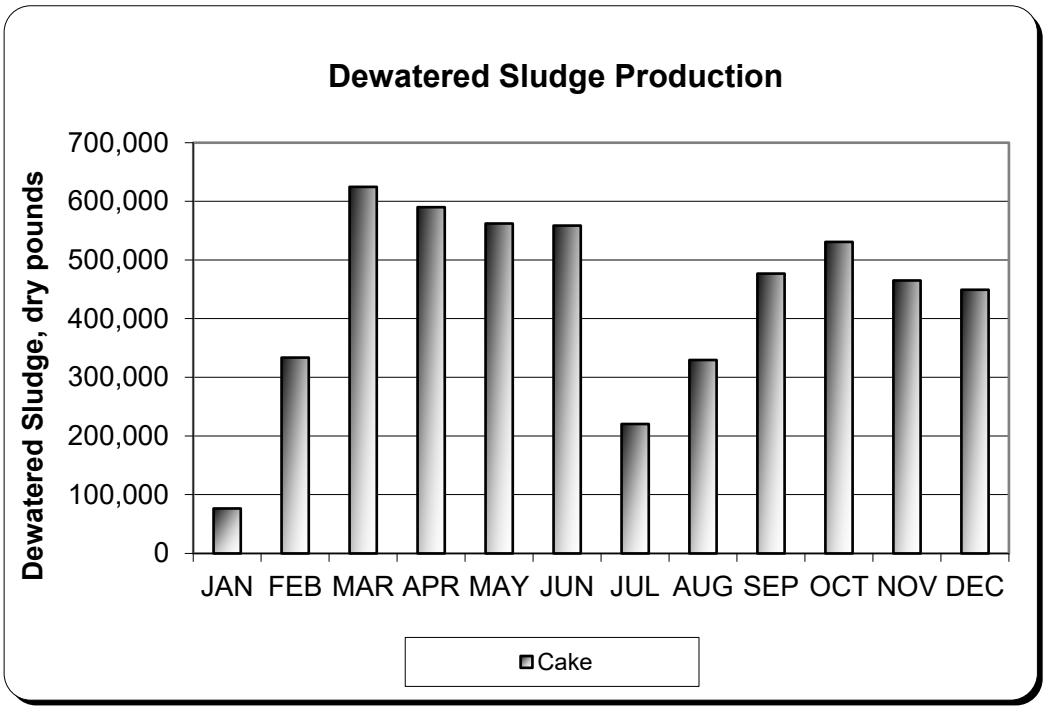

Capital Region Water

Advanced Wastewater Treatment Facility

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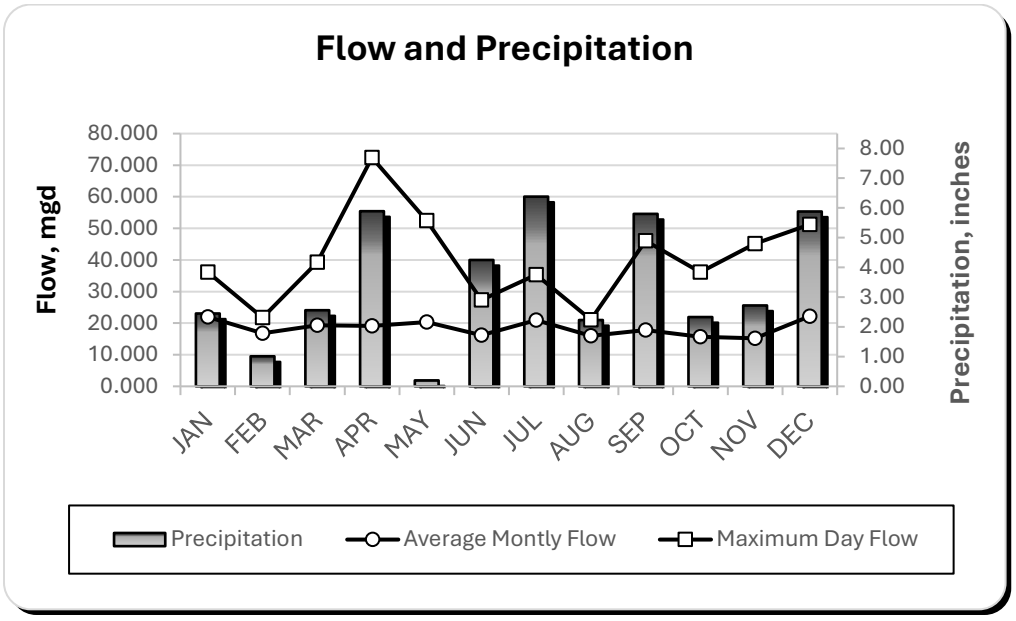

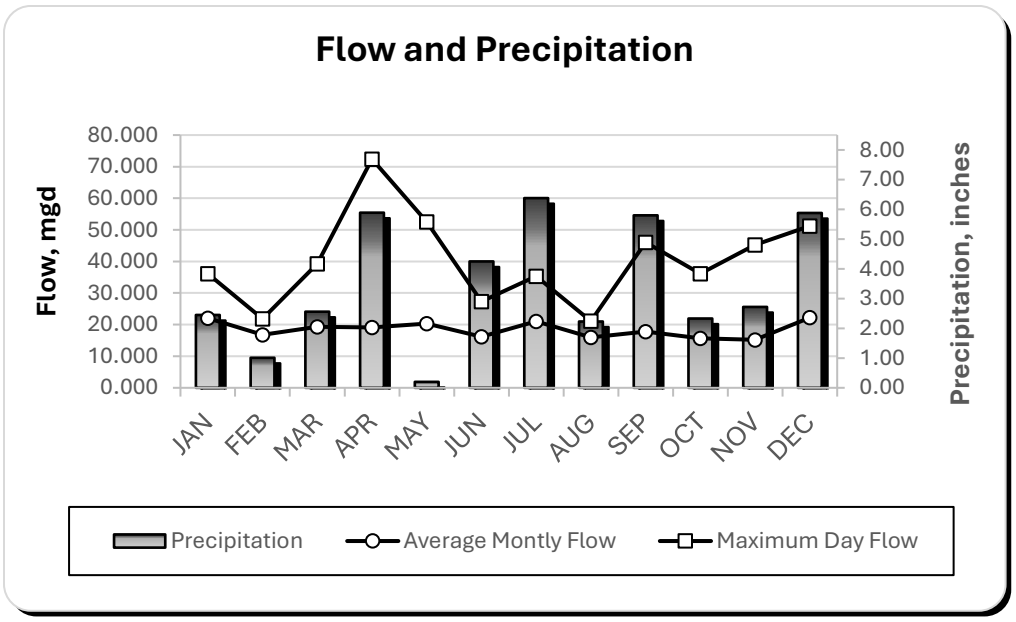

Capital Region Water

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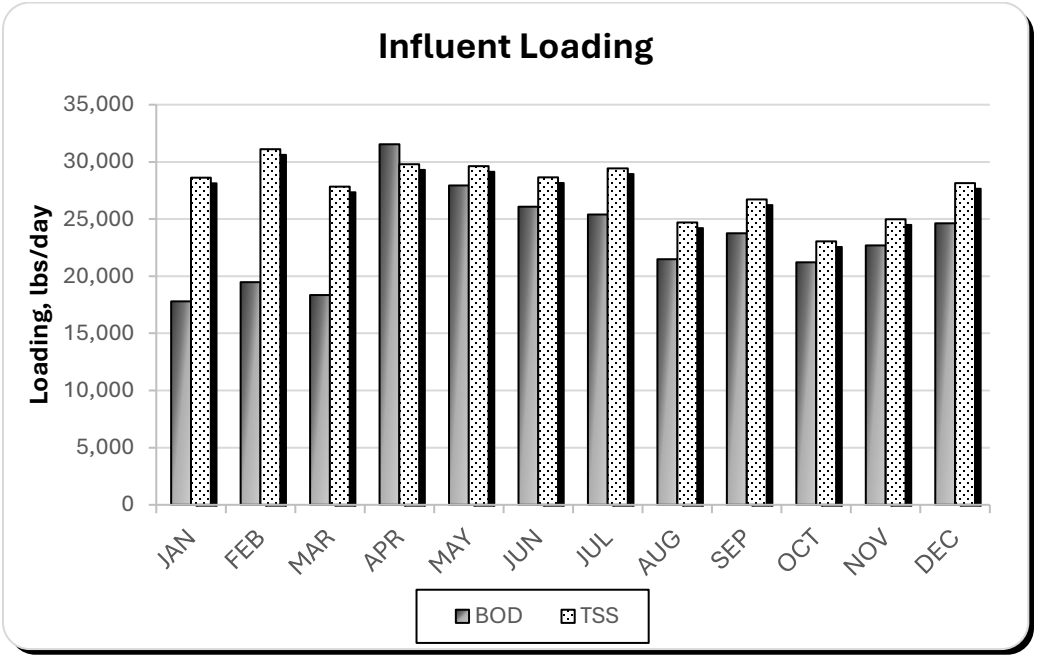

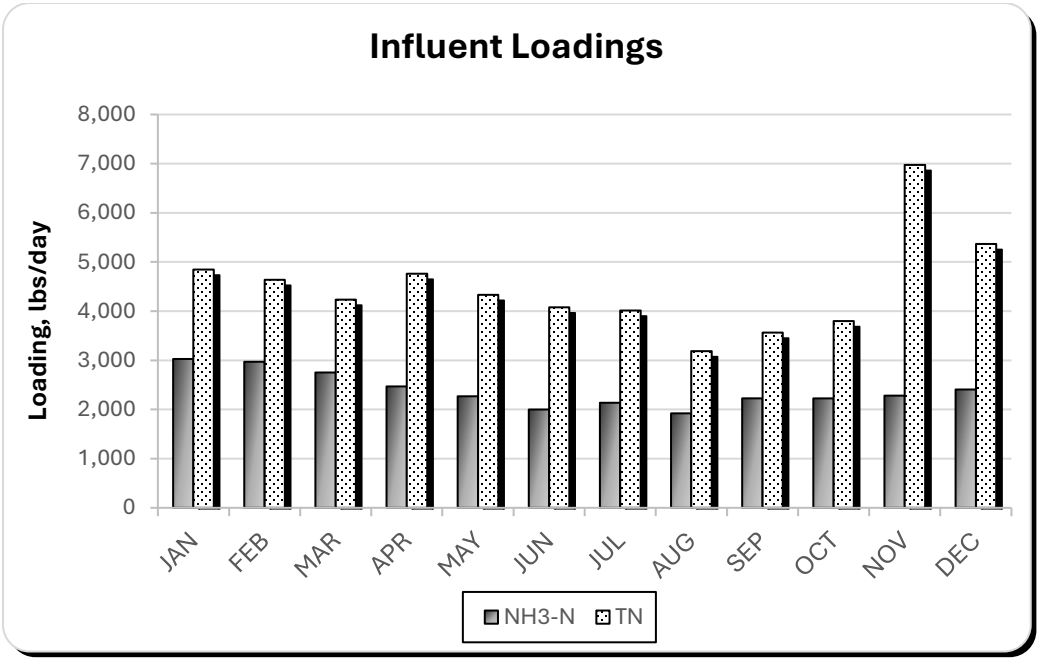

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Advanced Wastewater Treatment Facility

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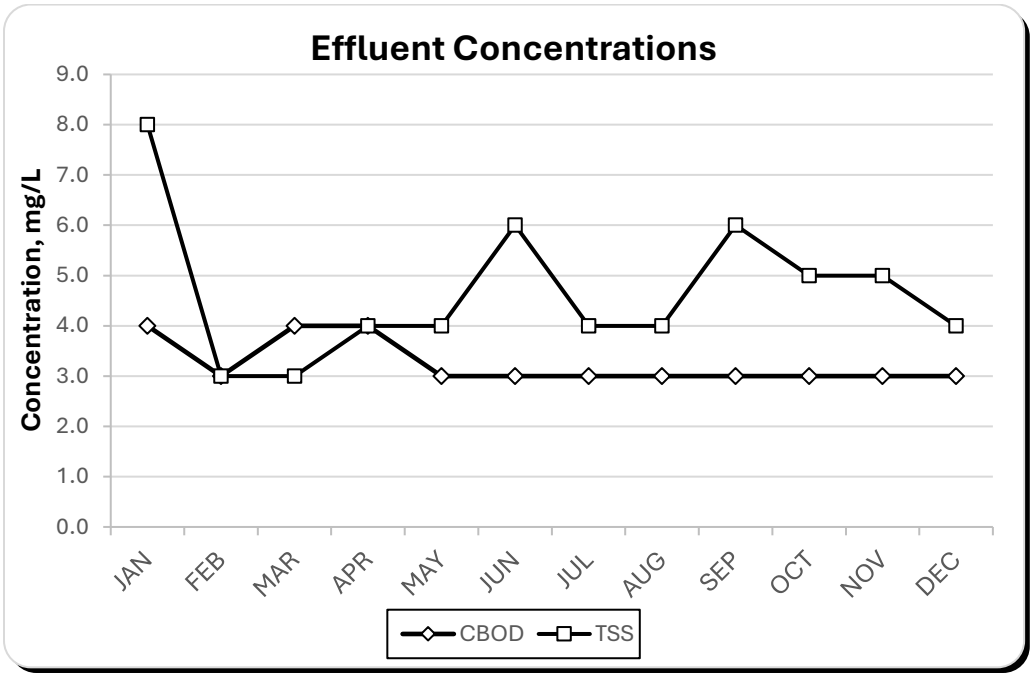

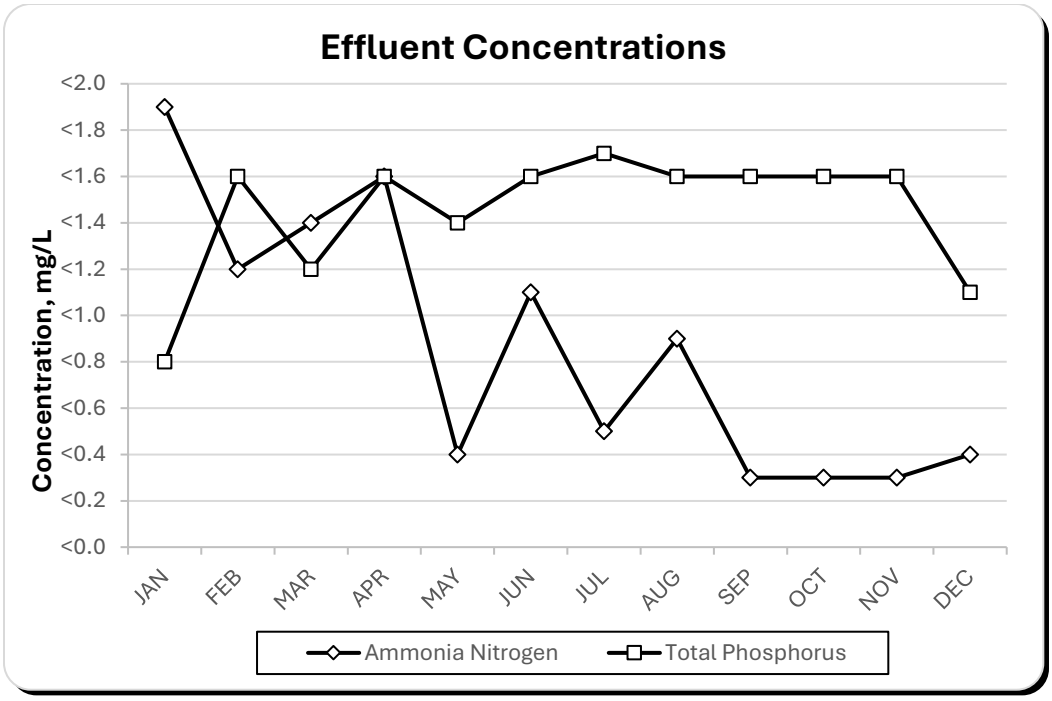

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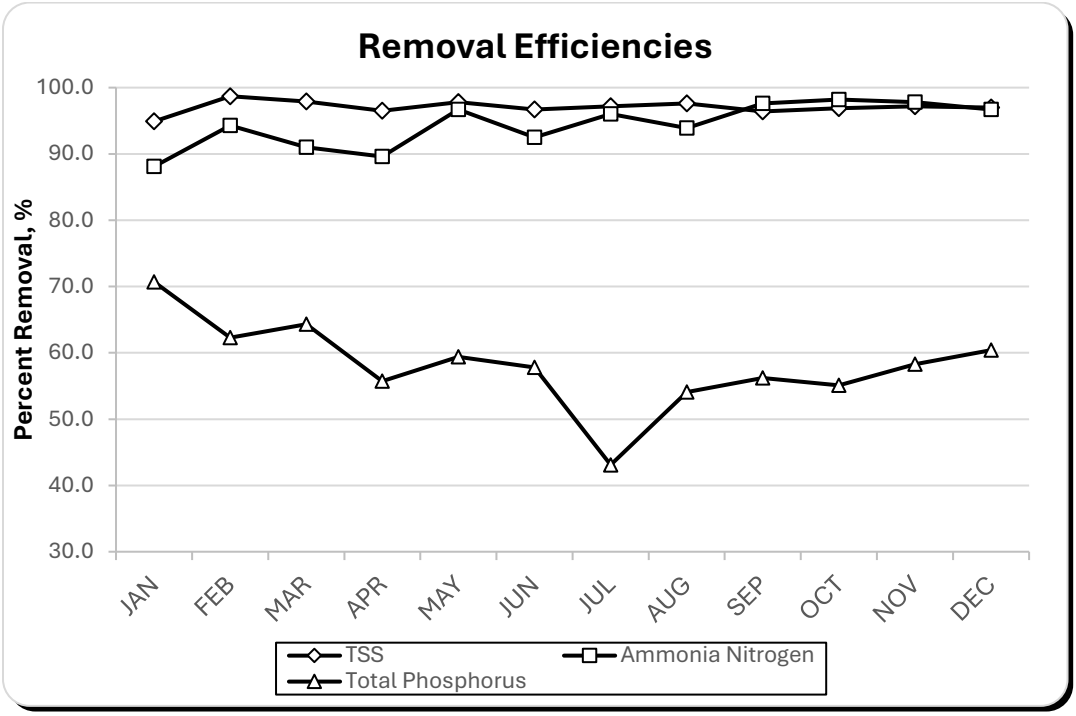

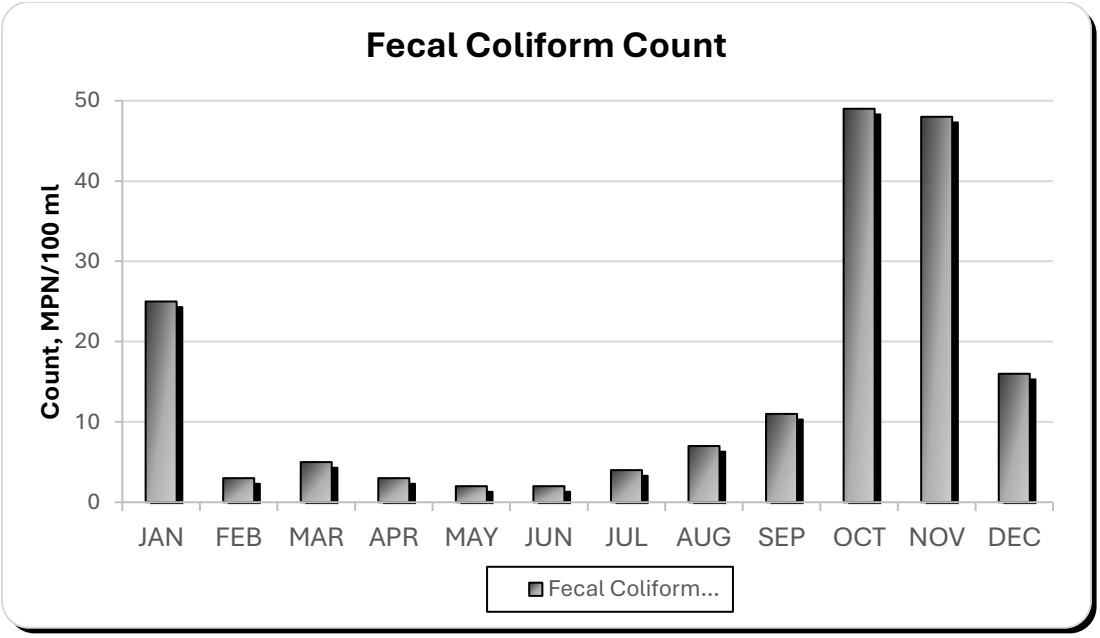

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