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PUERTO RICO
AQUEDUCT AND
SEWER AUTHORITY

Fiscal Year 2023 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority

Final Report

December 2023

To satisfy the requirements of Section 7.07 of the 2012 Master Agreement of Trust by and between PRASA and Banco Popular de Puerto Rico as Trustee; and the requirements between PRASA, the Government of Puerto Rico and the Puerto Rico Fiscal Agency and Financial Advisory Authority.

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Acronyms and Abbreviations

AAFAF	Puerto Rico Fiscal Agency and Financial Advisory Authority (Spanish Acronym)
ABT	Additional Bonds Test
ACA	Asset Condition Assessment
ADSEF	Office of Administration for the Families Socioeconomic Development (Spanish Acronym)
AMI	Automatic Meter Reading and/or Advanced Metering Infrastructure
AOP	All Other Perils
ARPA	American Rescue Plan Act
ASG	General Services Administration of Puerto Rico (Spanish Acronym)
ASSMCA	*Administración de Servicios de Salud y Contra la Adicción*
AWWA	American Water Works Association
BNR	Biological Nutrient Reactor
BOD	Biological Oxygen Demand
BPR	Biannual Progress Report
CAGR	Compound Annual Growth Rate
CARES Act	Coronavirus Aid, Relief, and Economic Security Act
CBA	Collective Bargaining Agreement
CCL	Contaminant Candidate List
CCP	Corrosion Control Program
CCT	Corrosion Control Treatment
CDBG-DR	Community Development Block Grant-Disaster Recovery
CER	Consulting Engineer’s Report
CGI	Commonwealth Guaranteed Indebtedness
CIAPR	College of Engineers and Land Surveyors of Puerto Rico (Spanish Acronym)
CIP	Capital Improvements Program
COR3	Central Office for Recovery, Reconstruction, and Resilience
CSO	Commonwealth Supported Obligations
CSWO	Combined Sewer Overflow
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
DBP	Disinfection Byproducts

DBPR	Disinfection Byproducts Rule
DIC	Difference in Condition
DMR	Discharge Monitoring Report
DNER	Department of Natural and Environmental Resources
DSC	Debt Service Coverage
DWO	Dry Weather Overflow
DWSRF	Drinking Water State Revolving Fund
E&O	Errors and Omissions
EGU	Emergency Generator Unit
EMT	Executive Management Team
EPL	Employment Practices Liability
EQ	Earthquake
ERAP	Emergency Rental Assistance Program
ERISA	Employee Retirement Income Security Act
ERP	Emergency Response Plans
ERS	Employees Retirement System
FAASt	FEMA Accelerated Award Strategy
FEMA	Federal Emergency Management Agency
FOG	Fats, Oils, and Grease
FOMB	Fiscal, Oversight, and Management Board
FTE	Full-Time Employee
FY	Fiscal Year
GIS	Geographic Information System
gpm	gallons per minute
GWUDI	Groundwater Under the Direct Influence of Surface Water
HAA	Haloacetic Acid
HIEPAAA	*Hermandad Independiente de Empleados Profesionales de la Autoridad de Acueductos y Alcantarillados*
HMGP	Hazard Mitigation Grant Program
HR	Human Resources
HUD	United States Department of Housing and Urban Development
IMP	Integrated Maintenance Program

IT	Systems and Information Technology
KPI	Key Performance Indicators
kWh	Kilowatt-Hour
LCR	Lead and Copper Rule
LIHWAP	Low-Income Household Drinking Water and Wastewater Assistance Program
LOC	Line of Credit
LSL	Lead Service Lines
LT2ESWTR	Long-Term 2 Enhance Surface Water Treatment Rule
LTP1	Short Long-Term 2 Projects
LTP2	Mid Long-Term 2 Projects
LTP3	Long-Term 2 Projects
LUMA	Luma Energy, operator of PREPA's electricity distribution in Puerto Rico
M	Million
MAPFRE	MAPFRE PRAICO Insurance Company
Marsh	Marsh Saldaña, Inc.
MAT	Master Agreement of Trust
MG	Million Gallons
MGD	Million Gallons per Day
MNC	Minor Non-Compliance
MPA	Microscopic Particulate Analysis
MPS	Maintenance Planning and Scheduling
NPDES	National Pollutant Discharge Elimination System
NPV	Net Present Value
NPW	Non-Potable Water
NRW	Non-Revenue Water
OCIP	Owner Controlled Insurance Program
OSHA	Occupational Safety and Health Administration
PCS	Process Control System
PE	Professional Engineer
PFAS	Per-and Polyfluoroalkyl Substances
PFC	Puerto Rico Public Finance Corporation
PFOA	perfluorooctanoic acid

PFOS	perfluorooctanesulfonic acid
PMC	Program Management Consultant
PML	Probable Maximum Loss
PMO	Project Management Office
POSE	*Programa de Orientación Social al Empleado*
PPA	Power Purchase Agreement
PRASA	Puerto Rico Aqueduct and Sewer Authority
PRDOH/DOH	Puerto Rico Department of Health
PREB	Puerto Rico Energy Bureau
PREPA	Puerto Rico Electric Power Authority
PRIFA	Puerto Rico Infrastructure Financing Agency
PRITS	Puerto Rico Innovation and Technology Service
PROMESA	Puerto Rico Oversight, Management, and Economic Stability Act
PWS	Potable Water Systems
QSAR	Quarterly Settlement Agreement Report
R&R	Renewal and Replacement
RFP	Request for Proposal
RWI	Raw Water Intakes
RWPS	Raw Water Pump Station
RWWTP	Regional Wastewater Treatment Plant
SAP	Systems, Applications, and Products in Data Processing
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SIR	Self-Insured Retention
SNC	Significant Non-Compliance
SOP	Standard Operating Procedures
SRF	State Revolving Fund
SSO	Sanitary Sewer Overflow
SSOMP	Sewer System Operation & Maintenance Plan
STS	Sludge Treatment System
TOC	Total Organic Carbon

TSO	*Trabajador Servicio Operacional*
TSS	Total Suspended Solids
TTHM	Total Trihalomethane
U.S.	United States
UCMR5	Fifth Unregulated Contaminant Monitoring Rule
UIA-AAA	*Unión Independiente Auténtica de la Autoridad de Acueductos y Alcantarillados*
USDA RD	U.S. Department of Agriculture Rural Development
USDOJ	U.S. Department of Justice
USEPA	U.S. Environmental Protection Agency
UV	Ultraviolet
VARTOL	Values at Risk at the Time of Loss
WPS	Water Pump Station
WRO	Water Recovery Office
WST	Water Storage Tank
WTP	Water Treatment Plant
WWPS	Wastewater Pump Station
WWTP	Wastewater Treatment Plant

Disclaimer

This Consulting Engineer's Report (CER) considers the six-year financial projections and Capital Improvements Program (CIP) included in the Puerto Rico Aqueduct and Sewer Authority's (PRASA) 2023 Certified Fiscal Plan as certified by the Oversight Board on May 26, 2023 (2023 PRASA Fiscal Plan), PRASA's FY2024 Annual Budget approved by the Oversight Board on June 30, 2023.

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Arcadis relied on assumptions, forecasts, data, and statistics provided by PRASA, its other consultants, and published industry references. Arcadis reviewed the PRASA-prepared forecast over a future six-year period of time and "forward-looking statements." These statements relate to Arcadis's expectations, beliefs, intentions, or strategies regarding the future. These statements may be identified by the use of words like "anticipate", "believe", "estimate", "expect", "intend", "may", "plan", "project", "will", "should", "seek", and similar expressions. The forward-looking statements reflect Arcadis's views and assumptions with respect to future events as of the date of this document and are subject to future economic conditions and other risks and uncertainties. Actual and future results and trends could differ materially from those set forth in such statements due to various factors, including, without limitation, those that will be discussed in this FY2020 CER. These factors are beyond Arcadis's ability to control or predict. Accordingly, Arcadis makes no warranty or representation that any of the projected values or results contained in this document will actually be achieved.

Unless otherwise stated, this FY2023 CER summarizes the work completed through September 1st, 2023 to align with the annual Budget Review Report. Changed conditions occurring or becoming known after such date could affect the material presented, and the conclusions reached herein to the extent of such changes. Arcadis has no responsibility for updating this report for changes that occur after the date of the report.

This document is qualified in its entirety by, and should be considered in light of, these limitations, conditions, and considerations.

Executive Summary

E.1. Introduction

The Puerto Rico Aqueduct and Sewer Authority (PRASA) is a public utility that owns and operates water and wastewater infrastructure in Puerto Rico. PRASA serves approximately 3.2M residents[1] and millions of visitors annually. PRASA owns many assets, including land, buildings, dams, wells, water and wastewater treatment facilities and pump stations, ocean outfalls, buried infrastructure, vehicles, equipment, and water meters.

Arcadis Caribe, PSC (Arcadis), has been retained by PRASA as their Consulting Engineer for the preparation of the Consulting Engineer's Report (CER) to satisfy the reporting requirements specified in Section 7.07 of the Master Agreement of Trust (MAT), as amended, by and between PRASA and Banco Popular de Puerto Rico as Trustee, and the requirements between PRASA and the Government of Puerto Rico.

As required by Section 7.07 of the MAT, unless the Senior Bonds have been rated investment grade by at least two Rating Agencies for 24 consecutive months, the Consulting Engineer shall prepare a CER to document the current condition and changes, if any, in PRASA's operation and the performance of the system. Arcadis prepared this CER for FY2023 (2023 CER or the "Report") in compliance with the MAT. PRASA's fiscal year begins on July 1st and ends on June 30th. Therefore, FY2023 is the fiscal year from July 1, 2022, through June 30, 2023.

E.2. PRASA's Fiscal Situation

Over the past several years, the Government of Puerto Rico has faced significant economic and demographic challenges that have adversely impacted PRASA. In addition to the economic downturn that has been experienced in Puerto Rico, like many other municipal water and wastewater utilities around the world, PRASA continues to face several major challenges, including service affordability, aging infrastructure, high volume of non-revenue water (NRW), regulatory mandates, system vulnerabilities to climate change and natural disasters, declining population and water consumption, workforce challenges, and increasing capital and renewal and replacement (R&R) needs. In addition, Puerto Rico has suffered economic, infrastructural, and operational impacts because of Hurricanes Irma and María in 2017, a series of earthquakes in 2020, the Coronavirus Disease 2019 (COVID-19) pandemic, and Hurricane Fiona in 2022.

In May 2016, the United States (U.S.) Congress enacted the Puerto Rico Oversight, Management, and Economic Stability Act, PROMESA. PROMESA created the Fiscal, Oversight, and Management Board (FOMB) for Puerto Rico to provide financial and other oversight of the Government and its agencies, including PRASA. The FOMB oversees the development of budgets and fiscal plans for Puerto Rico's Central Government, including PRASA. Also, it may issue subpoenas, certify voluntary agreements between creditors and debtors, seek judicial enforcement of its authority, impose penalties, and enforce territorial laws prohibiting public sector employees from participating in strikes or lockouts.

Under the PROMESA's requirement for the submission of a Fiscal Plan, on May 26, 2023, the FOMB certified PRASA's Fiscal Plan, according to Section 201(d)(2) of PROMESA (2023 PRASA Fiscal Plan). The 2023 PRASA Fiscal Plan promotes PRASA's mission of providing high-quality drinking water and sanitary sewer service at the lowest possible cost. Provided that the Certified Fiscal Plan is successfully executed and the financial and

[1] Source: U.S. Census Bureau as of July 1, 2022.

operational sustainability objectives are achieved, PRASA will be able to maintain access to credit markets at reasonable rates and, as needed, to meet borrowing requirements, enabling it to continue to provide the essential services to its customers.

The 2023 PRASA Fiscal Plan provides for its Capital Improvement Program (CIP) to cover six years from FY2023 to FY2028 (the six-year CIP) as well as PRASA's six-year forecast covering preliminary results for FY2023 and projections for FY2024 through FY2028 (the Forecast).

PRASA has implemented various initiatives and has secured funding from various sources to improve its fiscal situation, which includes:

1. Federal Debt Modification: In July 2019, PRASA modified its debt obligations under the Drinking Water and Clean Water State Revolving Funds (DWSRF and CWSRF) programs and the United States Department of Agriculture Rural Development (USDA RD) loans. The benefits of this federal debt modification are:
    a. Reduction of interest rates and extension of the amortization period resulting in a debt service relief of approximately $370 million between FY2021 and FY2031 and $253M between FY2018 and FY2023.
    b. Terminating existing Commonwealth guarantees over the Federal Debt, reducing overall Government contingent liabilities by approximately $1 billion.
    c. Access to new loans from the SRF and USDA RD Programs, including $26M granted under the SRF program.
2. 2020 and 2021/2022 Refunding: The issuance of the 2020 Senior Bonds resulted in a reduction in average annual senior debt service of $13M and total debt service savings to final maturity of approximately $348.2M. In August 2021, PRASA issued its 2021 Senior Bonds in a total principal amount of $1,089.8M, and in June 2022, completed the issuance of its 2022 Senior Bonds in a total principal amount of $565.2M to refinance the aggregate of all the 2012 Series A and B senior revenue bonds. The issuance of the 2021/2022 Senior Bonds resulted in a reduction of the average annual senior debt service of $22M and total debt service savings to final maturity of approximately $569.7M.
3. Rate Adjustments: On June 30, 2022, PRASA implemented a new rate structure and charges, simplifying its rate to only two charges – a base charge and a consumption charge. The rate increase in FY2023 included an increase of 4.95% to the base charge revenues and 2.00% to the consumption charge revenues. The updated rates also incorporate an annual increase for subsequent years of at least 2.00% but not more than 5.00% annually, up to a limit of 30.00% cumulative.
4. Energy Management: PRASA plans to access federal or other funding sources to implement additional projects that could provide renewable energy and realize cost savings. In FY2024, PRASA will define priorities and determine the roadmap for implementing additional efficiency and renewable/alternate energy projects for the system in the Master Plan. In the meantime, PRASA recently started designing a microgrid energy system at the Superaqueduct raw water pumping station.
5. Federal Funds for Disaster Recovery and Resilience: In addition to the historical type of funding available (e.g., SRF and USDA RD), PRASA secured federal funding for efforts related to the 2017 Hurricanes (Hurricanes Irma and María), the 2020 Earthquakes, the COVID-19 pandemic, and Hurricane Fiona in 2022. PRASA also secured funds from other available sources for water and wastewater infrastructure, including the Federal Emergency Management Agency (FEMA) Public Assistance Program, the Department of Housing and Urban Development (HUD) Community Development Block Grant-Disaster Recovery (CDBG-DR) Program, Consolidated Appropriations Act (2021), the American Rescue Plan Act (ARPA) and the Infrastructure

Investment and Jobs Act. Table ES-1 includes a summary of the identified, obligated, and received funds as of April 2023.

Table ES - 1 Federal Funding Summary (As of April 2023, $ in M[2]

Fund Name	Program	Funding Source	Identified Amount	Obligated/Approved	Received
Reconstruction & Recovery	Emergency Work (Category A&B)	FEMA (PA)	$212.1	$212.1	$196.27
	Permanent Work (FAASt, Section 428)	FEMA (PA)	$3,662.0	$3,662.0	$29.7
	Disaster Related Hazard Mitigation	FEMA (406)	$801.2	$9.2	-
	Non-Disaster Related Hazard Mitigation (HMGP)	FEMA (404)	$438.5	$423.0	-
	CDBG – MIT	HUD	$346.2	$45.5	-
	CDBG-DR (Non-Federal Match Program)	HUD	$406.9	$200.0	$4.2
	Direct Administrative Costs (DAC)	FEMA (PA)	$203.5	-	-
	Working Capital Advance (Perm Work)	FEMA (PA)	-	-	$204.8
	Hurricane Recovery Funds		**$6,071.4**	**$4,552.9**	**$434.9**
COVID-19 Relief Funds	Cares Act	OMB	$2.1	$2.1	$2.1
	Revenue Loss	ARPA	TBD	-	-
	Infrastructure Projects (Naranjito, Santa Rita, El Yunque (Las Picuas) WWTP Elimintation[3], etc.)	ARPA	$66.0	$66.0	$65.0
	Caño Martín Peña	ARPA	$130.0	$130.0	-
	Premium Pay	ARPA	$12.3	$12.3	$12.3
	LIHWAP	ARPA/CAA	$4.5	$4.5	$4.5
	ERAP – Emergency Rental Assistance	HUD	TBD	$16.1	$16.1
	Mortgage Assistance Program	HFA	TBD	$2.8	$2.8
	Total Coronavirus Relief Funds		**$214.9**	**$233.8**	**$102.8**
Infrastructure Funds	CWSRF	USEPA	$237.9	$237.9	$58.2
	DWSRF	USEPA	$127.8	$65.9	$24.5
	RD – Hurricanes Harvey, Irma, and María Grant	RD	$22.0	-	-
	CDBG-DR Electrical Power Systems	HUD	$63.3	-	-
	Total Funds for Infrastructure Projects		**$326.3**	**$241.1**	**$58.9**
		Total	**$6,335.5**	**$4,556.2**	**$302.4**

[2] Source: 2023 PRASA Fiscal Plan.

[3] It is assumed that the elimination of the El Yunque (Las Picuas) WWTP is included in the identified amount of $66M.

E.3. Organization and Management

PRASA is organized into five operational Regions (North, South, East, West, and Metro) and is managed by an Executive Management Team (EMT) that provides the day-to-day management oversight and coordination for all institutional activities and is governed by a multi-disciplinary Board. The organization includes various departments including, but not limited to, finance, human resources, customer services, legal, and information systems. Figure ES-1 shows PRASA's current organization.

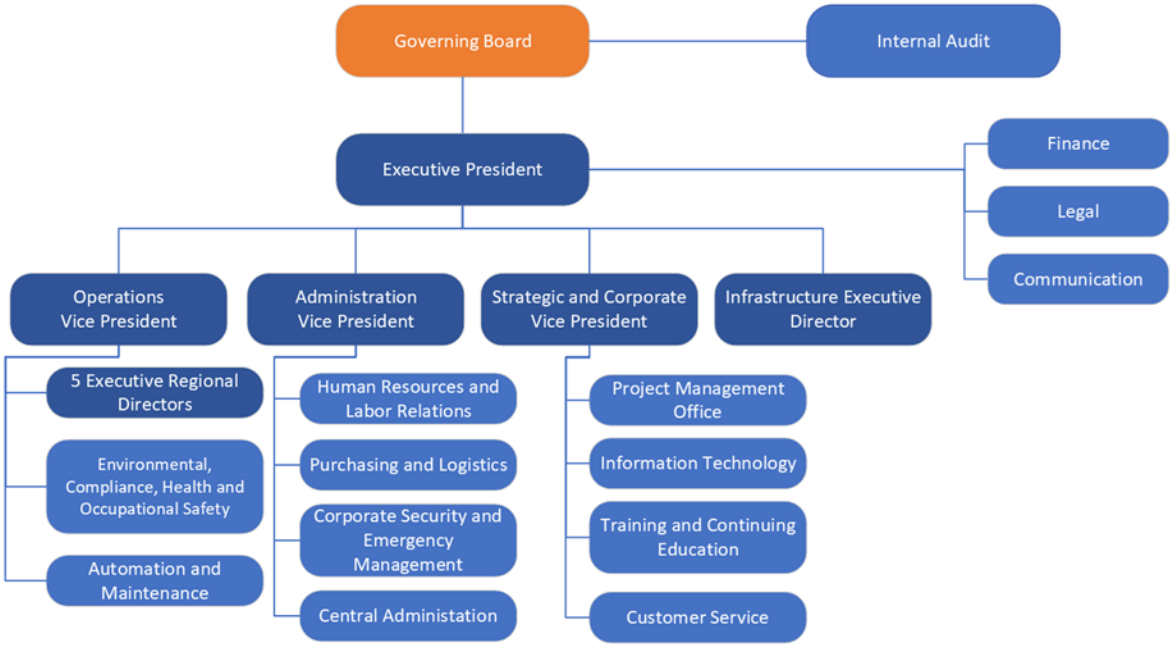


Figure ES - 1 PRASA's current Legislated and Executive Management Structure

Key PRASA leadership includes its Executive President, Executive Director of Finance, Strategic and Corporate Planning Vice-President, Operations Vice-President, Administration Vice-President, Executive Director of Infrastructure, and the five Regional Executive Directors and Department Directors. PRASA's key EMT staff and current roles during FY2023 are Eng. Doriel Pagán (Executive President), Eng. Damaris Santini (Operations Vice-President), Eng. Arnaldo Jiménez (Strategic and Corporate Planning Vice-President), Mariana S. Pérez, Esq. (Administration Vice-President), Omar Rivera (Executive Director of Finance), Eng. Joel Lugo (Interim Executive Director for Infrastructure), Eng. Roberto Martínez (Executive Director Metro Region), Eng. José Rivera (Interim Executive Director North Region), Eng. Bruce León (Interim Executive Director South Region), Eng. Enrique Rosario (Interim Executive Director East Region) and Eng. Erick Rosa (Interim Executive Director West Region).

At the end of FY2023, PRASA had a total headcount of 4,551 employees, including 216 employees under the Voluntary Pre-Retirement Program. Staff decreased by 1.2% from FY2022 to FY2023, including a reduction of four HIEPAAA employees and 17 management employees. In January 2022, PRASA completed a labor capacity and productivity assessment to determine optimal staffing levels. The study identified a need for 5,030 employees for PRASA's optimal performance for FY2023. PRASA continues to struggle to fill key staffing needs in the Operations Department (i.e., operators for treatment facilities, system maintenance, electromechanical personnel, and meter readers).

E.4. Condition of System Assets

Arcadis performed asset condition assessments of a selection of WTP and WWTP facilities corresponding to FY2023 and a sample of ancillary facilities. The facilities were inspected to assess the structural integrity and physical condition of the structures, equipment's adequacy of operation and maintenance practices, and renewal and repair needs. Arcadis also evaluated the compliance performance results for the WTPs and WWTPs from January 1, 2022, through December 31, 2022. Dams were not included in this round of inspections since they were inspected in February 2022 and included in the previous report (FY2022). The WTPs, WWTPs, and ancillary facilities were inspected between January 2023 and April 2023. Additional information can be found in the FY2023 Asset Condition Assessment (ACA) Report. The facilities were rated as Good, Adequate, Poor, or Unacceptable.

In total, 180 facility inspections were performed out of the 3,942 facilities comprising the system, excluding 136 active RWIs and 75 RWPSs. Inspected facilities include 57 WTPs, 23 WWTPs, 20 Wells, 30 WPSs, 30 WSTs, and 20 WWPSs. Table ES-2 includes the summary of the facilities inspected by category.

Table ES - 2 Assets Inspected by Category

Asset Category	Total PRASA Facilities[1]	Inspections Performed	
		Quantity	Percent
Regulated Dams	8	-	0
Water Treatment Plants	112	57	51
Wastewater Treatment Plants	50[4]	23	46
Wells	238	20	8
Water Pump Stations	1,136	30	3
Water Storage Tanks	1,568	30	2
Wastewater Pump Stations	830	20	2
Total	**3,942**	**180**	**5**

[1] Data obtained from PRASA Geographical Information System (GIS) updated in March 2023. The total excludes 136 active RWIs and 75 RWPSs.

One of the inspected WTPs, El Yunque WTP, was rated as Poor, four (La Boca WTP, Matrullas WTP, Tibes WTP, and Rucio WTP) were rated as Good, and the rest were rated Adequate with an overall rating score of 2.2. However, even though 91% of the WTPs were classified as Adequate, three of the 52 WTPs, Guayabota WTP, Sergio Cuevas WTP, and Ponce Nueva WTP, received a low-end rating that could deteriorate to a Poor rating if not attended.

A total of 23 WWTPs (45% of total WWTPs) currently in operation were inspected as part of this asset evaluation. Overall, the facilities inspected were rated as borderline Adequate, with a score of 1.5; 10 (43%) WWTPs were rated as Poor, and 13 (57%) WWTPs were rated as Adequate in the overall rating. However, nine of the 13 WWTPs rated as Adequate in the overall rating are on the lower end, close to being rated as Poor. The WWTPs with the lowest overall score (below 2) include Camuy-Hatillo (North Region), Dorado (North Region), Ciales (North Region), Barceloneta (North Region), Yauco (South Region), Caguas (East Region), Vega Alta (North Region), Utuado (North Region), Yabucoa (East Region), Isabela (West Region), Arecibo (North Region), San Sebastián (New)

[4] Río Grande Estates WWTP was eliminated with the CIP 3-61-5020.

(West Region), San Germán (West Region), Corozal (North Region), San Sebastián (Old) (West Region), Aguas Buenas (East Region), Fajardo (East Region), and Aibonito (East Region).

A total of 20 wells (equivalent to 8% of total wells) from the Operational Areas of Caguas, Fajardo, Guaynabo, Arecibo, Toa Alta, Ponce, Yauco, Aguadilla, and Mayagüez were inspected in FY2023. Out of the 20 wells inspected, three received a rating of Poor, seven were rated Good, and the remainder were rated Adequate under the overall rating criteria.

A total of 30 above-ground WPSs (3% of total WPSs) were inspected. Four (13% of inspected WPSs) facilities were rated as Poor under this category, which includes Gabiña and Gino Pitaya, both from Fajardo Operational Area; Dos Millones, from Arecibo Operational Area; and Plata I, from Aguadilla Operational Area.

A total of 30 WSTs were inspected in FY2023. Emphasizing the facility-specific criterion, the WSTs rating distribution for this evaluation is as follows: two (7% of inspected WSTs) WSTs were rated as Poor, 11 (37% of inspected WSTs) were rated as Adequate, and 17 (57% of inspected WSTs) were rated as Good.

A total of 20 WWPSs were inspected in FY2023. Out of the 20 WWPSs inspected, 10 (50%) received an Adequate overall rating, four (20%) received an overall rating of Poor, and none were rated as Good and Unacceptable. The areas of opportunity in each facility that obtained a low score to improve its condition include replacing old equipment with new equipment or modifying the process control strategies.

In FY2023, of the total 513 MGD produced, approximately 328 MGD was Non-Revenue Water (NRW), a decrease in NRW over FY2022 results (339 MGD). Of this amount of NRW, 310 MGD was due to water losses (both apparent and real), and 18.28 MGD was due to unbilled authorized consumption. Of the total water losses in FY2023, approximately 52.19 MGD was due to apparent (commercial) losses, while approximately 264.37 MGD was due to real (physical) losses. According to the FY2023 PRASA Fiscal Plan, PRASA's goal is to reduce water losses by 64.1 MGD by FY2028 by successfully implementing the Water Recovery Office (WRO) three main programs:

- Master Meters: This initiative includes the installation of water meters at critical facilities to measure water production accurately.
- Pressure Management: This initiative includes installing best practices across the transmission and distribution network.
- Leaks Detection and Reduction: This initiative will aid PRASA with identifying, prioritizing, and resolving major leaks detected in the system.

PRASA recognizes that reducing its NRW and water loss volume and, in turn, its water production will positively impact its operations and financial results (lower O&M expenses and higher revenues, for example) and its sustainability practices. Therefore, reducing NRW is one of the top priorities and is one of the main objectives of the 2023 PRASA Fiscal Plan.

Because of the system's size, complexity, and current condition, it is reasonable to state that it will continue to require significant capital investments and continuous maintenance and repairs. Also, it is likely that as the system ages and new compliance regulations are implemented, an additional O&M budget may be necessary to address maintenance, repairs, and compliance requirements.

E.5. O&M Practices and Strategic Plan

Arcadis assessed the adequacy of PRASA's O&M practices based on compliance with regulatory requirements, interviews with PRASA personnel, and facility observations by field inspectors obtained through the FY2023 asset condition assessment effort previously described. Several WTP and WWTP facilities reported exceedances in

compliance treatment parameters during the evaluation period due to the lack of appropriate tools for executing the O&M practices and the outdated versions of O&M manuals and equipment manuals. There are also deficiencies in other areas, such as no potable water flow meter, no calibration plan for the chemical feed pump, lack of control rooms, operators not performing jar tests consistently, inadequate pipe labeling, poor lighting, no working emergency generator unit, issues with the automatic transfer switches, and deficient housekeeping. Despite having some operations and process control issues, the WTPs deliver potable water adequately. Various WWTPs face challenges due to process control or equipment issues.

PRASA should consider operational procedure improvements like standardization of processes and providing more tools and training to operators on process controls and actions to facilitate and improve plant operations and performance and optimize O&M expenses. Also, including new process control equipment and system automation would benefit PRASA, given that operators continue to depend on manual operation for several processes. There is also room for improvement concerning prioritization, scheduling, and execution of corrective and preventive maintenance activities for optimizing and strengthening the system.

PRASA's FY2023 O&M expenses preliminary projection for the water and wastewater system (combined) is approximately $820M, of which $753M are directly related to the O&M of the System. The remainder of $67M is related to commercial activities and provision of customer services, including but not limited to staffing and operation of customer service offices island-wide; meter reading; connection and disconnection services; invoice preparation, printing, and distribution; and customer service call centers, among others. PRASA estimates that during FY2023, approximately 73% of its System's O&M budget ($549M) was allocated to the water system and the remaining 27% ($173M) to the wastewater system.

In FY2023, chemical-related expenses were one of the largest operating expenditures at nearly $70M. PRASA's efforts to reduce overall chemical costs include non-capital initiatives such as procurement strategies and better handling of chemical usage. However, rising costs associated with chemical production and the compliance requirements for water quality have offset efforts to generate savings.

Below is a brief description and status of additional programs and initiatives that PRASA continued to work on in FY2023 and will continue to be implemented in future fiscal years.

1. Integrated Maintenance Program and Asset Management: The 2015 Consent Decree with USEPA and the 2006 PRDOH Agreement required that PRASA continues to develop a comprehensive Integrated Maintenance Program (IMP) to include both corrective and planned (i.e., preventive, predictive, and proactive) maintenance activities to ensure the proper O&M of its treatment plants and other critical facilities. In addition, PRASA has initiated efforts to prepare a Gap Analysis for asset management. In August 2023, the assessment for implementing the Asset Management Program in PRASA was started. The project is in the initial phase and evaluation process.
2. NRW Reduction Program: Refer to the section above.
3. Electricity Management Program: PRASA's energy cost is the second largest expense and depends on the fluctuations in electricity rates established by the Puerto Rico Energy Bureau (PREB) based on oil prices. Therefore, PRASA continues to implement initiatives to reduce energy consumption.
4. Master Plan Update: PRASA develops its Water and Wastewater Master Plan (Master Plan) every ten years to align with the United States Census population information. The latest Master Plan was completed in 2010 and then updated in 2014 for population projection adjustments. During FY2023, PRASA continued coordinating with a consultant to finalize the next Master Plan update to create the roadmap for the next years for a safer, resilient, efficient, and financially viable System.

E.6. Capital Improvement Program and Regulatory Compliance

PRASA has developed a multi-year CIP to improve and maintain its system. The CIP's main objectives are to maintain (renew and replace), modernize (new technology), and simplify the system to achieve operational efficiency, protect public health, safeguard environmental quality, enable continued economic development, and meet all regulatory requirements. In addition, PRASA has included the restoration of damaged infrastructure to its condition before the 2017 Hurricanes, Hurricane Fiona and the 2020 earthquakes as part of the CIP objectives.

As of March 31, 2023, PRASA had 224 active projects in the CIP at different stages for a total investment of $4,414M, as shown in Table ES-3.

Table ES - 3 Active CIP Projects by Stage

Stage	No. of Projects	Estimated Investment ($, million)	Percentage (%)
Pre-Planning	5	$921	20
Planning	61	$1,196	27
Design	37	$845	21
Bidding	38	$757	28
Construction	57	$632	13
Completed	26	$63	1
Total	**224**	**$4,414**	**100**

As of March 2023, the major projects under construction include the dredging of Lake Carraízo, the Guayama WWTP rehabilitation, the Los Angeles trunk sewer lining project, the Caguas Laboratory, the Dorado, Arroyo/Guayama, Ponce, Río Grande Estates and Salinas/Guayama trunk sewers rehabilitation, the rehabilitation of the trunk sewer from Road 684 to the Barceloneta WWTP, improvements to the Arroyo WWPS, the Coabey sewer system, the Coto Laurel WTP and the Ponce WTP. In addition, the main projects under design or bidding phases include water meter replacement, Enrique Ortega WTP rehabilitation, the Isabela Aguada trunk sewer, the rehabilitation of the Camuy, Caguas, Hormigueros/Mayagüez, and Patillas/Guayama trunk sewers, the Buena Vista Community drainage, sewer and water system improvements, the Carolina and Mayagüez WWTPs improvements, El Yunque WTP improvements, the elimination of the Maunabo WWTP and the Maunabo/Patillas trunk sewer, the new Salinas WTP, improvements to the Vieques WWTP, rehabilitation of the Hatillo/Camuy WTP and improvements to the Santa Rosa water intake.

Compared to the 2022 PRASA Fiscal Plan six-year CIP ($3,454.9M), the 2023 PRASA Fiscal Plan CIP was increased by a total expenditure of $3,090.4M, an 89.5% increase. The difference is mainly attributed to the increase in Recovery and Reconstruction projects. Other categories increased as well. However, the FY2023 PRASA Fiscal Plan CIP did have some reductions in projects and expenditures for the Quality and Fleet and IT categories with annual average expenditures of $15M (1.4% of the total CIP and $10.1M (0.9% of the total CIP), respectively. Table ES-4 shows the CIP money distribution for FY2023 through FY2028.

Table ES - 4 CIP FY2023-FY2028 by Category ($, Millions)

Project Category	Fiscal Year Ending June 30						2023-2028
	2023	2024	2025	2026	2027	2028	
Reconstruction & Recovery	$117.0	$526.8	$925.0	$1,106.1	$828.1	$545.2	$4,048.3
Mandatory Compliance	$34.4	$119.5	$165.2	$101.9	$84.3	$54.1	**$559.5**
Mitigation & Resiliency	$0.8	$7.1	$41.9	$171.2	$127.8	$128.1	**$476.8**
Renewal & Replacement	$49.4	$67.4	$44.1	$45.0	$65.0	$75.0	**$345.9**
Non-Mandatory Compliance	$34.4	$62.8	$40.9	$9.1	$5.7	$7.6	**$160.6**
Quality	$12.8	$30.7	$35.0	$10.2	$0.5	$0.7	**$89.8**
Safe & Growth	$7.3	$30.8	$39.9	$13.7	$0.3	$1.5	**$93.5**
Fleet & IT	$16.0	$13.8	$12.8	$5.0	$5.0	$8.0	**$60.5**
Generators and Meters	$16.1	$42.5	$115.4	$84.0	$82.3	$85.2	**$425.5**
Others	$21.1	$54.5	$82.1	$66.0	$46.3	$14.9	**$284.9**
Total	**$309.2**	**$955.9**	**$1,502.4**	**$1,612.3**	**$1,245.3**	**$920.3**	**$6,545.3**

One of the main six-year CIP objectives is regulatory compliance with the existing USEPA Consent Decree and the 2006 PRDOH Settlement Agreement. The Consent Decree with USEPA and the Settlement Agreement with PRDOH require PRASA to implement remedial plans, develop and implement CIP projects to bring PRASA's Systems into compliance with regulatory requirements, and conduct evaluations concerning specific system infrastructure and operational issues. PRASA, USEPA, and the United States Department of Justice (USDOJ) completed negotiations and modifications to the Consent Decree, and notice of lodging was presented in court at the beginning of FY2024 to address the force majeure events. In addition, as part of the 2006 Drinking Water Settlement Agreement between PRASA and the PRDOH, PRASA submits a Quarterly Settlement Agreement Report (QSAR) every quarter, including Remedial and Preventive Measures and action plans to prevent future violations.

While PRASA has begun to identify the potential impact of new regulations, the full impact of future regulations and other regulatory requirements on PRASA's System is unknown. CIP modifications may be required to accommodate the resulting needs adequately. As a result, the CIP needs will need to be reprioritized, and implementation schedules will depend on PRASA's financial capacity.

PRASA is vigilant of potential future regulations, such as the Lead and Copper Compliance Rule and the Per-and Polyfluoroalkyl Substances (PFAS) groups, that may impact the System and compliance requirements. Also, PRASA has experienced additional compliance challenges regarding NPDES permit limit requirements for WWTPs and STS discharges at the WTPs. Over the past years, the NPDES permit limits became more stringent for certain parameters such as total nitrogen, total phosphorous, and residual chlorine, among others. PRASA is currently performing investigations and analysis to explore feasible alternatives while continuing communication with regulatory agencies to achieve compliance in the future.

However, as the impact of future regulations becomes clearer and NPDES permit limits become more stringent, modifications to the CIP may be necessary to address the resulting needs adequately. Consequently, the reprioritization of CIP requirements and implementation schedules will depend on PRASA's financial capacity.

E.7. Insurance Program

The evaluation has been based solely on PRASA's copies of policies for the 2023-2024 period provided by PRASA for this purpose. Several key recommendations for PRASA's insurance program are provided below.

1. The insurable values stated in the policy program are the same as in 2013 based on the cost appraisal performed by Malcolm Pirnie in 2006. Therefore, factors like PRASA's CIP, inflation, acquisitions, etc., have not been considered for at least 16 years. It is strongly recommended that PRASA undertake a new valorization of its assets. Arcadis has been retained during 2023 to perform an asset valorization update expected to be completed on or before March 2024.
2. The current PML estimates for PRASA for quantifying catastrophic risk exposures were performed in 2010 by AIR Worldwide Corporation based on a valorization study from 2006. Since then, modules, maps, and projections have changed, and new modules might prove economically beneficial to PRASA. This study will provide PRASA and its stakeholders with a scientific report representing the maximum foreseeable loss from catastrophic events, considering various scenarios in terms of intensity and return periods, corroborating if the current limits of insurance carried are adequate or if adjustments shall be made. This analysis may assist PRASA in complying with FEMA's insurance requirements. It is strongly recommended that PRASA undertake a new PML study, which should be performed after a new valorization of PRASA's assets is conducted since any changes in the values of all insurable assets will affect the outcome of this study.
3. It is recommended that a loss control assessment plan be set in place to reduce the possibility of a loss and reduce the severity of those that do occur. Periodic inspection of WTPs and WWTPs, focusing on safe working conditions and proper maintenance, will be an integral part of the Loss Control Assessment Plan.

E.8. System Assets and Financial Analysis

Arcadis evaluated PRASA's financial forecast as included in the 2023 PRASA Fiscal Plan and as certified by the Oversight Board on May 26, 2023, and evaluated the appropriateness of rates and charges. Arcadis also reviewed the FY2024 Annual Budget, certified and approved on June 30, 2023, by the FOMB. This section summarizes Arcadis's review and provides an assessment of PRASA's financial condition as it relates to PRASA's financial preliminary results for FY2023 and the reasonableness of PRASA's assumptions in the preparation of the five-year financial projections from FY2024-FY2028 (the forecast period). The sufficiency of the revenues necessary to support the projected operations and capital costs.

PRASA included the simplified rate structure in the 2023 PRASA Fiscal Plan projections. The projected accumulated benefit of the rate increases is $327M through FY2028 and will help meet its objectives of providing clean and reliable water and wastewater services.

Operating Revenues and Expenses

PRASA's annual Operating Revenue projections for FY2023 through FY2028, including the 2023 PRASA Fiscal Plan revenue-enhancing initiatives, presented on a cash basis per the MAT, are summarized in Table ES-5.

Table ES - 5 PRASA Operating Revenues ($, Millions)

Fiscal Year	Operating Revenues
FY2023 Projection, based on Preliminary Results	$1,083.5
FY2024 Annual Budget[1]	$1,127.3
FY2025 Projected	$1,174.6
FY2026 Projected	$1,199.5
FY2027 Projected	$1,225.8
FY2028 Projected	$1,255.3

[1] As certified by the FOMB on June 30, 2023.

PRASA is not projecting any additional sources of revenue. Therefore, PRASA's Authority Revenues shall equal Operating Revenues for the forecast period from FY2023 through FY2028.

PRASA's Operating (Current) Expenses are presented on an accrual basis as required by the MAT. PRASA's preliminary Operational Expenses for FY2023 and operating expense projections for FY2024 to FY2028 net of (i) capitalized expenses, (ii) the 2023 PRASA Fiscal Plan expense reduction initiatives, and (iii) the 2017/2022 Hurricanes impact recoveries are presented in Table ES-6.

In its FY2023 projections, PRASA includes a net deposit of $15M from FEMA funds to the credit of the Current Expense Fund for the reimbursement of PRASA's operating expenses concerning the impacts of Hurricanes Irma and María. In FY2024, PRASA has budgeted a net deposit of $17M for the impacts of 2020 earthquakes and Hurricane Fiona in 2022. No additional deposits are included in the periods from FY2025 through FY2028.

Table ES - 6 PRASA Operating Expenses ($, Millions)

Fiscal Year	Operating Expenses Without FEMA Reimbursements	Operating Expenses net of FEMA Reimbursements
FY2023 Preliminary	$817.3	$802.3
FY2024 Annual Budget	$850.5	$833.5
FY2025 Projected	$886.9	
FY2026 Projected	$878.1	
FY2027 Projected	$876.9	
FY2028 Projected	$882.9	

Debt Service

Estimated debt service amounts include projected payments on the 2008, 2020, 2021, and 2022 Bonds, other existing debt, and payments for maintaining required debt service reserves, as applicable. Other System Indebtedness in parity with Senior bonds includes the SRF and USDA RD Loans, which started in July 2019 after

the federal debt modification. Renegotiated terms of PRASA's SRF and RD debt obligations, reclassified as Senior Level Debt per the Seventh Supplemental Agreement of Trust dated July 26, 2019, are summarized in Table ES-7.

Table ES - 7 Renegotiated Terms for SRF and RD Debt

Debt Category	SRF	RD
Outstanding Debt Balances, including future loans of $26M for SRF and accrued interests for RD	$595,777,017.21	$402,931,464.55
Term	30 years	40 years
Rate	0% until year 10 and 1.0% after that	2.0%
Payment Terms	Biannual principal-only payment of $5M in Years 1-10; biannual principal and interest payments of $13.7M in Years 11-30	Biannual principal and interest payments of $5M in Years 1-10, increasing to $8.5M in Years 11-40
Maturity Date	7/1/2049	7/1/2059
Debt Level	Senior	Senior

A summary of PRASA's debt service obligations and projections for FY2023 and the forecast period are presented in Tables ES-8 and ES-9, respectively. As shown, PRASA did not make payments for CSO debt.

Table ES - 8 FY2023 Debt Service Obligations and Preliminary Results ($, Thousands)

Debt Category	FY2022 Obligations[1]	FY2022 Preliminary Results[2]
Senior Debt	$246,834	$246,834
Senior Subordinated Debt	-	-
Subordinated Debt	-	-
Commonwealth Guaranteed Indebtedness (CGI)	-	-
Commonwealth Supported Obligations (CSO)[2]	-	-
Total	**$246,834**	**$246,834**

[1]Considers the full debt service obligations due in FY2023 per the amortization schedule.

[2] Considers no payment of CSO (PFC Superaqueduct-related debt, payable from Commonwealth appropriations). As provided in the MAT, the obligation to make CSO payments is not cumulative. It, therefore, does not carry forward to future periods, and failure to make the payments or required deposits related to this debt is not an event of default under the MAT. The PFC Bonds were canceled and extinguished under the PFC Qualifying Modification effective January 12, 2023. Therefore, PRASA was discharged from any liability relating to such promissory notes.

Table ES - 9 FY2024-FY2028 Debt Service Obligations ($, Thousands)

Debt Category[1]	FY2024 Projection	FY2025 Projection	FY2026 Projection	FY2027 Projection	FY2028 Projection
Senior Debt	$246,834	$260,105	$268,660	$270,263	$272,940
Senior Subordinated Debt	-	-	-	-	-
Subordinated Debt	-	-	-	-	-
Commonwealth Guaranteed Indebtedness (CGI)	-	-	-	-	-
Commonwealth Supported Obligations (CSO)	-	-	-	-	-
Total Debt	**$248,834**	**$260,105**	**$268,660**	**$270,263**	**$272,940**

[1] Considers no payment of CSO (PFC Superaqueduct-related debt, payable from Commonwealth appropriations). As provided in the MAT, the obligation to make CSO payments is not cumulative. It, therefore, does not carry forward to future periods, and failure to make the payments or required deposits related to this debt is not an event of default under the MAT. The PFC Bonds were canceled and extinguished under the PFC Qualifying Modification effective January 12, 2023. Therefore, PRASA was discharged from any liability relating to such promissory notes.

The Debt Service Coverage (DSC) results presented in Table ES-10 for the forecast period have been calculated using the Rate Covenant requirements per the MAT, as amended, and debt service obligations.

Table ES - 10 FY2023 - FY2028 Debt Service Coverage

Debt Service Level	DSC Requirement	FY2023 Preliminary DSC	FY2024 DSC	FY2025 DSC	FY2026 DSC	FY2027 DSC	FY2028 DSC
Senior Debt[1]	**2.50**	4.39	4.43	4.52	4.46	4.54	4.60
Senior Subordinated Debt[1]	**2.00**	4.39	4.43	4.52	4.46	4.54	4.60
Subordinated Debt[1]	**1.50**	4.39	4.43	4.52	4.46	4.54	4.60
All Obligations[2]	**1.00**	1.00	1.00	1.00	1.00	1.00	1.00

[1] DSC calculated for Operating Revenues.
[2] DSC calculated for Authority Revenues.

Reserves and Other Deposits Requirements

Per the Sixth Supplemental Agreement to the MAT, PRASA is cash funding the reserve and deposited $12.1M in the Operating Reserve Fund during FY2023. For FY2024, PRASA is projecting to deposit $5.8M in the Operating Reserve Fund to comply with the MAT requirement of 90 days of current expenses of such year. In future years, PRASA is projecting to deposit the required funds in the Operating Reserve Fund to align the balance with the increases in Operating Expenses, always seeking to maintain three months of current expenses in deposit.

PRASA deposited $20.5M from Operating Revenues in the Capital Improvement Fund during FY2023 to finance a portion of its projected CIP. This deposit is net from the FEMA/ARPA proceeds and other restricted funds, and the PRASA FY2023 Fiscal Plan New Federal Funds initiative is estimated at $69.2M (excluding the costs related to such funds as they are already included as a part of the debt service) for FY2023.

In its FY2024 Annual Budget, PRASA projects to make a deposit to the Capital Improvement Fund of $32.6M from Operating Revenues, net from FEMA/ARPA proceeds and net from the PRASA FY2023 Fiscal Plan New Federal Funds initiative estimated at $225.8M (excluding the costs related to such funds as they are already included as a part of the debt service).

From FY2025 through FY2028, PRASA projects to make deposits in the Capital Improvement Fund in the amounts of $15.3M, $56.0M, $79.7M, and $98.5M from Operating Revenues, net from the New Federal Funds initiative estimated at $227.3M, $95.4M, $60.6M, and $47.4M, respectively (excluding the costs related to such funds as they are already included as a part of the debt service).

The FY2023 projections include a $20M transfer to the Rate Stabilization Account, while the FY2024 Annual Budget does not include any transfers from or to the Rate Stabilization Account. The 2023 PRASA Fiscal Plan also includes transfers from the Rate Stabilization Account in the amounts of $20M and $8M in FY2025 and FY2026, respectively. Additionally, transfers to the Rate Stabilization Account of $5M and $13M are planned in FY2027 and FY2028, respectively.

E.9. Conclusions

Over the past several years, the Government of Puerto Rico has faced significant economic and demographic challenges that have adversely impacted PRASA. In addition to the economic downturn that has been experienced in Puerto Rico, PRASA is also facing several major challenges, including service affordability, aging infrastructure, high volume of NRW, regulatory mandates, system vulnerabilities to climate change and natural disasters, declining population and water consumption, workforce challenges, and increasing capital and renewal and replacement (R&R) needs. However, PRASA's financial circumstances have improved and indicate a positive outlook due to the implementation of various initiatives, including recent debt refunding resulting in debt service and generating savings in debt service without increasing the maturities of the refunded debt, expected influx of federal funds, gradual increases to rates, and improved collection of past due amounts and government accounts.

In January 2022, PRASA completed a labor capacity and productivity assessment to determine optimal staffing levels. The study identified a need for 5,030 employees for PRASA's optimal performance. Based on the FY2023 total headcount of 4,551 employees, PRASA will ideally need to hire 479 additional employees. PRASA continues to face challenges in filling critical operational staff needs in its Operations Department (i.e., operators for treatment facilities, system maintenance, electromechanical personnel, and meter readers), resulting in overtime hours, delayed repairs, or understaffed/deficient services.

Arcadis performed asset condition assessments of a selection of WTP and WWTP facilities corresponding to FY2023 and a sample of ancillary facilities. Arcadis visited 180 facilities throughout PRASA's five Operational Regions between January and April of 2023 to conduct a condition assessment of PRASA's facilities. Of the inspected facilities, 80 (44%) were treatment (WTP and WWTP) facilities. The assessment included a visual inspection of the physical condition of the equipment and the facilities, process controls, and an evaluation of the regulatory compliance performance, O&M practices, staffing, and training.

Overall, the WTPs inspected are mostly in Adequate condition. To the extent that the physical structures and operational and process controls are maintained or improved, they are expected to continue to serve their intended purpose of providing potable water supply in compliance with applicable regulations. The WWTPs generally range from Poor to Adequate conditions in the overall rating. Out of the 23 facilities inspected, 10 (43%) received a Poor overall rating, and 13 (57%) received an Adequate rating. Regarding ancillary facilities, the facility criteria rating of wells, WPS, and WST increased significantly but remained at the Adequate. PRASA has included in its CIP program several projects to address WPSs, WSTs, and WWPSs, and it is expected to see improvements in the following years.

Several WTP and WWTP facilities reported exceedances in compliance treatment parameters during the evaluation period due to a lack of appropriate tools for executing the O&M practices and outdated versions of O&M manuals and equipment manuals. There are also deficiencies in other areas, such as no potable water flow meter, no calibration plan for the chemical feed pump, lack of control rooms, operators not performing jar tests consistently, inadequate pipe labeling, poor lighting, no working emergency generator unit, issues with the automatic transfer switches, and deficient housekeeping. Despite having some operations and process control issues, the WTPs deliver potable water adequately. Various WWTPs face challenges due to process control or equipment issues. PRASA has a long road ahead to address challenges that have hindered and continue to affect O&M performance but hopes that important operational initiatives, including reducing NRW, improving meter and billing accuracy with the procurement of advanced metering solutions, and the influx of federal funds for the CIP implementation will allow for the much-needed improvements to the system.

PRASA has engaged the services of four PMCs to support its Infrastructure Department in the planning, design, permitting, procurement, construction, and management of the CIP projects in each of the five Regions. As of March 31, 2023, PRASA had 224 active projects in the CIP at different stages for a total investment of $4,414M.

PRASA’s insurance program, including risk management, policies, and the OCIP, was reviewed to determine if it is appropriate for the system. Several key recommendations for PRASA’s insurance program were made and are recommended to be implemented promptly.

PRASA’s forecast reflects the financial projections included in the 2023 PRASA Fiscal Plan certified by the Oversight Board on May 26, 2023. With PRASA’s projected additional revenues, cost savings, new federal funds, and proposed rate increases, the forecast reflects a total surplus of $8.3M.

Operating Revenues are projected to be sufficient to meet Senior Lien debt service payments and meet Rate Covenant DSC requirements for Senior Lien Debt. Authority Revenues are projected to be sufficient every year of the forecast period to meet All Obligations per the MAT. Therefore, PRASA is projecting to meet its Rate Covenant requirement of 1.0x coverage of its current obligations throughout the forecast period. In meeting these requirements, PRASA must consider its rates’ overall sustainability and affordability, given the overall economic situation affecting Puerto Rico and recent trends affecting customer consumption profiles.

1 Introduction

1.1 Introduction

The Puerto Rico Aqueduct and Sewer Authority (PRASA) is a public utility that owns and operates water and wastewater infrastructure in Puerto Rico. PRASA serves approximately 3.2M residents[5] and millions of visitors annually. PRASA is the only utility in Puerto Rico providing water to approximately 96% and wastewater services to approximately 59% of Puerto Rico's population. The remaining four percent of residents acquire water from private wells, and 41% treat the wastewater using septic tanks or other private disposal systems. The effective operation of this vital public service is essential to the health and economic prosperity of Puerto Rico and its residents.

PRASA provides water and wastewater services throughout the island for approximately 3,535 square miles. Because Puerto Rico is an island with varied topography, isolated demographic distributions, and a diverse mix of users, PRASA has a somewhat fragmented and localized system of water sources, treatment systems, and distribution/collection systems. As a result, PRASA has more treatment facilities than most utilities that serve a similar number of customers, and greater diversity in assets in terms of size, treatment technologies, and age when compared to systems in the United States (U.S.) and Canada, which tend to have more centralized systems with larger regional facilities. The size and diversity of assets add complexity to the management of the water and wastewater systems (collectively, the "System") and contribute to higher operation and maintenance (O&M) costs compared to other utilities serving similar populations.

Based on the water and wastewater infrastructure geodatabase data provided by PRASA in March 2023, PRASA owns and operates:

- Eight dams
- 112 Water Treatment plants (WTPs)
- 136 active Raw Water Intakes (RWIs)
- 50 Wastewater Treatment Plants (WWTPs)
- 238 water supply wells
- 1,136 Water Pump Stations (WPSs), of which 75 are Raw Water Pump Stations (RWPSs)
- 1,568 Water Storage Tanks (WSTs)
- 830 Wastewater Pump Stations (WWPSs)
- More than 21,060 miles of water and wastewater pipelines island-wide.

1.2 Consulting Engineer's Report Purpose and Requirement

PRASA has retained Arcadis Caribe, PSC (Arcadis) as its Consulting Engineer to assist in the preparation of a Consulting Engineer's Report (CER) to satisfy the reporting requirements specified in Section 7.07 of the Master

[5] Source: U.S. Census Bureau as of July 1, 2022.

Agreement of Trust (MAT), as amended, by and between PRASA and Banco Popular de Puerto Rico as Trustee, and certain requirements between PRASA and the Government of Puerto Rico.

As required by Section 7.07 of the MAT, unless the Senior Bonds have been rated investment grade by at least two Rating Agencies for 24 consecutive months, the Consulting Engineer shall prepare a CER to document the following:

- The recommendations of the Consulting Engineer as to the proper maintenance, repairs, and operation of the System during the ensuing Fiscal Year (FY), and an estimate of the amounts of money necessary for such purposes.
- The recommendations of the Consulting Engineer as to the amount that should be deposited each month during the ensuing FY to the credit of the Capital Improvement Fund.
- The recommendations of the Consulting Engineer as to the improvements that should be made during the ensuing FY and an estimate of the amounts of money necessary for such purposes, showing separately (i) the amount to be expended during such FY from moneys to the credit of the Capital Improvement Fund and the Surplus Fund and (ii) the amount to be expended during such FY from the proceeds of Bonds and other Indebtedness.
- The recommendations of other Consultants retained by or relied upon by the Consulting Engineer as to the insurance to be carried under the provisions of Section 7.08 of the MAT.
- A statement by the Consulting Engineer of the cost of all additions made to the System and of the cost (if the cost cannot be accurately determined, the estimated cost) of all retirements of property made in such FY.
- A report of the Consulting Engineer (which may retain other Consultants as necessary) as to the adequacy of existing rates and charges for purposes of the Rate Covenant contained in Section 7.01 hereof for the current FY to date and recommendations as to any necessary or advisable revisions of rates and charges and such other advice and recommendations as they may deem desirable.
- The findings of the Consulting Engineer, whether the properties of the System have been maintained in good repair and sound operating condition, and their estimate of the amount, if any, required to be expended to place such properties in such condition and the details of such expenditures and the approximate time required therefor.

Arcadis prepared this CER for FY2023 (2023 CER or the “Report”), which covers the FY starting on July 1, 2022, and ending on June 30, 2023.

1.3 Approach and Methodology

This section presents the approach and methodology used in the evaluation to achieve the CER's goals and the report's organization.

- Section 2 PRASA’s Fiscal Situation: This section overviews PRASA’s fiscal situation during FY2022.
- Section 3 PRASA’s Organization and Management: This section summarizes PRASA’s organization and management, including:
  - The Executive Management Team (EMT)
  - The Board of Directors
  - Staffing Profile
  - Labor Relations

  - Training
- Section 4 Condition of the System Assets: This section includes a summary of the condition and operational state of the water and wastewater facilities inspection during FY2023.
- Section 5 O&M Practices and Strategic Plan: A summary of the O&M program, O&M costs (benchmarked against other industry utilities), and a detailed summary of PRASA's Strategic Plan, and Operational Initiatives are included in this section.
- Section 6 Capital Improvement Program (CIP) and Regulatory Compliance: This section provides an overview of the six-year CIP as presented in the 2023 PRASA Fiscal Plan and an update on the regulatory compliance of the System.
- Section 7 Insurance Program: This section summarizes PRASA's current insurance coverage per the provided policies, and recommendations for adequacy were evaluated.
- Section 8 System Assets and Financial Analysis: This section includes the estimated costs for additions to the System and assets that were retired in FY2023, the financial forecast, and rates and charges appropriateness evaluation.
- Section 9 Conclusions and Recommendations: This section includes an overview of the assumptions, significant conclusions, and recommendations related to the FY2023 evaluation.

1.4 Acronyms

A listing of acronyms or abbreviations of terms used in this report is included in the Table of Contents.

2 PRASA's Fiscal Situation

2.1 Overview

Over the past several years, the Government of Puerto Rico has faced significant economic and demographic challenges that have adversely impacted PRASA. In addition to the economic downturn that has been experienced in Puerto Rico, like many other municipal water and wastewater utilities around the world, PRASA continues to face several major challenges, including service affordability, aging infrastructure, high volume of non-revenue water (NRW), regulatory mandates, system vulnerabilities to climate change and natural disasters, declining population and water consumption, workforce challenges, and increasing capital and renewal and replacement (R&R) needs. In addition, Puerto Rico has suffered economic, infrastructural, and operational impacts because of Hurricanes Irma and María in 2017, a series of earthquakes in 2019 and 2020, the Coronavirus Disease 2019 (COVID-19) pandemic, and Hurricane Fiona in 2022. However, PRASA's financial circumstances have improved due to the implementation of various initiatives, including debt restructuring, revenue-enhancing measures, federal funding from disaster recovery, and access to State Revolving Fund (SRF) loans and grants. PRASA is committed to building on its past accomplishments, particularly in improving its System's condition, increasing operational efficiencies, and timely and on-budget implementation of its CIP. These areas are expected to be addressed using the projected inflow of federal funds (with appropriate contributions from PRASA's internal funds) to cover its CIP needs, which should support PRASA's goal to build a more robust infrastructure and more efficient and resilient water and wastewater systems. The initiatives and challenges faced by PRASA during FY2023 are summarized in this section.

2.2 Puerto Rico Oversight, Management, and Economic Stability Act, and PRASA's Fiscal Plan

In May 2016, the United States Congress enacted the Puerto Rico Oversight, Management, and Economic Stability Act, PROMESA. PROMESA created the Fiscal, Oversight, and Management Board (FOMB) for Puerto Rico to provide financial and other oversight of the Government and its agencies, including PRASA. The FOMB oversees the development of budgets and fiscal plans for Puerto Rico's Central Government, including PRASA. Also, it may issue subpoenas, certify voluntary agreements between creditors and debtors, seek judicial enforcement of its authority, impose penalties, and enforce territorial laws prohibiting public sector employees from participating in strikes or lockouts. The Oversight Board's responsibilities include:

- Certifying fiscal plans for entities designated as "covered entities" by the Board as well as the Government's Fiscal Plan
- Approving annual budgets
- Enforcing budgets and ordering any necessary spending reductions
- Reviewing laws, contracts, rules, and regulations for compliance with the fiscal plan

Under the PROMESA's requirement for the submission of a Fiscal Plan, on May 26, 2023, the FOMB certified PRASA's Fiscal Plan, according to Section 201(d)(2) of PROMESA (2023 PRASA Fiscal Plan). The 2023 PRASA Fiscal Plan promotes PRASA's mission of providing high-quality drinking water and sanitary sewer service at the lowest possible cost. This certified Fiscal Plan reflects the financial and operational goals of PRASA in compliance with the requirements mandated by PROMESA to ensure fiscal responsibility while prioritizing the delivery of

reliable, safe, and affordable water and wastewater services. Provided that the Certified Fiscal Plan is successfully executed, and the financial and operational sustainability objectives are achieved, PRASA will be able to maintain access to credit markets at reasonable rates and as needed to meet borrowing requirements, enabling it to continue providing essential services to its customers.

For this Report, Arcadis used the certified 2023 PRASA Fiscal Plan as the official fiscal plan, which provides for its CIP to cover six years from FY2023 to FY2028 (the six-year CIP) as well as PRASA's six-year forecast covering preliminary results for FY2023 and projections for FY2024 through FY2028 (the Forecast). In addition, PRASA's six-year CIP has been restructured to optimize the use of federal funding, achieve a more resilient and reliable water and wastewater system, improve water quality, ensure consistency with PRASA's long-term goals, and ultimately achieve financial sustainability.

The 2023 PRASA Fiscal Plan is discussed in more detail in Section 8.

2.3 Federal Debt Modification

Typically, PRASA receives federal funds through loans from the Drinking Water and Clean Water SRF programs and bonds or loans under the United States Department of Agriculture Rural Development (USDA RD) program (both "Federal Lenders"). In July 2019, PRASA was able to modify the debt obligations under the SRF programs and USDA RD loans. The benefits of this federal debt modification are:

- Reduction of interest rates and extension of the amortization period resulting in a debt service relief of approximately $370 million (M) between FY2021 and FY2031 and $253M between FY2018 and FY2023.
- Termination of existing Commonwealth guarantees over the Federal Debt reducing overall Government contingent liabilities by approximately $1 billion.
- Access to new loans from the SRF and USDA RD Programs, including $26M granted under the SRF program.

2.4 Senior Debt Refunding (2020 and 2021/2022 Refunding)

PRASA issued its 2020 Senior Bonds in the principal amount of $1,370M in December 2020 to refund a significant portion of its outstanding 2008 Senior Bonds and all the 2008 Guaranteed Bonds. The issuance of the 2020 Senior Bonds resulted in a reduction in average annual senior debt service of $13M, total debt service savings to final maturity of approximately $348.2M or approximately $213.3M Net Present Value (NPV) savings, representing 15% of refunded par amount, and the termination of the Commonwealth guarantee over the 2008 Guaranteed Bonds. In August 2021, PRASA issued its 2021 Senior Bonds in a total principal amount of $1,089.8M, and in June 2022, completed the issuance of its 2022 Senior Bonds in a total principal amount of $565.2M to refinance the aggregate of all the 2012 Series A and B senior revenue bonds. The issuance of the 2021/2022 Senior Bonds resulted in a reduction of the average annual senior debt service of $22M, total debt service savings to final maturity of approximately $569.7M or approximately $361.5M NPV savings, representing 20% of refunded par amount.

After the Federal Debt modification in July 2019 and the issuance of the 2020 Senior Bonds, no Commonwealth Guaranteed Indebtedness (CGI) remains outstanding. In addition, each purchaser of 2020/2021/2022 Bonds consented to certain amendments to the MAT that, among other changes, will convert the security for the revenue bonds under the MAT from a gross revenue pledge to a net revenue pledge, subject to the consent of the remaining bondholders of the 2008 non-callable bonds (due on July 1, 2024) and the Federal Lenders.

2.5 Rate Adjustments

Through June 30, 2022, the rate structure implemented by PRASA provided a maximum annual rate adjustment of 4.5%, up to a cumulative 25%, through applying an adjustment coefficient. From FY2018 through FY2023, these yearly rate adjustments generated a total revenue of $550M for PRASA.

During FY2023, after following the process required by Act 21-1985, PRASA implemented a new rate structure and charges, simplifying its rate to only two charges – a base charge and a consumption charge. The rate increase in FY2023 included an increase of 4.95% to the base charge revenues and 2.00% to the consumption charge revenues. As recommended by the Officer Examiner appointed to run the public hearing process required by Act 21-1985, the revised rate also incorporates an annual increase for subsequent years of at least 2.00% but not more than 5.00% annually, up to a cumulative cap of 30.00%. Additionally, as part of this process, PRASA revised the charges for other service activities such as water connection charges, wholesale charges, etc.

In addition, from FY2018 through FY2023, PRASA has collected $185M from government accounts, including Central Government agencies, public corporations, municipalities, and Federal agencies. Refer to Section 8.3 for additional details.

2.6 Energy Management

Reducing PRASA's electricity expenses is a priority, given unpredictable and rising energy prices. To reduce electricity costs, PRASA has ten facilities under Power Purchase Agreements (PPAs) to use photovoltaic energy, which allows for a blended rate that is less than the rates charged by the Puerto Rico Electrical Power Authority and its distributor system operator (PREPA/LUMA). The electricity expense reduction from PPAs from FY2018 through FY2023 is $4M.

In addition, PRASA has implemented regional energy conservation and optimization measures throughout the System. Since FY2013, the electricity consumption has been reduced by approximately 13% from 740M kilowatt-hour (kWh) to 640M kWh. By implementing these measures, PRASA aims to reduce energy consumption by approximately 15M kWh by FY2028. In FY2024, PRASA will define priorities and determine the roadmap for implementing additional efficiency and renewable/alternate energy projects for the System in the Master Plan. In the meantime, PRASA recently started designing a microgrid energy system at the Superaqueduct raw water pumping station. This pumping station of 100M gallons per day (MGD) capacity would operate off-grid and be powered by liquid natural gas and photovoltaic energy. PRASA plans to access federal or other funding sources to implement additional projects that could provide renewable energy and realize cost savings.

2.7 Federal Funds for Disaster Recovery and Resilience

In addition to the historical type of funding available (e.g., SRF and USDA RD), PRASA secured federal funding for efforts related to the 2017 Hurricanes (Hurricanes Irma and María), the 2020 Earthquakes, the COVID-19 pandemic, and Hurricane Fiona in 2022. PRASA also secured funds from other available sources for water and wastewater infrastructure.

2.7.1 Disaster Recovery Programs

The main sources of disaster recovery federal funding are:

1. Federal Emergency Management Agency (FEMA) Public Assistance Program: This program addresses emergency work (e.g., debris removal and emergency protective measures) and permanent work (e.g., reconstruction of the System to current industry standards). PRASA, FEMA, and the Central Office for Recovery, Reconstruction, and Resilience (COR3) have been coordinating for years to define the projects that resulted in the FEMA Accelerated Award Strategy (FAASt) Initiative.
   This program also provides funding for measures that would reduce or eliminate threats of similar future damage to the System that was damaged by previous disasters, also known as Section 406. Table 2-1 includes the projects expected to be completed using these funds.
   In addition, FEMA's Hazard Mitigation Grant Program (HMGP), also known as Section 404, provides funding to improve resiliency for facilities not damaged by a declared disaster. Grants provided under HMGP may be used with Section 406 funds to bring a facility to a higher level of disaster resiliency only when a disaster event damages portions of the facility. PRASA submitted four applications under this program. Table 2-2 includes the HMGP applications submitted by PRASA.
2. Department of Housing and Urban Development (HUD) Community Development Block Grant-Disaster Recovery (CDBG-DR) Program: PRASA is a subrecipient of these funds, which provides annual grants to develop communities by providing decent housing and a suitable living environment in low and moderate-income areas.
   HUD also includes CDBG Mitigation funds (CDBG-MIT) under this program. CDBG-MIT funds are used for financial assistance to support areas impacted by recent disasters to carry out strategic activities to mitigate risks and reduce future losses. The CDBG-MIT program applies for costs not covered or in excess of funding available from the FEMA Public Assistance Program/HMGP Section 404. The CDBG-MIT applications submitted by PRASA are summarized in Table 2-3.

Table 2-1 Section 406 Funded Projects ($ in millions)[1]

Project Name	Requested Amount	Approved Amount
Dorado-Barceloneta WWTP	$792.0	$-
Enrique Ortega WTP Rehabilitation	$2.3	$2.3
Isabela Lake Membranes	$6.9	$6.9
Totals	**$801.2**	**$9.2**

[1] Source: 2023 PRASA Fiscal Plan

Table 2-2 HMGP Section 404 Projects Applications ($ in millions)[1]

Project Name	Requested Amount	Approved Amount
East Region Water System Improvements (Valenciano)	$417.0	$418.6
San Sebastián WWTP Elimination	$17.1	$-
Enrique Ortega La Plata Generators for RWI	$1.5	$1.5
Salinas WTP Phase 1	$2.9	$2.9

Project Name	Requested Amount	Approved Amount
Totals	**$438.5**	**$423.0**

[1] Source: 2023 PRASA Fiscal Plan

Table 2-3 CDBG-MIT Projects Applications ($ in millions)[1]

Project Name	Requested Amount	Approved Amount
Emergency Generator Units La Plata Phase II	$20.6	$20.6
Bauta	$257.4	$-
Salinas WTP Phase II	$24.9	$24.99
New San Lorenzo WTP	$43.3	$-
Totals	**$346.2**	**$45.5**

[1] Source: 2023 PRASA Fiscal Plan

2.7.2 Consolidated Appropriations Act, 2021

In December 2020, Section 533 of the Consolidated Appropriations Act (CAA) was enacted to assist low-income households with paying water and sewer bills. The funds of the payments are provided directly to PRASA by CAA. In addition, Section 501 of the CAA provides funds to assist households unable to pay rent or utilities under the Emergency Rental Assistance Program (ERAP). As of March 2023, PRASA received $21.8M and applied it to outstanding balances for services provided to qualifying beneficiaries.

2.7.3 American Rescue Plan Act

The American Rescue Plan Act (ARPA) was enacted in March 2021 to provide relief due to COVID-19 impacts. The ARPA provisions applicable to PRASA are:

- Subtitle M Section 9901: In September 2021 and December 2022, PRASA received $7.5M and $4.7M, respectively, to provide premium pay to its essential employees. In December 2021, $65M was assigned to PRASA for infrastructure projects, and in February 2022, an additional $130M was assigned to implement the Caño Martín Pena Program.
- The Government of Puerto Rico could assign additional funds for PRASA under this Act to assist low-income households with water and wastewater services.
- Homeowner Assistance Fund (HAF): As of April 30, 2023, PRASA has received $3.2M through the HAF program to relieve vulnerable homeowners and prevent water and wastewater services loss.

2.7.4 Infrastructure Investment and Jobs Act

The Infrastructure Investment and Jobs Act, established in 2021, allocated funds over 5 years to improve the transportation network and core infrastructure, including aging water infrastructure, upgrading water treatment

facilities, addressing emerging contaminants in small and disadvantaged communities, and making water systems resilient. For FY 2023, PRASA estimated $23M of funding under the Act and forecasted approximately $40M per year for FY 2024 through FY 2026.

2.8 Funding Status

PRASA also secured funds from other available sources for water and wastewater infrastructure. Table 2-4 summarizes the identified, obligated, and received funds as of April 2023.

A total of $6.7 billion of funds have been identified, $5.1 billion has been obligated, and $645M has been received through April 30, 2023.

Table 2-4 Federal Funding Summary (As of April 2023, $ in M)[1]

Program	Funding Source	Identified Amount	Obligated/ Approved	Received
Emergency Work (Cat. A&B)	FEMA (PA)	$212.1	$212.1	$196.2
Permanent Work (FAASt, Section 428)	FEMA (PA)	$3,662.0	$3,662.0	$29.7
Disaster Related Hazard Mitigation	FEMA (406)	$801.2	$9.2	-
Non-Disaster Related Hazard Mitigation (HMGP)	FEMA (404)	$438.5	$423.0	-
CDBG – MIT	HUD	$346.2	$45.5	-
CDBG – DR (Non-Federal Match Program)	HUD	$406.9	$200.0	$4.2
Direct Administrative Costs (DAC)	FEMA (PA)	$203.5	-	-
Working Capital Advance (Perm Work)	FEMA (PA)	-	-	$204.8
Hurricane Recovery Funds		**$6,071.4**	**$4,552.9**	**$434.9**
Cares Act	OMB	$2.1	$2.1	$2.1
Revenue Loss	ARPA	TBD	-	-
Infrastructure Projects (Naranjito, Santa Rita, El Yunque (Las	ARPA	$66.0	$66.0	$65.0

Program	Funding Source	Identified Amount	Obligated/ Approved	Received
Picuas) WWTP Elimination[2], etc.)				
Caño Martín Peña	ARPA	$130.0	$130.0	-
Premium Pay	ARPA	$12.3	$12.3	$12.3
LIHWAP	ARPA/CAA	$4.5	$4.5	$4.5
ERAP	HUD	TBD	$16.1	$16.1
Mortgage Assistance Program	HFA	TBD	$2.8	$2.8
Total Coronavirus Relief Funds		**$214.9**	**$233.8**	**$102.8**
CWSRF	USEPA	$237.9	$237.9	$58.2
DWSRF	USEPA	$127.8	$65.9	$24.5
RD – Hurricanes Harvey, Irma, and María Grant	RD	$22.0	-	-
CDBG-DR Electrical Power Systems	HUD	$63.3	-	-
Total Funds for Infrastructure Projects		**$326.3**	**$241.1**	**$58.9**
Total		**$6,335.5**	**$4,556.2**	**$302.4**

[1] Source: 2023 PRASA Fiscal Plan
[2] It is assumed that the El Yunque (Las Picuas) WWTP Elimination is included in the identified amount of $66M.

3 PRASA's Organization and Management

3.1 Introduction

According to Act No. 92, effective on March 31, 2004 (Act 92-2004), PRASA is organized into five Operational Regions (North, South, East, West, and Metro), as shown in Figure 3-1.

Figure 3-1 PRASA Regions

PRASA's EMT provides daily management oversight and coordination for institutional activities. Several departments support the EMT, including finance, compliance, human resources, customer services, legal, and information systems. Figure 3-2 shows PRASA's current organization.

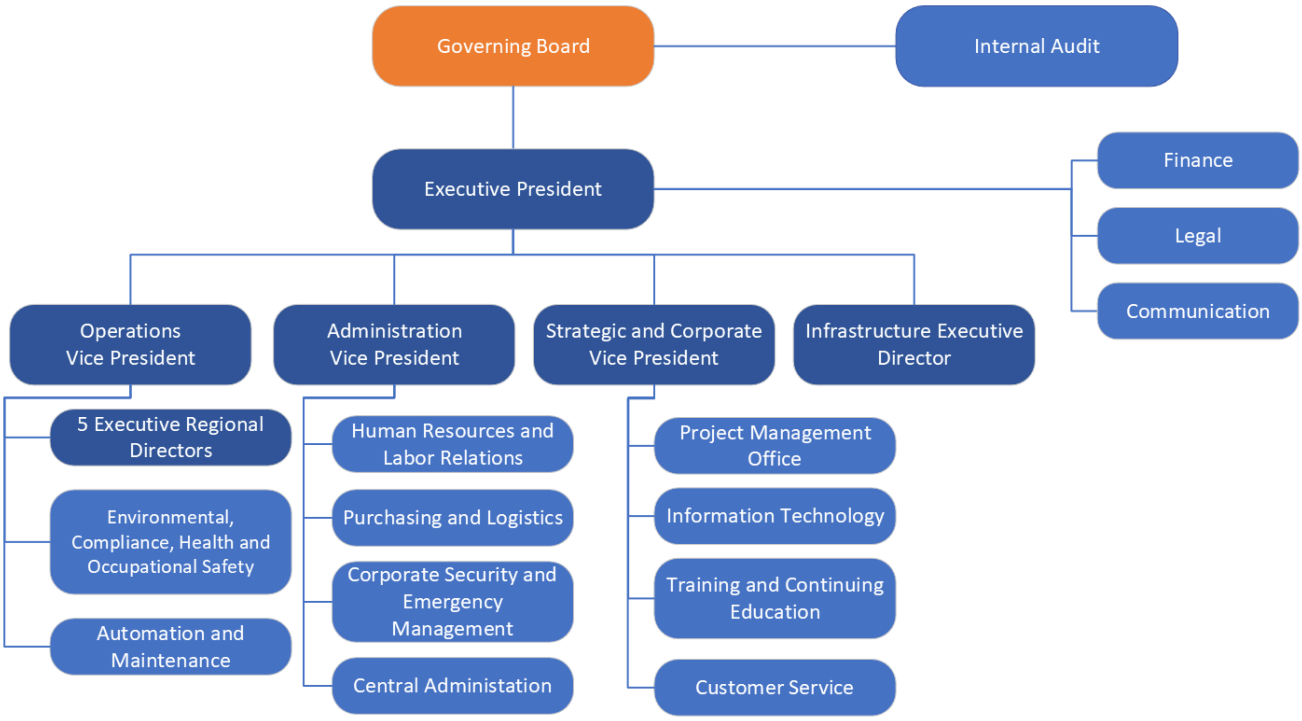


Figure 3-2 PRASA's current Legislated and Executive Management Structure

3.2 Updates and Changes in PRASA's Organization and Management

3.2.1 Board of Directors

According to restructuring as per Act No. 68 of 2016 (Act 68-2016), PRASA's Governing Board is composed of eight members (refer to Table 3-1), which include:

- Four independent directors appointed by the Governor of Puerto Rico, comprised of:
  a. One engineer licensed to practice in Puerto Rico with at least 10 years of experience.
  b. One attorney with at least ten years of experience in Puerto Rico admitted to practicing in the Commonwealth of Puerto Rico.
  c. One member with broad knowledge and experience in the field of corporate finance.
  d. One professional with expertise in any field-related functions delegated to PRASA.
- One representative from the AAFAF as per Act 2-2017.
- One Consumer Representative, a private citizen representing PRASA's customers.
- Two ex-officio members: the Executive Directors of the Association of Mayors, and the Federation of Mayors.

Table 3-1 PRASA's Governing Board Members (as of June 30, 2023)

Name	Board Position	Position Description	Term Ends
Héctor J. del Río Jiménez, Esq.	President	Independent Director/Finance	November 21, 2026
Alberto Castañer Padró, Esq.	Vice-President	Independent Director/Legal	Pending[1]
Iván E. López Báez, PE	Director	Independent Director/Engineering	Pending[2]
Vacant	Director	Independent Director	-
Gerardo Lorán Butrón, Esq.	Director	AAFAF Representative	Indefinite
Sr. José E. Velázquez Ruiz	Director	Executive Director of the Mayors Association	Indefinite
Sra. Véronica Rodríguez Irizarry	Director	Executive Director of the Mayors Federation	Indefinite
Héctor Sánchez Cardona, PE	Director	Consumer Representative	June 20, 2020[3]

[1] Mr. Castañer occupied the original appointment term from January 10, 2017, through December 14, 2021. He continues to serve uninterruptedly. He is currently pending consideration for confirmation from the Senate of Puerto Rico.
[2] Eng. Lopez has occupied the appointment since January 4, 2022. He continues to serve uninterruptedly. He is currently pending consideration for confirmation from the Senate of Puerto Rico.
[3] Mr. Sánchez's term expired on June 20, 2020. Accordingly, based on Act 15-2013 and Regulation No. 8390 of the Department of Consumer Affairs adopted on October 15, 2013, applicable at the time of his election, he can continue the role in this position.

Directors appointed by the Governor will be selected from ten candidates, vetted by a recognized executive search firm, and according to objective criteria, including the candidate's professional and educational backgrounds. The Consumer Representative will serve for a three-year term, with no term limits, and be chosen through a selection process under the jurisdiction of the Puerto Rico Ombudsman. The Governor-designated or elected Board members serve staggered terms: two members will hold office for five years and two members for six years. As these Board members' office terms expire, the Governor will appoint successors for five-year terms, following the exact candidate identification mechanism. None of the Governor's appointed members may hold such office for over three terms.

The Governing Board is responsible for making or approving major decisions taken by PRASA, including overall institutional policies, strategies and programs, executive and key management recruitments and terminations, approval of union contracts, professional services contracts beyond the limits accorded to the Executive President, and contract changes that are beyond the limits accorded to the Executive President.

3.2.2 Executive Management Team

Since enacting Act 92-2004, PRASA has implemented various organizational management changes, including the EMT. A summary of PRASA's key EMT as of June 30, 2023, including previous positions and years of experience, is presented in Table 3-2.

Table 3-2 PRASA's Executive Management Team (as of June 30, 2023)

Name	Current Role	Term Ends	Prior Role	Experience Total/Experience at PRASA
Eng. Doriel Pagán	Executive President	February 2025	Operations Vice-President	33 years/31 years
Eng. Damaris Santini Martínez	Operations Vice-President	Indefinite[2]	Interim Executive Director South Region	26 years/16 years
Eng. Arnaldo Jiménez	Strategic and Corporate Planning Vice-President	Indefinite[2]	Executive Advisor, Presidency	24 years/22 years
Maríana S. Pérez Cordero, Esq.	Administration Vice-President	Indefinite[2]	Executive Advisor, Presidency	18 years/3 years
Omar Rivera Rolón	Executive Director of Finance	Indefinite[2]	PRASA Treasurer	24 years/16 years
Eng. Joel Lugo Rosa	Interim Executive Director for Infrastructure[1]	Indefinite[2]	Interim Executive Director West Region	24 years/24 years
Eng. Roberto Martínez	Executive Director Metro Region[1]	Indefinite[2]	Deputy Executive Director Metro Region	36 years/26 years
Eng. José Rivera Ortiz	Interim Executive Director North Region[1]	Indefinite[2]	Toa Alta Area Director	25 years/24 years
Eng. Bruce León Ng	Interim Executive Director South Region[1]	Indefinite[2]	Deputy Executive Director South Region	28 years/17 years
Eng. Enrique Rosario	Interim Executive Director East Region[1]	Indefinite[2]	Deputy Executive Director East Region	25 years/15 years
Eng. Eric Rosa Lugo	Interim Executive Director West Region[1]	Indefinite[2]	Deputy Executive Director West Region	24 years/11 years

[1] These roles are legislated positions.
[2] Indefinite per amended Act 40-1945 (Ley 68-2016), which allows EMT staff to be on an interim basis without a defined term of service.

PRASA reported the following changes during FY2023 regarding its organization and changes in leadership and management: Maríana S. Pérez Cordero, Esq. was designated as Administrative Vice-President, replacing Keralia Moreda; William Thompson Faberlle was designated Customer Service Director; Orlando Rodríguez Hernández was designated Compliance Director, and Ismael Robles was designated the Integrated Maintenance Director.

3.2.3 Staffing Profile

PRASA's existing staff is categorized into the five primary categories described below:

- Appointed Employees: This category includes the executive staff, deputy and department directors, area directors, and administrative assistants that support key management personnel of the utility.
- Management Employees: These employees manage the day-to-day operations of the utility. They hold management positions both in the central and regional offices.
- HIEPAAA Employees (*Hermandad Independiente de Empleados Profesionales de la Autoridad de Acueductos y Alcantarillados*): These employees are the unionized professional staff that includes accountants, engineers, insurance specialists, project inspectors, and surveyors.
- UIA-AAA Employees (*Unión Independiente Auténtica de la Autoridad de Acueductos y Alcantarillados*): The unionized plant and System operators, maintenance, support staff, meter readers, customer service specialists, and administrative assistants.
- Temporary Employees: These employees are hired and classified as temporary until formally assigned to a regular position. New hires are placed in a 90-day probationary period. They do not have full benefits during the probationary period. If still employed after probation, they either become full-time employees (FTE) or renew their temporary employment contract.

At the end of FY2023, PRASA had a total headcount of 4,551 employees, including 216 employees under the Voluntary Pre-Retirement Program. Staff decreased by 1.2% from FY2022 to FY2023, including a reduction of four HIEPAAA employees and 17 management employees. Based on the total number of active FTE employees for FY2023 (4,335), the ratio of service accounts (counting the water service and sanitary sewer service for the same client as two separate accounts) to employees was 449, representing a reduction of 4.8% compared to FY2022, which was 470. The industry standard for combined (water and wastewater) utility operations average ranges from 345 to 626, with a median of approximately 485 customer accounts per employee[6]. Therefore, based on the customer account per employee benchmarking ratio, PRASA falls within the range for the industry. Table 3-3 shows the staff levels by staff category over the last five fiscal years.

Table 3-3 Staff Levels

End of FY	Appointed Employees	Management Employees	HIEPAAA Employees	UIA-AAA	Temporary Employees (UIA)	Pre-Retired Employees	Total Employees
2019	162	1,058	123	2,915	8	327	4,593
2020	164	1,089	118	2,883	7	321	4,582
2021	164	1,138	120	2,956	0	292	4,670
2022	171	1,094	116	2,963	6	254	4,604
2023	177	1,077	112	2,964	5	216	4,551

[6] Source: 2022 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

End of FY	Appointed Employees	Management Employees	HIEPAAA Employees	UIA-AAA	Temporary Employees (UIA)	Pre-Retired Employees	Total Employees
5-year CAGR[1]	**2.24%**	**0.45%**	**-2.31%**	**0.42%**	**-11.09%**	**-9.85%**	**-0.23%**

Source: Human Resources Department
[1] CAGR is the acronym for Compound Annual Growth Rate

3.2.3.1 Organization Optimization

In January 2022, PRASA completed a labor capacity and productivity assessment to determine optimal staffing levels. The study identified a need for 5,030 employees for PRASA's optimal performance. Based on the FY2023 total headcount of 4,551 employees, PRASA will ideally need to hire 479 additional employees. However, PRASA expects to reach a headcount of 4,950 FTEs by FY2028, while the additional 80 employees remaining will be re-evaluated to determine if they are still required to achieve optimal headcount. Below is a summary of PRASA's strategy to address the employee gap:

- Continue to gradually recruit to cover pre-retired employees as they reach the full retirement age.
- Continue to recruit key technical and operating positions such as plant operators, electromechanics, and other workers for operations.
- Continue to fill headcount needs in the Infrastructure, Customer Service, and Compliance Departments, among others.

To reach the staff needs total headcount number by FY2027, PRASA will continue to reevaluate based on the results and benefits of the projected headcount additions, and the balancing of the FTE with overtime and external resources as well as fleet and other resources availability.

PRASA implemented the recruitment technology called "Smart Tool". This centralized management tool allows PRASA to efficiently identify opportunities for personnel training or transfer among departments to maximize FTE availability and capacity focused on addressing critical needs. This tool facilitates greater visibility for the areas of need and personnel surpluses to develop a systematic recruitment plan. In FY2023, PRASA utilized newspaper ads and digital platforms to post operators and electromechanics positions, which resulted in filling a significant number of vacancies.

PRASA's current hiring strategy focuses on positions that are difficult to recruit, including departments that are understaffed and impacted by the Voluntary Pre-Retirement Program. These departments include Maintenance, Customer Service, Infrastructure, and Operations. Staff position needs identified include but are not limited to field workers, supervisors, electromechanics for the Maintenance Department, plant operators, services coordinators, assistant directors, laboratory assistants, and licensed engineers in the Infrastructure Department to assist with the extensive CIP. In addition, the deficit in operations personnel has forced the Operations Department to incur overtime hours and private contractors to operate facilities, thus impacting payroll metrics.

PRASA intends to keep identifying candidates and following hiring procedures, while complying with FOMB requirements further to optimize its staff and address needs in critical areas. In addition, PRASA is currently redefining certain key performance indicators (KPIs) and specific goals for overtime and absenteeism labor indicators. PRASA's action plans for the optimization measures are projected for FY2024. The main three action items are the following:

- Provide status to the Oversight Board on the system expected to be used in the workforce efficiency plan.
- Develop a plan to measure workforce efficiency.
- Continue tracking absenteeism and overtime levels to identify areas of opportunities.

Findings of a pay scale evaluation performed by an external firm conducted in previous years revealed that PRASA's salaries were lower than the median compared to the labor market. In FY2023, PRASA started implementing new payment scales for the labor groups except the appointed employees. With this initiative, PRASA hopes to minimize the high personnel turnover rates from the past years.

3.2.4 Labor Relations

After the commencement of the elected Government in January 2021, several laws that affect PRASA's labor relations came into effect. These laws are Act No. 26 of April 27, 2017 (Act 26-2017) and Act 176-2019. These laws have supremacy over any other law or agreement regarding the same matters. The aspects of these laws that affect PRASA are discussed below.

3.2.4.1 Voluntary Pre-Retirement Program (Act 211-2015)

As a result of the past fiscal situation, the Government enacted Act No. 211 on December 8, 2015 (Act 211-2015), which created a "Voluntary Pre-Retirement Program". Act 211-2015 intended to create a program "whereby eligible employees of the Government of the Commonwealth of Puerto Rico may voluntarily separate from service by receiving incentives until they meet the requirements for retirement; provide for the requirement of credited years of service needed to qualify for this Program; established the timeframe for employees to exercise their option to avail themselves of the Voluntary Pre-Retirement Program; provided the special incentives that will be granted to employees who avail themselves of the Program; provided the requirements needed to implement the Program; and for other related purposes".

The program attempted to reduce the workforce progressively and voluntarily. The Voluntary Pre-Retirement Program was active until 2018, and no additional employees can be added. However, some employees still benefit from Act 211-2015 until they meet the requirements for the Pre-Voluntary Program. In FY2023, over 350 PRASA employees retired under the program.

3.2.4.2 Acts 26 of 2017 and 176-2019

To ensure the Government's compliance with the approved Fiscal Plan, Act 26-2017 was enacted. Act 26-2017 prevails over any previous law. Among other measures, Act 26-2017 requires marginal benefits to be the same for the Government of Puerto Rico employees, including public agencies, instrumentalities, and corporations, such as PRASA. The act froze and reduced some payroll benefits or compensation, including vacation and sickness licenses, payout terms of licenses, and bonuses. Subsequently, under Act 176-2019, certain amendments were reverted. Currently, PRASA employees' benefits include the following:

- Vacation licenses accumulate at a rate of 1.25 days per month of service and may be accumulated to up to a maximum of 24 days by the end of each natural year and may accrue up to 60 days.
- Sickness licenses accumulate at a rate of 1.5 days per month of service and may be accumulated to up to 18 days by the end of each natural year.
- Licenses in excess will not be paid out, except for vacation days accrued up to 60 days.

- Elimination of all bonuses, except for Christmas bonuses, which shall have a maximum of $600.
- Extra hours will be compensated at a maximum rate of 1.5 times the regular hourly rate.

3.2.4.3 Collective Bargaining Agreement

On April 6, 2021, the Authority received a partial labor agreement proposal from *Unión Independiente Auténtica* (UIA), its main labor union. The Negotiation Agreement provides for the continuing negotiation of the revised pay scales and several incentives that benefit both parties, subject to compliance with PROMESA and PRASA's Certified Fiscal Plan. Refer to Section 8 for additional updates related to this agreement.

3.2.5 Training

PRASA offers varied training programs to its employees to improve work management and productivity. During FY2023, PRASA provided over 75,870 training hours to its employees, representing an average of approximately 18 hours per employee. During FY2023, the training program continued to use virtual tools and remote courses to increase participation. PRASA continues to leverage the contract with the *Oficina de Administración y Transformación de los Recursos Humanos* for training courses. Training topics ranged from technical-oriented seminars to conflict resolution and team-building sessions. In addition, PRASA continues to use the internet-based training platform called Moodle, where pieces of training are designed and incorporated into the tool. In addition, to expand the utilization of Moodle, a recording studio was created at the Central Administration Building to facilitate the development of new training. The recording studio will also be used for social media campaigns and other activities requiring recording as needed. PRASA's goal is to continue offering diverse training programs to its employees to improve work management and productivity. PRASA also conducts activities and training through the *Programa de Orientación Social al Empleado* (POSE).

About 95% of the employees participated in training activities offered by PRASA during FY2023. PRASA continues investing in personnel training to increase work ownership and productivity. PRASA also continues with the training and certification of its treatment plant operators in compliance with requirements established by regulatory agencies. Table 3-4 summarizes the number of operators by the type of license held.

Table 3-4 FY2023 Operator Licensing[1]

Facility	In Training	Type I	Type II	Type III	Type IV	Total
Water	110	24	41	84	220	479
Wastewater	32	6	7	19	82	146
Total	**142**	**30**	**48**	**103**	**302**	**625**

[1]Does not include operators under the Voluntary Pre-Retirement Program.

4 Condition of System Assets

4.1 Introduction

Arcadis evaluated the condition and operation of PRASA's assets through an inspection program of selected facilities in the System to meet the following objectives:

1. Assess the current physical state of the facilities inspected.
2. Determine if the facilities are being operated and maintained to achieve their operational goals.
3. Evaluate if PRASA's Capital Improvement Program (CIP) is aligned with the System's identified needs.

Arcadis performed asset condition assessments of a selection of WTP and WWTP facilities corresponding to FY2023 and a sample of ancillary facilities. The facilities were inspected to assess the structural integrity and physical condition of the structures, equipment's adequacy of operation and maintenance practices, and renewal and repair needs. Arcadis also evaluated the compliance performance results for the WTPs and WWTPs from January 1, 2022, through December 31, 2022. The WTPs, WWTPs, and ancillary facilities were inspected between January 2023 and April 2023. This section summarizes the inspection results, findings, and recommendations based on the condition of the assets inspected during FY2023 and is detailed in the FY2023 Asset Condition Assessment (ACA) Report.

4.2 Facility Inspections

A summary of the facilities inspected between January and April of 2023 is presented in Table 4-1. A total of 180 facilities were inspected out of the 3,942 facilities comprising the System, excluding 136 active RWIs and 75 RWPSs. Inspected facilities include 57 WTPs, 23 WWTPs, 20 Wells, 30 WPSs, 30 WSTs, and 20 WWPSs. Dams were not included in this round of inspections since they were inspected in February 2022 and included in the FY2022 ACA.

Inspections were not performed on the following assets: small dams and weirs, buried infrastructure, meters, ocean outfalls, buildings, and land. PRASA provided limited buried infrastructure condition data, which is included in Section 4.3.

Table 4-1 Percent of Assets Inspected by Category

Asset Category	Total PRASA Facilities[1]	Inspections Performed	
		Quantity	Percent
Regulated Dams	8	-	100
Water Treatment Plants	112	57	51
Wastewater Treatment Plants	50[2]	23	46
Wells	238	20	8
Water Pump Stations	1,136	30	3
Water Storage Tanks	1,568	30	2

Asset Category	Total PRASA Facilities[1]	Inspections Performed	
		Quantity	Percent
Wastewater Pump Stations	830	20	2
Total	**3,942**	**180**	**5**

[1] Data obtained from PRASA Geographical Information System (GIS) updated in March 2023. The total excludes 136 active RWIs and 75 RWPSs.

[2] Río Grande Estates WWTP was eliminated under CIP Project No. 3-61-5020.

4.2.1 Inspections Methodology

Inspections were performed throughout PRASA's five Operational Regions: North, South, East, West, and Metro. Table 4-2 shows the number of facilities inspected within each Region. Note that the total number of inspections performed in the Metro Region is lower than those performed in the other Regions since it has fewer but larger WTPs and WWTPs.

Table 4-2 Summary of Inspections by Region

Asset Category	East	Metro	North	South	West	Total
Regulated Dams	-	-	-	-	-	0
Water Treatment Plants	14	5	15	15	8	57
Wastewater Treatment Plants	6	0	10	3	4	23
Wells	3	1	5	5	6	20
Water Pump Stations	6	6	6	6	6	30
Water Storage Tanks	6	6	6	6	6	30
Wastewater Pump Stations	4	4	4	4	4	20
Total	**39**	**22**	**46**	**39**	**34**	**180**

Following the approach adopted by Arcadis in previous condition assessments, an attempt was made to obtain a random sampling of the wells, pump stations, and storage tanks, including ancillary facilities, by inspecting several facilities within each Operational Area across the island rather than inspecting a uniform number of minor facilities within each Operational Area. The Operational Areas visited were Toa Alta and Arecibo (North Region), Ponce and Yauco (South Region), Caguas and Fajardo (East Region), Mayagüez and Aguadilla (West Region), and San Juan and Guaynabo (Metro Region). The San Juan Operational Area does not have wells. Arcadis visited wells at the Arecibo, Ponce, and Aguadilla Operational Areas.

Each facility was inspected using an asset management application called Fulcrum. Fulcrum includes scoring and weighting criteria developed by Arcadis. The assets are grouped by type of facility: WTP, WWTP, Wells, WPS, WST, and WWPS. Fulcrum was customized for each specific asset category to determine the asset's current state of repair and operation as influenced by age, historical maintenance, and operating environment. This platform

facilitates access to the data gathered and allows for evaluation, monitoring, and generating asset-specific condition reports with digital photos and Global Positional System (GPS) coordinates.

Each facility's compliance parameters were summarized and verified using a Microsoft Power BI Dashboard. Arcadis designed the Compliance Dashboard, and the source data is the information provided by PRASA for the calendar year 2022. The dashboard summarized the following parameters including, but not limited to: Total Organic Carbon (TOC), Trihalomethane (THM), Haloacetic Acids (HAA5), sewer system, Sludge Treatment System (STS), Turbidity, and Flow. The evaluation criteria used include the following:

- Regulatory Compliance – The degree to which the performance of the asset complies with its permit limits and regulatory requirements.
- Operations/Process Control – The degree to which the asset condition and features allow it to be operated and controlled to meet its performance objectives.
- Equipment/Maintenance – An assessment of the adequacy of the maintenance practices and the condition of the facility.
- Staffing/Training – An assessment of facility staffing coverage and training adequacy.

The asset inspected was assigned a numerical score between zero and three within each evaluation criterion. An overall facility rating was then determined based on a weighted average of the ratings for each criterion. For example, for a WTP and WWTP, a weighted average was used per equipment listed in Fulcrum to account for the importance of critical equipment. The average of each equipment rating was considered for the overall facility rating. The general interpretation of the numerical ratings is described below.

Rating	**Range**
• Good (Most of the criteria are adequately addressed)	2.5 – 3.0
• Adequate (Many of the criteria are adequately addressed)	1.5 – 2.4
• Poor (Many of the criteria are not adequately addressed)	0.5 – 1.4
• Unacceptable (Most of the criteria are not adequately addressed)	0.0 – 0.4

An overview of the approach and results of the inspections for each asset category is discussed in the following sections. Refer to the FY2023 ACA for the detailed evaluation and results.

4.2.2 Inspection Results

According to the facilities inspections performed in FY2023, an overall condition rating for each asset category was determined. The condition of the facilities varied mostly from adequate to those requiring capital or operation upgrades in addition to staffing and training needs. The inspection rankings and results per asset type are summarized in the following subsections.

4.2.2.1 Water Treatment Plants

PRASA operates 112 WTPs where it treats raw water to produce potable water for its customers. The island-wide WTP's design production capacity is approximately 625M gallons per day (MGD). The WTPs range from several thousand gallons per day to 100 MGD. For FY2023, PRASA reported a total water production of 513 MGD, of which approximately 88% or 454 MGD are from WTPs. A total of 57 WTPs (51% of total WTPs) were inspected as part of this assessment. Each assessment consisted of a thorough site visit inspection and an interview with the

operator, plant supervisor, or designated personnel. Therefore, the information obtained was at least partly based on the understanding of the person being interviewed. Arcadis developed and used criteria and weighting factors to evaluate the WTPs. The criteria include Equipment and Maintenance, Regulatory Compliance, Operations and Process Control, and Staffing and Training with Good, Adequate, Poor, or Unacceptable ratings. Refer to the FY2023 ACA for details on the criteria and factors evaluated for the WTPs inspected.

Table 4-3 summarizes the inspection results for the 57 WTPs sorted by the four evaluation criteria and the overall facility rating. One of the inspected WTPs, El Yunque WTP, was rated as Poor, four (La Boca WTP, Matrullas WTP, Tibes WTP, and Rucio WTP) were rated as Good, and the rest were rated Adequate with an overall rating score of 2.2. However, even though 91% of the WTPs were classified as Adequate, three of the 52 WTPs, Guayabota WTP, Sergio Cuevas WTP, and Ponce Nueva WTP, received a low-end rating that could deteriorate to a Poor rating if not attended.

Table 4-3 WTPs – Number and Percentage of Ratings by Category

Rating Range	Regulatory Compliance		Operations and Process Control		Equipment and Maintenance		Staffing and Training		Overall Rating	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Unacceptable (0-0.4)	0	0	0	0	0	0	0	0	0	0
Poor (0.5-1.4)	1	2	4	7	2	3	34	60	1	2
Adequate (1.5-2.4)	3	5	40	70	54	95	21	37	52	91
Good (2.5-3.0)	53	93	13	23	1	2	2	4	4	7
Average Rating	**2.8**		**2.1**		**1.8**		**1.3**		**2.2**	

4.2.2.1.1 Regulatory Compliance Findings

Most of the facilities were rated as Good in this category. The overall rating of the WTPs in this evaluation category decreased since the previous inspection. However, several compliance parameters had interim or monitoring only limits, which did not negatively affect the compliance rating. Whether the facility can meet the actual (permanent) limits when the interim/monitoring requirement expires is unknown. It is safe to say that interim limits will likely continue until PRASA can perform System improvements, whether capital or non-capital, to improve the facilities' equipment to meet compliance requirements.

In general, the majority of the facilities comply with regulations. However, PRASA continues implementing several operational strategies in the System to minimize incidences. Efforts are mainly targeted to address WTP issues contributing to disinfection byproducts (DBP) formation at the treatment process level.

Future regulations may require additional capital improvements to achieve higher levels of treatment at certain facilities depending on the characteristics of the source water and the distribution system, such as United States Environmental Protection Agency's (USEPA) residual chlorine, metals, phosphorous (P), and nitrogen (N) recent

criteria. At the issuance process for an updated National Pollutant Discharge Elimination System (NPDES) permit, PRASA continues to request interim limits, as determined by the Compliance Department, until the capital project for the said facility is executed and completed. The project completion term would be subject to the Prioritization System. In addition, PRASA is vigilant of potential future regulations such as the Lead and Copper Compliance Rule and the Per-and Polyfluoroalkyl Substances (PFAS) groups that may impact the water system and compliance with the regulatory agencies' requirements.

4.2.2.1.2 Operations and Process Control Findings

The Operations and Process Control in most WTPs inspected were rated as Adequate. Four facilities (7% of inspected WTPs) were rated as Poor, and 13 (23% of inspected WTPs) were rated as Good. The operations and process control scores increased from the previous year. The facilities rated as Poor are:

- Guayabota WTP (East Region) – Poor
- El Yunque WTP (East Region) – Poor
- Culebras Alto WTP (East Region) – Poor
- Jagua Ceiba WTP (South Region) – Poor

4.2.2.1.3 Equipment and Maintenance Findings

This criterion rated the facilities inspected as Poor, Adequate, or Good. No facility was rated as Unacceptable. Of the 57 facilities inspected, 37 (65%) had a rating under 2.0. Only one (2%) of the facilities inspected was rated Good regarding equipment and maintenance practices. The facility is Matrullas WTP (South Region).

Although rated as Adequate at the time of inspection, the following facilities are on the lower end of the scoring range (score below 2.0) and should be closely monitored. Equipment or maintenance deficiencies should be addressed:

- Espino WTP (East Region)
- Jagual WTP (East Region)
- San Lorenzo Urbano (Cerro Gordo) WTP (East Region)
- Gurabo Nueva WTP (East Region)
- Barrancas WTP (East Region)
- Culebras Alto WTP (East Region)
- El Yunque WTP (East Region)
- El Duque WTP (East Region)
- Guayabota WTP (East Region)
- Yabucoa (La Pica) WTP (East Region)
- Guzmán Arriba WTP (Metro Region)
- Canóvanas Nueva WTP (Metro Region)
- Guaynabo – Los Filtros WTP (Metro Region)
- Sergio Cuevas WTP (Metro Region)
- Barrio Nuevo WTP (Metro Region)

- Negros WTP (North Region)
- Hatillo-Camuy WTP (North Region)
- Río Arriba WTP (North Region)
- La Pica WTP (North Region)
- Sabana Grande – Utuado WTP (North Region)
- Mameyes de Utuado (Abajo) WTP (North Region)
- Roncador WTP (North Region)
- Santa Isabel (Utuado) WTP (North Region)
- Frontón WTP (North Region)
- Jaguas Pesas (Pozas) WTP (North Region)
- Sanamuertos WTP (North Region)
- Real Anón WTP (South Region)
- Coto Laurel WTP (South Region)
- Mal Paso WTP (South Region)
- Jagua Ceiba WTP (South Region)
- Rancheras WTP (South Region)
- Río Prieto WTP (South Region)
- Guajataca WTP (West Region)
- Aguadilla (Montaña) WTP (West Region)
- Ponce de León WTP (West Region)
- Betances WTP (West Region)
- Lajas WTP (West Region)

4.2.2.1.4 Staff and Training Findings

The Staffing and Training category's overall rating was 1.3, which fell in the upper end of Poor and decreased by 0.3 compared to the 2022 inspections. Two (4%) facilities received a Good rating, 21 (37%) facilities received an Adequate rating, and 34 (60%) facilities received a Poor rating in this category, mostly due to the need for staffing, including certified operators and/or lack of training. In FY2022, 25 facilities were rated as Poor compared to 34 in FY2023, which is an eight percent increase. The personnel turnover is still an ongoing challenge for PRASA, along with the lack of training and the need for more certified WTP operators. In addition to licensed operators, there is also a need for STS operators, licensed operators at large, maintenance staff, supervisors, laboratory analysts, operator assistants, purification mechanics, filter assistants, and operational service workers (TSOs for its Spanish Acronym).

4.2.2.1.5 Lowest Rated Facilities

Only three facilities scored below 2.0 out of the 57 WTPs inspected. The observations of these facilities are described in Table 4-4.

Table 4-4 WTPs – Lowest Rated Facilities and Observations

WTP	2023 Score	Observations
Guayabota (East Region)	1.8	During the evaluation period, the Compliance of the WTP was rated as good. However, the NPDES compliance parameters had a minor non-compliance exceedance for copper. The Operations and Process Control of the WTP were rated as poor. Compliance testing records, O&M manual, SOPs, equipment manuals, and Safety Data Sheets (SDS) were available at the visit. The available version for the O&M was not updated. The operators conduct routine sampling, follow SOPs, and perform the necessary process control adjustments. The streaming current monitor and jar tests are performed daily as part of the process. At the time of the visit, the facility did not have an EGU, but it had a new ATS. Although the overall housekeeping condition of the WTP was in good condition, the general appearance was poor. The structures, pipelines, and handrails need to be painted. Parts of the fence around the WTP need to be repaired. The electric gate must be fixed. The lighting is in good condition. Also, the facility has telephone and internet access. The Equipment and Maintenance of the WTP were rated as adequate. However, the screen at the RWI is in poor condition; the flow meter and stream current monitoring are out of service; most pipelines, structures, and handrails are corroded and not properly painted; the safety shower at the disinfection area is out of service; the effluent flow meter box was full of water, and the electrical connection is submersible which can be a potential electric hazard; the area where the D-CHLOR tablets are applied is broken; and the facility does not have EGU and has poor overall appearance. The facility is in the CIP (pre-planning phase). The Staffing and Training of the WTP were rated as poor. The WTP is understaffed for its operation hours and needs at least one licensed operator at large to operate the facility efficiently during operating hours. One operator is new and needs PRDOH certification. Trainings were delayed due to COVID-19.
Sergio Cuevas (Metro Region)	1.9	During the evaluation period, the facility's Compliance was rated as adequate. However, it had several parameters with interim limits or only monitoring. SDWA violations in Combined Filter Effluent (CFE) turbidity and THM parameters with compliance category; minor non-compliance. NPDES violations in dissolve oxygen parameter with compliance category; significant non-compliance. In addition, NPDES violations in residual chlorine and lead parameters with compliance category; minor non-compliance. Some issues in water treatment with iron & manganese, algae, and color are mitigated by applying sodium permanganate and frequent cleaning. The facility's Operations and Process Control were rated as adequate. The operators performed the necessary sampling following the SOPs for adjustments to the process, and ERP was updated. The available version of the Operation & Maintenance manual was not updated. The jar test, stream current monitor, and raw water parameters sampling results are used to determine and apply the appropriate chemical dose. The jar test is performed every day (Monday through Saturday by the laboratory technician). The facility has a good process control laboratory. The EGU's are tested (AAA-500C form) biweekly. General safety is inadequate because the handrails on the filter area do not comply with the 42" height of the handrails and tripping hazards. The basement was flooded, and the lighting was poor. The aeration area overflows with the fifth pump operating at the Carraízo Dam. The facility has guards at the access gate (front and back) 24 hours, internet, and telephone. Finally, the air conditioner is out of service in the process laboratory and dewatering offices. The facility's

WTP	2023 Score	Observations
		Equipment and Maintenance were rated as adequate. However, some equipment such as (1) pump at the water intake, (5) EGU at the water intake, (2) slow mixers of flocculation tanks, the automatic sludge removal system (spyder system) from sedimentation tanks, (4) multimedia filters' with valve problems in filters # 14, # 18, # 22 and # 23, (3) IFE turbidimeter, (1) contact tank, (2) sludge pumps, (1) thickener tank, (1) torque alarm, (1) decanting pump, (1) tile for the vacuum sludge drying beds, approximately (8) valves for the vacuum sludge drying beds, (4) gates for the vacuum sludge drying beds, (1) vacuum pump, (1) polymer application pump for the STS, (4) wash water booster pump control panel, (2) dewatering bed filling control panel, (1) EGU for Dewatering System, and (1) ATS for Solid Treatment System were out of service. In addition, the facility does not have an influent flow meter; the aeration system needs cleaning; sedimentation basins have mudballs; distribution and thickener tanks need painting; holding tanks/EQ tanks need maintenance and cleaning (vegetation inside the tanks); and thickener tanks and vacuum sludge drying beds need improvements, specifically adding roofs. During the visit, there was no access to the thickener tanks because of sludge and silt in the floor due to overflow; staff (TSO) performs routine maintenance, preventive and corrective maintenance challenge lacks staff, the facility is in the CIP and does not have as-built drawings available. There's a warranty/contractor operational issue with one valve at the sedimentation basin. The facility's Staffing and Training criterion was rated as poor. At the time of the visit, all licenses posted at the operator control room were expired. Staffing needs at least (1) licensed operator, (1) laboratory technician, (4) filter assistants, (1) licensed operator at large, and (1) purification mechanic to cover the facility's operating hours effectively. All training was delayed due to COVID-19.
Ponce Nueva WTP (South Region)	1.9	During the evaluation period, the Compliance of the WTP was rated as poor even though it had several parameters with interim limits or only monitoring. SDWA violations in CFE turbidity and TOC parameters with compliance category SNC. NPDES violations in copper parameter with compliance category SNC. Also, WTP has some challenges with organics from raw water. The Operations and Process Control of the WTP were rated as good. The available version of the O&M Manual is from 2013. The Operators conduct routine sampling at different locations during the day, following SOPs, and perform the necessary process control adjustments. They use streaming current monitoring, jar tests, and raw water parameters to establish the coagulant dosages. Jar tests are performed daily and when necessary. The facility has an EGU with a capacity of 750 kW and can energize the WTP. The ATS is working properly, and the EGU is tested weekly. The process laboratory is on-site, and the Operator takes the samples for process control. The lab equipment is adequate, and the calibration is up to date. The chemicals/supplies are on-site, and they are properly stored. The facility, in general, is safe even though it is under construction. However, the bathrooms remain inadequate, and the access road has some potholes. The illumination is adequate. The facility has telephone and internet access. The Equipment and Maintenance of the WTP were rated as adequate. The facility is an Ongoing CIP improvement project. Some areas are currently being constructed; however, the facility works properly. The Staffing and Training of the WTP were rated as poor. Needs at least one maintenance (housekeeping) employee to cover operating hours. New personnel are pending to be certified with PRDOH. Trainings were delayed due to COVID-19.

The major concern is the facilities' physical condition, which deteriorates yearly. However, PRASA expects to properly address the deficiencies with the projected inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) its needs.

4.2.2.2 Wastewater Treatment Plants

PRASA currently operates 50 WWTPs. The facilities range from several thousand gallons per day up to 80 MGD. The island-wide design treatment capacity is approximately 378 MGD, and the treated wastewater for FY2023 was estimated at 220 MGD. PRASA has seven plants designed to provide tertiary or advanced treatment, 38 plants designed to provide secondary treatment, and the remaining six facilities (which account for approximately 230 MGD of treatment capacity) provide primary treatment.

A total of 23 WWTPs (45% of total WWTPs) currently in operation were inspected as part of this asset evaluation. Each assessment consisted of a thorough site visit inspection and an interview with the operator, plant supervisor, or designated personnel. Arcadis developed and used criteria and weighting factors to evaluate the WWTPs. The criteria include Equipment and Maintenance, Regulatory Compliance, Operations and Process Control, and Staffing and Training with Good, Adequate, Poor, or Unacceptable ratings. For the Equipment and Maintenance criterion, the inspection forms show scores distributed by type of processes for ease of identification of deficiencies, including Pretreatment, Primary Treatment, Secondary Treatment, Tertiary Treatment, Sludge Treatment and Handling, Disinfection and Discharge, and Miscellaneous (Non-potable water, Back-up Power, Septage). Refer to the FY2023 ACA for details on the criteria and factors evaluated for the WWTPs inspected.

Table 4-5 summarizes the WWTP ratings for each of the four evaluation criteria and the overall facility rating. Overall, the facilities inspected were rated as borderline Adequate, with a score of 1.5; ten (43%) WWTPs were rated as Poor, and 13 (57%) WWTPs were rated as Adequate in the overall rating. However, nine of the 13 WWTPs rated as Adequate in the overall rating are on the lower end, close to being rated as Poor.

Table 4-5 WWTPs – Number and Percentage of Ratings by Category

Rating Range	Regulatory Compliance		Operations and Process Control		Equipment and Maintenance		Staffing and Training		Overall Rating	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Unacceptable (0-0.4)	8	35	1	4.5[1]	0	0	0	0	0	0
Poor (0.5-1.4)	5	22	3	13	8	35	7	30	10	43
Adequate (1.5-2.4)	6	26	18	78	15	65	14	61	13	57
Good (2.5-3.0)	4	17	1	4.5[1]	0	0	2	9	0	0
Average Rating	**1.2**		**1.9**		**1.6**		**1.8**		**1.5**	

[1] Numbers rounded, considers adding to 100 percent.

4.2.2.2.1 Regulatory Compliance Findings

The WWTPs received an overall combined score of 1.2 in Regulatory Compliance, considered Poor. The equipment's condition and treatment units out of service have negatively impacted the compliance criterion. Scores could be even lower at some facilities inspected since some NPDES parameters have interim or monitoring only limits. Despite this, the results show that there were still exceedances. PRASA intends to address requirements stipulated under the 2015 USEPA Consent Decree (Consent Decree) to achieve compliance objectives, including new, more restrictive permit limits and major improvements that need to be implemented to achieve positive results. PRASA must make the necessary improvements to meet current limits, understanding that when interim limits are lifted, they will have the necessary processes, tools, and conditions to meet the permanent permit limits.

Out of the 23 facilities inspected, eight (35%) were rated as Unacceptable, and four (17%) received a Poor rating under the regulatory compliance criterion. The remainder treatment plants were rated as Adequate, except for Aibonito WWTP, Humacao WWTP, Ponce WWTP, and San Sebastián WWTP, which were rated as Good. The facilities that were rated as Unacceptable and Poor in this criterion are:

- Ciales WWTP (North Region) – Unacceptable
- Barceloneta WWTP (North Region) – Unacceptable
- Dorado WWTP (North Region) – Unacceptable
- Vega Alta WWTP (North Region) – Unacceptable
- Utuado WWTP (North Region) – Unacceptable
- Camuy-Hatillo WWTP (North Region) – Unacceptable
- Yauco WWTP (South Region) – Unacceptable
- Isabela WWTP (West Region) – Unacceptable
- Caguas WWTP (East Region) – Poor
- Arecibo WWTP (North Region) – Poor
- Lares WWTP (North Region) – Poor
- San Germán WWTP (West Region) – Poor
- San Sebastián (New) WWTP (West Region) – Poor

The nutrient removal and aeration process must be evaluated for some of these facilities and determine its optimal operation. In addition, repairs to key equipment and improvements to outdated or damaged ones must be performed for WWTPs to operate properly and achieve the required compliance.

4.2.2.2.2 Operations and Process Control Findings

The WWTPs Operations and Process Control criteria were rated as Adequate, with a 1.9 overall rating. Of the 23 facilities inspected, one (4%) received an Unacceptable rating, and three (13%) received a Poor rating under this criterion. The rest were rated as Adequate, except for Orocovis WWTP, which was rated Good. The facilities that were rated as Unacceptable and Poor in this criterion are:

- San Sebastián (Old) WWTP (West Region) – Unacceptable
- Yabucoa WWTP (East Region) – Poor
- Camuy-Hatillo WWTP (North Region) – Poor

- Dorado WWTP (North Region) – Poor

In addition, it was observed that various treatment plants are still experiencing problems with process control of P, N, metals, and residual chlorine, among other parameters with interim limits.

4.2.2.2.3 Equipment and Maintenance Findings

The Equipment and Maintenance category had an average overall rating of 1.6, barely Adequate. Equipment condition is the primary driver under this criterion. Out of the 23 facilities inspected, eight (35%) received a Poor rating under this criterion, and the remaining facilities were rated as Adequate. The eight facilities rated as Poor are:

- Yabucoa WWTP (East Region)
- Aguas Buenas WWTP (East Region)
- Caguas WWTP (East Region)
- Ciales WWTP (North Region)
- Corozal WWTP (North Region)
- Camuy-Hatillo WWTP (North Region)
- Yauco WWTP (South Region)
- San Sebastián (New) (West Region)

Despite 15 (65% of inspected WWTPs) of the facilities being rated as Adequate at the time of inspection, 14 (61% of inspected WWTPs) of those WWTPs are on the lower end of the scoring range (score below 2.0), and if unattended, could fall to a Poor or Unacceptable rating in the future. These 14 facilities are:

- Aibonito WWTP (East Region)
- Fajardo WWTP (East Region)
- Humacao WWTP (East Region)
- Arecibo WWTP (North Region)
- Dorado WWTP (North Region)
- Lares WWTP (North Region)
- Barceloneta WWTP (North Region)
- Toa Alta WWTP (North Region)
- Vega Alta WWTP (North Region)
- Ponce WWTP (South Region)
- Isabela WWTP (West Region)
- San Sebastián (Old) (West Region)
- Orocovis WWTP (West Region)
- San Germán WWTP (West Region)

The deficiencies identified in several of these facilities will be addressed through PRASA’s capital or O&M projects in the future.

4.2.2.2.4 Staff and Training Findings

The Staffing and Training category was rated as Adequate, with an overall score of 1.8. Seven (30% of inspected WWTPs) facilities were rated as Poor, two (9% of inspected WWTPs) facilities were rated as Good, and the remaining 61% of visited WWTPs received an Adequate rating in this category. The facilities rated as Poor in this criterion are:

- Aguas Buenas WWTP (East Region)
- Aibonito WWTP (East Region)
- Utuado WWTP (North Region)
- Barceloneta WWTP (North Region)
- Corozal WWTP (North Region)
- Vega Alta WWTP (North Region
- Ponce WWTP (South Region)

It has certainly been evident that PRASA needs qualified operators, as shown by the WWTP's lack of licensed operators to effectively cover the facility's operating hours, including vacations and other absences. Besides licensed operators, the findings showed multiple vacancies for laboratory technicians, sludge dewatering operators, sanitary sewer technicians, supervisors, maintenance and housekeeping staff, and wastewater workers (TA, by its Spanish acronym). PRASA mitigates the needs by having existing staff work overtime or reducing shifts, increasing PRASA's overtime costs.

Although PRASA has installed remote monitoring systems (telemetry) through its Integrated Maintenance Program (IMP) in many facilities throughout the island, most WWTP facilities do not have it, or the equipment was out of service during the inspection. The ability to remotely monitor these facilities becomes particularly critical as most WWTPs are not staffed 24 hours per day, with many WWTPs having only one shift.

4.2.2.2.5 Lowest Rated Facilities

The facilities with the lowest overall score (below 2.0) are summarized in Table 4-6. PRASA should address the deficiencies identified during the inspections to improve the physical condition of these facilities and achieve continuous and consistent compliance. These improvements may be related to new process equipment, process automation, or process control optimization.

Similar to the WTPs, future regulations may require additional capital improvements to comply with stringent NPDES discharge parameters per updates of WWTP's NPDES permits based on the Water Quality Certificate and agreements in the Consent Decree. During the issuance process for an updated NPDES permit, PRASA requests interim limits for P, N, metals, and residual chlorine in some facilities until the capital project for the said facility is executed and completed. The project completion term is subject to PRASA's prioritization system.

Regulatory Compliance and Equipment and Maintenance are the categories of major concern. Similar to the WTPs, the major concern is the facilities' physical condition, which deteriorates yearly. PRASA expects to properly address the deficiencies with the projected inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) its needs.

Table 4-6 WWTPs – Lowest Rated Facilities and Observations

WWTP	2023 Score	Observations
Camuy-Hatillo (North Region)	0.9	During the evaluation period, the facility's Compliance was rated as unacceptable. Significant non-compliance exceedances were observed in the following parameters: Residual chlorine, Total Nitrogen Concentration, TSS Removal %, and TSS Concentration (Monthly and Weekly). Also, MNC exceedances in the following parameter: Biological Oxygen Demand (BOD) Removal %. Needs further analysis to determine violations. The facility's Operations and Process Control were rated as poor. The operators perform the necessary sampling to make adjustments to the process. However, the O&M manual was not updated, no chemical feed pump calibration plan, control room, laboratory on-site, or potable water meter. Broken fences and erosion near Chlorine Contact Chambers compromise safety and security. The exterior lighting, housekeeping, and overall appearance were not adequate. Most of the buildings were showing deterioration. EGU is rented (new EGU already purchased will be installed in the next weeks), and there is no containment on rented diesel storage. The facility has adequate communication tools. The facility's Equipment and Maintenance were rated as adequate. However, the facility needs improvements to its process. Several components of critical operation equipment were out of service, including (2) comminutors, (2) degritter system, (2) Variance Frequency Drives (VFDs) at the lift pump station, (1) final clarifier, pump 101 for secondary stage, belt filter press #1, chlorine residual analyzer, dissolved oxygen analyzer, and pH meter analyzer. The pre-treatment area has structural cracks and deterioration (weathering); fall and electrical hazards were observed; most major equipment is old and with some degree of deterioration; pump #2 of the lift pump station is clogged; EGU is out of service(currently using a rented EGU); and overall appearance of the facility is not adequate. Regional staff performs routine maintenance. The corrective maintenance is challenging due to its slow process. The facility is in an inactive project of the CIP and as-built drawings are available. The facility's Staffing and Training criterion was rated as Adequate. However, one operator at the facility is pending certification.

WWTP	2023 Score	Observations
Dorado (North Region)	1.0	During the evaluation period, the facility's Compliance was rated as unacceptable. There were significant exceedances of BOD (Monthly and Weekly Concentration and % Removal) and TSS (Monthly and Weekly Concentration, Load Weekly, and % Removal). Also, a MNC exceedance with BOD (Monthly and Weekly Load), TSS, and Residual Chlorine. The facility's Operations and Process Control were rated as poor. The operators perform the necessary sampling following SOPs for adjustment to the process. However, the O&M and equipment manuals were lost during the Hurricane María flooding. There was some floating debris in the effluent. Also, no jar tests were being performed to establish coagulant dosage. The site has poor process control laboratory equipment and procedures and no control room (all systems are controlled locally). Also, the piping has no labels or was incorrectly labeled. In terms of security, the facility complies with the use of security cameras and alarms. The facility has internet and telephone, and the EGU is in operation. The facility's Equipment and Maintenance were rated as adequate. However, significant delays in equipment repair/replacement cause operational difficulties; not enough capacity for a mechanically clean bar screen; the nutrient removal tank is not in use due to leaks in the tank structure; tertiary treatment (rotating cloth filter) is not in use(currently bypassed); and main equipment to be repaired or replaced are: (1 out of 3) pump for nutrient removal tank (anaerobic/aerobic), (2 out of 2) degritter system, (10 out of 10) Rotating Biological Contact (RBC) system, (1 out of 2) Biological Nutrient Reactor (BNR) blower, (2 out of 2) BNRs' DO sensors, (1 out of 3) motor of blower for package plant, (1 out of 3) mixed liquor recycle pumps, (1 out of 3) secondary clarifier, and (1 out of 3) NPW pumps. In addition, Regional staff performs routine maintenance, there are parts procurement process challenges, the facility is in the CIP, and as-built drawings are unavailable. The facility's Staffing and Training criterion was rated as adequate. However, one additional operator for RBC should be hired. Training needs improvement.
Ciales (North Region)	1.1	During the evaluation period, the facility's Compliance was rated as unacceptable. There were significant exceedances of Total Suspend Solids (all parameters), one exceedance of Biochemical Oxygen Demand, and twelve exceedances of Total Nitrogen. The facility's Operations and Process Control were rated as adequate. The operators perform the necessary sampling following SOPs for adjustment to the process. However, the O&M manual is not updated. Adjustment for sludge dewatering polymer dosing performed after sludge is processed; performing tests before processing could improve sludge quality. The control room only has the capability to view status, no control. The facility gate has been damaged for six months. The WWTP has good emergency power. The telephone is normally offline, and the internet does not work. The facility's Equipment and Maintenance were rated as poor. Some equipment, such as the transmission of clarifier #2, Return Activated Sludge (RAS)/Waste Activated Sludge (WAS) pump #4, all tiles with a drying bed, and one drain pump, were out of service. Also, the Biological System with uneven air distribution and mixing in anoxic and degasification zones is not operating, and the sludge drying bed's dewatering system does not have a roof. Regional staff performs routine maintenance, and there are corrective maintenance issues; the facility is not under CIP and does not have as-built drawings. The facility's Staffing and Training criterion was rated as Adequate. One operator (new personnel) at the facility is pending certification.

WWTP	2023 Score	Observations
Barceloneta (North Region)	1.1	During the evaluation period, the facility's Compliance was rated as unacceptable. There were significant exceedances of parameters in BOD, TSS, and Total Nitrogen. The facility's Operations and Process Control were rated as adequate. The available version for the O&M was updated. The personnel indicated that the jar test is conducted weekly. The automatic transfer switch for emergency generators is under the bidding process for replacement. Sufficient sampling was performed for process control with good laboratory equipment and procedures. However, no chemical feed pump calibration plan or control room exists. In terms of security, the facility has security cameras, alarms, and guards. 70% of the lighting is in service. The facility's Equipment and Maintenance were rated as adequate. However, it needs to address several maintenance issues. The mechanical bar screen operates with significant corrosion in its chains. The main equipment to be repaired or replaced are (2 out of 4) lift pumps, (1 out of 2) primary clarifiers, (5 out of 8) biological reactor blowers, (2 out of 3) secondary clarifiers, (2 out of 4) RAS pumps, (2 out of 3) WAS pumps, (1 out of 3) digester tank, (2 out of 3) digester's blowers, (1 out of 2) sludge holding tanks, (2 out of 3) Gravity Belt Thickeners (GBT), (1 out of 2) conveyance system of GBT, (1 out of 4) sludge pump, and (3 out of 4) NPW pumps. The backup power transfer switch is currently out of service (under the bidding process for replacement). Regional staff performs routine maintenance. The facility has corrective maintenance and parts procurement process challenges. The facility is in the CIP and has as-built drawings available. The facility's Staffing and Training criterion was rated as Poor. Two operators at the facility are pending for certification. Also, the facility lacks two licensed operators, three technicians, and one sludge dewatering operator. Training needs improvement.

WWTP	2023 Score	Observations
Yauco (South Region)	1.1	During the evaluation period, the facility's Compliance was rated as unacceptable. There were significant non-compliance exceedances in the following parameters: Total Nitrogen Concentration, TSS Concentration (Monthly and Weekly), BOD Removal %, BOD Concentration (Monthly and Weekly), and BOD Load (Monthly). Also, MNC exceedances in the TSS Removal % parameter. The facility needs further analysis to determine violations. The facility's Operation and Process Control were rated as adequate. The operators conduct the sampling of the primary parameters of the facility and, based on the results, modify the dosage that will be applied to the wastewater treatment. However, the O&M manuals and SOPs of the facility were not updated. Also, many of the structures of the facility's buildings are compromised due to the damages by the earthquakes of 2020. In terms of security, the facility complies with the use of security cameras, but the gate's motor has issues. The facility's Equipment and Maintenance were rated as Poor. Most of the major equipment had some issues. Some equipment was not operating: (1) mechanical clean bar screen; (1) screened compactor, (1) one pump and graphical flow meter for lift pump station, Biological Nutrient Reactor (BNR) #2, clarifier of the BNR #2, (3) disc filters, (2) digester tanks, (4) aeration system for the digester tanks, (1) conveyance system for the Belt Filter Press, (1) sludge pump, (1) graphic meter for the discharge point 001, and (1) pump for Non Potable Water System. The degritter #2 was clogged at the time of the inspection. The facility currently is only operating with one BNR unit. Also, the Belt Filter Press (BFP) is not in use since the structure of the building where they are located is compromised by the damages of the earthquakes of 2020. The WWTP needs significant repairs. The facility is using the services of transporting the generated wet sludge directly to the Guayama and Ponce WWTPs (via a truck) without using the Dewatering System of the Sludge Drying Beds. Regional staff performs routine maintenance at the WWTP. The facility is in the CIP and lacks as-built drawings. The facility's Staffing and Training were rated as good. However, the facility requires additional staff for maintenance.
Caguas (East Region)	1.2	During the evaluation period, the facility's Compliance was rated as poor. There was one exceedance of BOD and Phosphorous, two exceedances of TSS concentration (monthly and weekly), and one exceedance of TSS (removal and load weekly). There were also 12 months exceedances of Total Nitrogen. The facility's Operations and Process Control were rated as adequate. The operators perform the necessary sampling to adjust the process. The available version of the O&M manual was from 2014. Not performing Jar tests. Laboratory equipment and calibration were rated as Good. Although some units are out, the plant has 24/7 security and odor control. Housekeeping needs attention to equipment and debris around the green areas. The facility's Equipment and Maintenance were rated as Poor. Most of the major primary and secondary treatment equipment has issues. Some of the equipment out of service were one of the three mechanical screens, as well as the extractors; two conical degritter units; one primary clarifier tank; one of the BNR; two mixers; three of the four aeration blowers of the BNR; one of the four RAS pumps; one tertiary filter; one sludge holding tank; and one centrifuge. However, one BFP was recently installed. New disinfection system, Sodium Hypochlorite 12.5%. The odor control towers need repairs. The screen system for the septage tank was out of service. The facility has corrective maintenance and parts procurement process challenges. The facility is the CIP and has as-built drawings available. The facility's Staffing and Training criterion was rated as Adequate. However, three operators at the facility are pending certification.

WWTP	2023 Score	Observations
Vega Alta (North Region)	1.2	During the evaluation period, the facility's Compliance was rated as unacceptable. This category worsened significantly compared to the previous inspection. There were SNC in the following parameters: BOD, TSS, Residual Chlorine, and Total Nitrogen. Also, there were minor exceedances in Fecal Coliforms. The facility's Operations and Process Control were rated as adequate. The operators perform the necessary sampling, following SOPs, for adjustments to process. Although the O&M manual was at the facility, it was not updated. Also, all equipment manuals were not in the facility at the inspection; SDS were available. There is no calibration plan in place for the chemical feed pumps. The facility has sufficient backup power to operate without significant interruption. Security cameras and alarms were added. Access road needs improvements. The facility has a control room, internet, and telephone. The facility's Equipment and Maintenance were rated as adequate. Most equipment is in adequate condition. One package plant (Contact Stabilization) is rehabilitated. Centrifuge and its polymer application system are by-others. Two pumps for the NPW System were out of service. Regional staff performs routine maintenance at the WWTP. The facility is not in the CIP and does not have as-built drawings. The facility's Staffing and Training criterion was rated as Poor. However, one operator (new personnel) at the facility is pending certification. Also, at least one at-large operator needed to cover vacations, and sickness and reduce overtime.
Utuado (North Region)	1.3	During the evaluation period, the facility's Compliance was rated as unacceptable. There were significant exceedances in the TSS and Total Nitrogen parameters. The exceedances may be due to a lack of treatment optimization. The facility's Operations and Process Control were rated as Adequate. However, on the visit date, the Operator was not knowledgeable of the plant equipment or operations, with no knowledge of the whereabouts of the O&M manual and SOPs. The facility's EGU was out of service, but they currently use a rented EGU. Access to the site is not in good condition. The entrance gate has been damaged for a long time: cattle are constantly grazing inside the perimeter. The general conditions on the site are not adequate. The facility has communication tools, including internet and telephone. The facility's Equipment and Maintenance were rated as adequate. The grit removal system is bypassed. Most equipment is in good condition, but more maintenance should be performed regarding vegetation in motors (i.e., SBR tanks and sludge holding tank), cleaning of algae in structures, and bird droppings inside the filter press building. There have been improvements in the Polyblend application system since the last inspection. Regional staff performs routine maintenance. The facility is not in the CIP and lacks as-built drawings. The facility's Staffing and Training were rated as Poor. However, one operator at the facility is pending certification. Several trainings have not been offered and/or need refreshers.

WWTP	2023 Score	Observations
Yabucoa (East Region)	1.4	During the evaluation period, the facility's Compliance was rated as adequate. Two exceedances of TSS concentration (weekly) and ten exceedances of Total Nitrogen were observed. These exceedances could be due to the state of the equipment, specifically the screening and pretreatment system. The facility's Operations and Process Control were rated as poor. This category worsened significantly compared to the previous inspection. The facility has a limited laboratory area to conduct the process control parameters; however, the samples are taken to the Humacao WWTP laboratory. The package plant weirs had traces of solids at the discharge. The facility has no EGU, currently using a temporary one. The facility has a deteriorated appearance and needs severe housekeeping and removal of old, useless equipment. Also, the facility gate sensor was malfunctioning. Old APAK 4059 totes and the contained area are about to overflow and need immediate care/intervention. The facility's Equipment and Maintenance were rated as Poor. The facility needs to improve its pretreatment, as there is no screening, comminutors were removed, and degritters were out of service. The influent building structure needs rehabilitation due to cracks/exposed bars and deteriorated appearance. Other structures are affected as well and need maintenance. Two lift pumps were out of service, and dry pit ventilation needs improvement. Blower #3 was out of service for the package plant, and some diffusers were not working. Geotube is used for dewatering using one of the available Sludge Drying Beds (SDBs). At the time of the visit, the gates for SDBs were not in place, and part of the roof was missing. No redundancy in the chlorine application system. The two tanks of bisulfite are exposed to sunlight. The hydropneumatic tank and pump #1 for the NPW system were out of service. The old plant should be demolished and removed, as well as the abandoned equipment like the BFP. The abandoned polymer in the contained area beside the package plant is about to overflow. The overall appearance of the facility is poor. The facility's Staffing and Training criterion was rated as Adequate. However, one operator (new personnel) at the facility is pending certification.

WWTP	2023 Score	Observations
Isabela (West Region)	1.4	During the evaluation period, the facility's Compliance was rated as unacceptable. There were significant exceedances of BOD (Monthly and Weekly Concentration) and TSS (Weekly Concentration). Also, a minor non-compliance exceedance with BOD (% Removal, Monthly and Weekly Load) and Residual Chlorine. These exceedances could be caused by the poor aeration in the treatment, being several floating aerators out-of-service. Two out of six reactors were out of service, causing a potential overload of the in-service ones. The facility's Operations and Process Control were rated as adequate. The operators perform the necessary sampling following the SOPs for adjustment in the process. Standardized files were very organized. The available version of the Operation & Maintenance manual is from 2013. The EGU provides power to the entire plant. However, lighting needs attention, and the facility needs some housekeeping for debris. Some areas present unsafe access, such as the chlorine storage building. The facility has guards at the access gate from 10:00 p.m. to 6:00 a.m., internet, and telephone. The facility's Equipment and Maintenance were rated as Adequate. However, the influent pit needs modifications for a higher flow capacity and a better screening system. Two new comminutors were recently installed. During the inspection, it was observed that the Biological Reactors (BR) and aerated digester tank were full of floating solids. Also, some equipment was out of service: degritter system, multiple floating aerators of the BR as well as the VFD control; two BRs; one secondary clarifier; one RAS pump; digesters #2 and #5; and motor of blower #2 for septage receiving tank. Also, the sludge drying beds (SDBs) don't have a roof, and corrosion on EGU was visible. Regional staff performs routine maintenance. There are corrective maintenance and parts procurement process challenges. The facility is in the CIP to be eliminated, and as-built drawings were available. The facility's Staffing and Training criterion was rated as Good. Staffing is sufficient for the operating hours, two work shifts: 6:00 a.m. - 2:00 p.m. and 2:00 p.m. - 10:00 p.m.

WWTP	2023 Score	Observations
Arecibo (North Region)	1.5	During the evaluation period, the facility's Compliance was rated as poor. This category worsened significantly compared to the previous inspection. However, the facility had SNC exceedances in the following parameters: fecal coliforms and residual choline. The fecal coliform parameter violations have been observed in previous inspections. Also, a minor non-compliance exceedance with TSS and BOD. The facility's Operations and Process Control were rated as adequate. The operators perform the necessary sampling following SOPs for adjustment to the process. However, the O&M manual was not updated, no onsite equipment manuals were available, and no calibration plan for chemical feed pumps. Substantial floating solids were observed at the discharge point. Also, the odor control system and illumination should be improved. The WWTP has EGU with capacity for the entire plant. The facility's Equipment and Maintenance were rated as adequate. However, some equipment was found to be in poor condition. One of the four influent pumps was out of service. Also, one primary clarifier and one belt filter press were out of service. The degritter system has been out of service for several years, and solids from the bar screens need to be manually collected from the floor (no collection or conveyance system). The primary clarifier's underground structure, the influent building structure, and others have exposed rebars and damaged concrete and spalling. Also, pipelines in every unit with corrosion. The dechlorination system was not in use; it was in standby mode. The septic tank was out of service; when septage is received, it is connected to thickeners. Regional staff performs routine maintenance. There are corrective maintenance and parts procurement process challenges. The facility is in the CIP, and as-built drawings are unavailable. The facility's Staffing and Training criterion was rated as adequate. However, one sludge operator is required.
San Sebastián (New) (West Region)	1.5	During the evaluation period, the facility's Compliance was rated as poor. There were significant violations in Total Nitrogen. Also, minor exceedances related to TSS Removal, BOD Removal and Load Monthly, and Residual Chlorine. The facility's Operations and Process Control were rated as adequate. The operators perform the necessary sampling, following SOPs to adjust the process. However, the available version of the O&M manual was not updated, equipment manuals were unavailable, no NPW system and no odor control system were available, and faulty interior and exterior illumination. The chemical dosing modification is determined and conducted by the operator's experience. Emergency numbers were posted. The facility has adequate EGU for the capacity of the plant. The facility is located in a flood zone, and its appearance deteriorated. The facility's Equipment and Maintenance were rated as poor. Some of the major equipment was out of service. These were: (1) pump and (1) exhaust fan (ventilation) in the lift pump station for the primary clarifiers; (2) units, (2) scum collectors, (1) WAS pump, (1) blower of primary biofilter, (1) sump pump, (1) recycle pump, for the secondary clarifiers; (1) unit, (1) scum collector, (1) WAS pump, (1) digester tank, (3) digester's blowers, (1) exhaust fan for the disinfection room and (1) fuel day tank for EGU. Regional staff performs routine maintenance at the WWTP. The facility is in the CIP, and there are corrective maintenance challenges. The as-built drawings were unavailable. Regarding the facility's Staffing and Training criterion was rated as Adequate. However, the staffing needs at least one licensed operator to cover the facility's operating hours effectively and one maintenance personnel.

WWTP	2023 Score	Observations
San Germán (West Region)	1.5	During the evaluation period, the facility's Compliance was rated as poor. This category worsened significantly compared to the previous inspection. Significant BOD Removal (%) and TSS Removal (%) violations existed. Also, minor exceedances related to Phosphorous and TSS Concentration Monthly and Weekly. The facility's Operations and Process Control were rated as adequate. The operators perform the necessary sampling, following SOPs to adjust the process. Currently, the plant operates at a quarter of the design capacity, which creates problems for equipment maintenance and operations. The available version for the O&M was not updated. The equipment manuals for degritters were the only available manuals. The chemical dosing modification is determined and conducted by the sampling results. There are security cameras available at the plant. The facility has EGU with enough capacity for the entire plant. The facility's Equipment and Maintenance were rated as adequate. However, some equipment was out of service, such as two lift pumps, two grit pumps, one unit and four rotors of the oxidation ditch, one RAS/WAS pump, two fine screens for scum, one booster pump, and seven lamps of the UV system. Regional staff performs routine maintenance. The facility is not in the CIP and lacks as-built drawings. The facility's Staffing and Training criteria were rated as Adequate. One operator (new personnel) at the facility is pending certification.

WWTP	2023 Score	Observations
Corozal (North Region)	1.7	During the evaluation period, the facility's Compliance was rated as adequate. There was a SNC exceedance in Total Nitrogen for all the 12 months of 2022. Also, an MNC exceedance with TSS Concentration (Weekly). The facility's Operations and Process Control were rated as adequate. This category improved significantly compared to the previous inspection. Although the operators performed the necessary sampling to adjust the process, it had multiple missteps. O&M manuals were available but were not being used. Also, they were not updated (1992). Equipment manuals not available/used. The Emergency Response Plan (ERP) found is a 2020 version. No calibration plan for chemical feed pumps was established. There were no floating solids on the effluent during the visit. The lab has been moved to the operator's office and is rated as not Adequate. There is no NPW system or odor control. The bathrooms are adequate. Security cameras were recently added. The plant does not have a control room. Some areas for the access roads need improvement. The facility has adequate emergency power. Poor housekeeping and construction/equipment debris lying around. General safety and overall appearance are inadequate. The facility's Equipment and Maintenance were rated as poor. The facility needs to improve its pretreatment, comminutors, and degritter units. Several major units were deficient: the extractor for the pretreatment was corroded and out of service; the lift pump station showed deterioration and a missing hatch to wet pit pump; the pit area was difficult to reach and with poor appearance; diffusers at basin #1 out of service; clarifier #1 is out of service due to infiltration through scum collector; clarifier #3 has a damaged telescopic valve; digester diffusers need maintenance; dewatering system for the geotubes with limited capacity, and no NPW system onsite. For the disinfection system, a new Sodium Hypochlorite system. EGU is deteriorated and needs maintenance or replacement. Regional staff performs routine maintenance at the WWTP. Overall appearance is deficient, there are corrective maintenance and parts procurement process challenges, the facility is in the CIP, and the project is on hold. The available as-built drawings are in bad shape. The facility's Staffing and Training were rated as poor. However, one operator (new personnel) at the facility is pending certification. The facility needs at least one licensed operator and one at-large operator to operate efficiently. Also, there is a need for a TA.

WWTP	2023 Score	Observations
San Sebastián (Old) (West Region)	1.7	During the evaluation period, the facility's Compliance was rated as good. There were 12 months of violations for Total Nitrogen. The plant works at overcapacity sometimes until diverting the flow to the San Sebastián New WWTP. The facility's Operations and Process Control was rated as Unacceptable. The operators perform the necessary sampling to make adjustments to the process. The available version for the O&M was not updated. Equipment manuals were not available. There was no calibration plan for chemical feed pumps. The chemical dosing modification was determined and conducted by the operator's experience and sampling results. No odor control system or control room. The access road needs improvement. In different areas of the facility, the fences were broken. The entrance gate motor operates manually. The lighting at the facility is poor. The facility has been running with a rented EGU since 2018. The facility's Equipment and Maintenance were rated as adequate. However, the facility should address several maintenance issues. The main equipment to be repaired or replaced were: (1 out of 3) Lift Pump, (1 out of 1) Package Plant is leaking. There is no redundancy for Sodium Hypochlorite and Dechlorination injection systems. The chlorine building exhaust fan needs improvement. The roofs of #1 to #8 have water leaking. The main issue is that the EGU, rented since 2018, can only supply 60% of the plant's demand. Regional staff performs routine maintenance. The facility is not in the CIP and does not have as-built drawings. The facility's Staffing and Training criterion was rated as Adequate. The facility lacks one licensed at-large operator to cover vacations and sicknesses.
Aguas Buenas (East Region)	1.8	During the evaluation period, the facility's Compliance was rated as adequate. This category improved compared to the previous inspection. It had twelve months of exceedances in Total Nitrogen and one Phosphorous violation. The facility's Operations and Process Control were rated as adequate. The operator performs the necessary sampling to make adjustments to the process. However, the O&M manual is not updated, equipment manuals are incomplete, no jar tests have been performed, and the lab location is inadequate; it needs relocation, and the chemicals storage needs a door. The facility's Equipment and Maintenance were rated as Poor. Half of the facility was under repairs (Package Plant A). Pretreatment area with structural cracks and deterioration. No redundancy on dosing pumps for coagulation at the clarifier. The degritter system is out of service. The effluent area of discharge needs maintenance. The overall appearance was not adequate. Regional staff performs routine maintenance. CIP project 3-04-5035 seeks to eliminate the plant. The facility's Staffing and Training were rated as poor. Needs an additional license operator to operate efficiently. Training needs improvement: mostly virtual, more in-person, and practical training is required.

WWTP	2023 Score	Observations
Fajardo (East Region)	1.8	During the evaluation period, the facility's Compliance was rated as adequate. There were three exceedances of BOD concentration (monthly) and twelve months exceedances of Total Nitrogen. The facility's Operations and Process Control were rated as adequate. The operators perform the necessary sampling, following SOPs, to adjust the process. The available version of the O&M manual was not updated. Not performing Jar tests. The emergency generator unit needs an automatic transfer switch to operate automatically. Laboratory equipment and calibration were rated as Good. Some pipes were not colored appropriately. The plant has outsourced security. The facility has adequate communication tools. The facility's Equipment and Maintenance were rated as adequate; however, there are several maintenance issues. Main equipment to be repaired or replaced are: (1 out of 2) mechanical bar screen, (1 out of 2) aerated mechanism of degritter system, (2 out of 2) grit washer separators, (1 out of 3) BNR, (1 out of 3) BNR's blower, (1 out of 2) BNRs' nitrate return pumps, (20 out of 24) BNRs' mixers, (11 out of 15) Dissolved Oxygen (DO) sensors, (2 out of 3) secondary clarifiers, (3 out of 5) RAS pumps, (1) VFD of RAS pumps, (2 out of 2) blowers with extractors of secondary clarifiers, (5) flow meter of secondary clarifiers, (3 out of 5) inlet valves to disk filters do not close, (2 out of 2) digester's blowers, (1 out of 2) jet diffuser pumps, (1 out of 2) belt filter press, (1 out of 3) sludge pumps, (3 out of 3) extractors of dewatering system, (2 out of 3) booster pumps of dewatering system, significant unknown number of ultraviolet (UV) lamps, (2 out of 2) UV sensor, (2 out of 3) recirculation pumps, and (2 out of 3) NPW pump. The chemical application system, Tanfloc 45 (polymer for dewatering system), is applied by a drum. The drums of Tanfloc 45 are located without dike protection spillage. The septage receiving system is out of service, and an alternate system is used. Regional staff performs routine maintenance. There are corrective maintenance and parts procurement process challenges; the facility is not in the CIP, and as-built drawings are available onsite. The facility's Staffing and Training were rated as adequate. However, the facility requires one additional licensed operator. Training needs improvement.
Aibonito (East Region)	1.9	During the evaluation, the facility's Compliance was rated as good. Nonetheless, there were twelve months of non-compliance in Total Nitrogen. The facility's Operations and Process Control were rated as poor. The available version of the O&M manual was not updated. General safety was inadequate due to the corrosion in the biofilter and digester's stairs. Third-shift lighting was also not adequate. The facility's Equipment and Maintenance were rated as adequate. However, the plant should address several maintenance issues. The main equipment to be repaired or replaced are: (1 out of 3) transfer pumps from the primary clarifier to biofilter, (1 out of 1) scum collector and (1 out of 2) RAS pumps for secondary clarifier, (3 out of 3) sand filters, (1 out of 1) belt filter press, and (1 out of 1) NPW System. The degritter system was on standby. The filter media for biofilters are cleaned manually. Also, there is no redundancy for the disinfection and bisulfite application systems. Regional staff performs routine maintenance. The facility is in the CIP, and as-built drawings were available. The facility's Staffing and Training criterion was rated as Poor. However, one operator is pending for certification. Also, the WWTP needs three TAs.

4.2.2.3 Wells

PRASA owns and operates 238 water wells, most of which deliver water directly into a distribution system with little or no treatment except for disinfection by chlorination. PRASA's wells vary in size from 100 to 1,200 gallons per minute (gpm). A total of 20 wells (equivalent to 8% of total wells) from the Operational Areas of Caguas, Fajardo, Guaynabo, Arecibo, Toa Alta, Ponce, Yauco, Aguadilla, and Mayagüez were inspected in FY2023. The wells in the Bayamón Operational Area were not visited during this period. The San Juan Operational Area does not have wells. Arcadis inspected additional wells at the Arecibo, Ponce, and Aguadilla Operational Areas. The facilities were assessed using the following criteria: facility-specific and regional-specific criteria. The facility-specific evaluation criterion considers a specific facility's operations, process control, and equipment aspects. The regional-specific criterion considers maintenance aspects carried out on a regional or operational area basis and staffing and training aspects. Staffing and training were included to evaluate the adequacy of PRASA's assigned monitoring and operations personnel. The facility-specific (Operations/Process Control and Equipment) criterion was assigned a weighting factor of 75%, while the regional-specific (Maintenance/Training/Staffing) criterion was 25%. While compliance information is relevant to evaluating wells, this category was not included. The wells were rated as Good, Adequate, Poor, or Unacceptable. Refer to the FY2023 ACA for details on the criteria and factors evaluated for the wells inspected.

Out of the 20 wells inspected, three received a rating of Poor, seven were rated Good, and the remainder were rated Adequate under the overall rating criteria. Note that even though only three wells were rated as Poor, two (equivalent to 10% of the wells inspected) of the ten wells rated in the Adequate range received an overall rating below 2.0 and, if left unattended, their condition could deteriorate, downgrading their rating to Poor or Unacceptable rating in the future.

Table 4-7 summarizes the facility ratings by each of the evaluation criteria, as well as the overall facility rating. As previously stated, the facility-specific criterion accounts for 75% of the weighted factor, as it is the key criterion for assessing the condition of the wells. Three (15%) wells were rated as Poor, six (30%) were rated as Adequate, and 11 (55%) were rated as Good. In addition, this inspection cycle had significantly fewer Operational Areas in the Regional Evaluation category rated in the Poor range compared to previous inspections.

Table 4-7 Wells – Number and Percentage of Ratings by Category

Rating Range	Facility Evaluation		Regional Evaluation		Overall Rating	
	Number	Percent	Number	Percent	Number	Percent
Unacceptable (0-0.4)	0	0	2	10	0	0
Poor (0.5-1.4)	3	15	5	25	3	15
Adequate (1.5-2.4)	6	30	9	45	10	50
Good (2.5-3.0)	11	55	4	20	7	35
Average Rating	**2.3**		**1.6**		**2.2**	

Table 4-8 shows the wells that received a Poor rating in the facility-specific category with a summary of the deficiencies identified during the inspection. The regional-specific evaluations for Guaynabo, San Juan, Yauco, and Mayagüez Operational Areas for potable water systems were rated as Poor for the regional-specific category. The Fajardo, Toa Alta, Arecibo, and Ponce Operational Areas were rated as Adequate with fewer deficiencies. In the Aguadilla Operational Area, rated as Good, the issues reported included the unavailability of O&M/vendor manuals and the lack of a plan to implement major improvements. The Caguas Operational Area was rated as Unacceptable.

Table 4-8 Wells Rated as Poor in Facility – Specific Category

Facility	2023 Observations
Parquecito (East Region, Caguas)	The facility is visited daily. The remote monitoring (telemetry) was out of service. Distribution lines were not labeled nor color-coded. The chlorine injection system is not functioning properly. According to PRASA's personnel, this well was on standby and has been out of service since March 19, 2023. However, the overall facility appearance was satisfactory.
Bairoa Mall (East Region, Caguas)	The facility is visited daily. The remote monitoring (telemetry) was out of service. Distribution lines were not labeled nor color-coded. There were minor visible leaks and corrosion along the pipeline. No safety shower at the facility. One section of the fence is broken. The emergency phone numbers were not posted. Overall facility's appearance was not satisfactory.

PRASA should look into mitigation initiatives to address some deficiencies identified during the inspections. However, for now, these wells are expected to continue serving their intended supplemental water supply function. Two main concerns are that the waste lines were improperly color-coded, and corrosion was repeatedly observed in several wells.

Most deficiencies can be addressed through PRASA's R&R program and may not require major capital improvements. Note that PRASA has an aggressive capital improvement plan as a result of the projected inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) its needs; hence, the deficiencies identified as adequate, poor, or unacceptable are expected to be properly addressed in future years. In addition, future regulatory requirements may require significant capital improvements to include and achieve additional treatment capabilities at the well facilities or the closure of certain wells.

4.2.2.4 Water Pump Stations

PRASA owns and operates 1,136 WPSs and an additional 75 RWPSs. The WPSs consist of two major categories: 1) above-ground pumps and 2) below-ground pumps inside vaults with heavy covers that cannot be readily removed by field inspectors, such as underground booster stations, which are not inspected. PRASA's WPSs vary in pumping capacity from less than 100 gpm to over 9,000 gpm. A total of 30 above-ground WPSs (3% of total WPSs) were inspected. Each assessment consisted of a site inspection and an interview with the designated personnel. The facilities were evaluated using facility-specific and regional-specific criteria to better understand the facility's conditions and obtain an overview of the Regional Operational Areas. The facility-specific criterion considers its operations, process control, and equipment aspects. The regional-specific criterion considers maintenance aspects carried out on a regional or operational area basis and the staffing and training aspects. In addition, staffing and training were included to evaluate the adequacy of PRASA's assigned monitoring and operations personnel. Refer to the FY2023 ACA for additional details on evaluating the WPSs inspected.

Table 4-9 summarizes the facility ratings for each of the evaluation criteria, as well as the overall facility rating. The average WPS's overall rating is Adequate, with a score of 2.1. The facility-specific criterion accounts for 75% of the weighted factor, as it is the key criterion for assessing the condition of the WPSs. Four (13% of inspected WPSs) facilities were rated as Poor under this category, which includes Gabiña and Gino Pitaya, both from Fajardo Operational Area; Dos Millones, from Arecibo Operational Area; and Plata I, from Aguadilla Operational Area. Note that three WPSs were rated as Poor in the overall rating, and five facilities received an overall rating below 2.0; if left unattended, their condition could deteriorate, downgrading their rating to Poor or Unacceptable in the future. In addition, the overall Regional Evaluation of Operational Areas was rated as Unacceptable, Poor, Adequate, and Good.

Table 4-9 WPSs Number and Percentage of Ratings by Category

Rating Range	Facility Evaluation		Regional Evaluation		Overall Rating	
	Number	Percent	Number	Percent	Number	Percent
Unacceptable (0-0.4)	0	0	3	10	0	0
Poor (0.5-1.4)	4	13	12	40	3	10
Adequate (1.5-2.4)	9	30	12	40	18	60
Good (2.5-3.0)	17	57	3	10	9	30
Average Rating	**2.3**		**1.4**		**2.1**	

Table 4-10 lists the deficiencies of the facilities rated as Poor in the facility-specific category.

Table 4-10 WPSs Rated as Unacceptable or Poor in Facility–Specific Category

Facility	2023 Observations
Gabiña (East Region, Fajardo)	The remote monitoring (telemetry) was out of service, and there was no rotating operation of pumps. There were no adequate isolation valves on suction and discharge. There was a moderate to severe visible leak along the line. An adequate fence or gate did not protect the facility. However, the overall facility appearance was satisfactory.
Gino Pitaya (East Region, Fajardo)	The facility is visited twice a week. The remote monitoring (telemetry) was out of service, and there was no rotating operation of pumps since one pump was out of service. The facility does not have an EGU, and an adequate fence or gate did not protect it. The overall facility appearance was deemed not satisfactory.

Facility	2023 Observations
Dos Millones (North Region, Arecibo)	The facility is inspected daily according to PRASA's personnel, but the logbook was not updated. There was a moderate leak along the pipeline. The overall appearance of the facility was deemed not satisfactory.
Plata I (West Region, Aguadilla)	The facility is inspected daily. Remote monitoring was working properly. Not all pumps in service were available. The facility was missing a crane rail, and there were minor visible leaks and corrosion along the pipelines. The overall appearance of the facility was deemed not satisfactory.

The observed deficiencies in terms of the regional-specific category evaluations for Guaynabo, San Juan, Yauco, and Mayagüez Operational Areas for potable water systems, which were rated as Poor, were the following:

- Unavailability of as-built drawings
- Insufficient staff
- Lack of training

In addition to the above common deficiencies observed, the Guaynabo and Mayagüez Operational Areas indicated the unavailability of O&M/vendor manuals. Likewise, one other deficiency was observed in the Guaynabo Operational Area: the lack of a procedure to prioritize repairs. At the San Juan Operational Area we observed inadequate maintenance parts inventory and challenges in the parts' procurement process, which is slow.

PRASA's Operational Regions continue efforts under the IMP to install telemetry systems in all facilities to enable monitoring through Remote Operating Centers (ROCs). PRASA expects to properly address the deficiencies with the projected inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) it needs. PRASA has included several projects to address WPSs in its CIP program, and it is expected to see improvement in the following years.

4.2.2.5 Wastewater Pump Stations

PRASA owns and operates 830 WWPSs, which vary in pumping capacity from less than 100 gpm to over 10,000 gpm, depending on the population density and its proximity to the receiving WWTP. A total of 20 WWPSs were inspected in FY2023. Each assessment consisted of a site visit inspection and an interview with the designated personnel. The inspected facilities predominantly use wet pit-type submersible pumps, although several dry pit-type stations were also inspected. The overall results of the assessments of those stations are described below. Refer to the FY2023 ACA for additional details on the evaluation of the WWPSs inspected.

The facilities were evaluated using facility-specific and regional-specific criteria to better understand the facility's conditions and obtain an overview of the Regional Operational Areas. The facility-specific criterion considers a specific facility's operations, process control, and equipment. The regional-specific criterion considers maintenance aspects carried out on a regional or operational area basis and the staffing and training aspects. Staffing and training were included to evaluate the adequacy of PRASA's assigned monitoring and operations personnel. The facility-specific (Operations/Process Control and Equipment) criterion was assigned a weighting factor of 75%, while the regional-specific (Maintenance/Training/Staffing) criterion was 25%.

Out of the 20 WWPSs inspected, ten (50%) received an Adequate overall rating, four (20%) received an overall rating of Poor, and none were rated as Good and Unacceptable. Table 4-11 summarizes the facility ratings by each evaluation criteria and the overall facility rating for the facilities inspected.

Table 4-11 WWPSs – Number and Percentage of Ratings by Category[1]

Rating Range	Facility Evaluation		Regional Evaluation		Overall Rating	
	Number	Percent	Number	Percent	Number	Percent
Unacceptable (0-0.4)	0	0	0	0	0	0
Poor (0.5-1.4)	5	25	8	40	4	20
Adequate (1.5-2.4)	13	65	6	30	10	50
Good (2.5-3.0)	2	10	0	0	0	0
Average Rating	**1.9**		**1.3**		**1.7**	

[1]Results in this table do not include data from the Toa Alta and Arecibo Operational Areas (North Region) and Mayagüez Operational Area (West Region) in Regional Evaluation and Overall Rating since PRASA did not provide it.

The areas of opportunity in each facility that obtained a low score to improve its condition include replacing old equipment with new equipment or modifying the process control strategies. Table 4-12 lists the deficiencies of the five facilities rated as Poor in the facility-specific category.

Table 4-12 WWPSs Rated as Poor in Facility–Specific Category

Facility	2023 Observations
Dorado Club (North Region, Toa Alta)	The pump station's overall status is reported once a week. Remote monitoring was out of service, the pumping pit had floating debris, and the bar screen was not clean. The overall facility appearance was satisfactory.
Reina de los Ángeles (East Region, Caguas)	The pump station's overall status is reported regularly. The remote monitoring (telemetry), backflow preventer, and the wet well's exhaust fan were out of service. The overall facility appearance was satisfactory.
Santa Elena 2 (Metro Region, Guaynabo)	The pump station's overall status is reported frequently. Remote monitoring and wet pit exhaust fan were out of service, and the bar screen was not clean. The overall facility appearance was satisfactory.
Montebello (Metro Region, San Juan)	The pump station's overall status is regularly reported once a week. Remote monitoring (telemetry) was out of service. The pump station cannot handle peak flows with one pump out of service. The overall facility appearance was satisfactory.

Facility	2023 Observations
Los Caobos (South Region, Ponce)	The pump station's overall status is regularly reported three times a week. Remote monitoring (telemetry) was working properly. The EGU was in good condition, and the overall facility appearance was satisfactory.

The common deficiencies observed in terms of the Regional evaluations for Guaynabo, San Juan, Yauco, and Aguadilla Operational Areas for wastewater systems, which were rated as Poor, were the following:

- Unavailability of O&M/vendor manuals and maintenance records
- Maintenance parts inventory inadequate
- Lack of procedure to prioritize repairs
- Challenges in the parts procurement since the process is slow
- Unavailability of as-built drawings
- Lack of written procedures to handle emergencies
- Insufficient staff
- Inadequate training

The other operational area evaluated, Caguas, Fajardo, and Ponce, were rated as Adequate and had some of the previously mentioned deficiencies.

The deficiencies identified may not require significant capital upgrades but rather a modification to O&M practices or can be addressed through PRASA's R&R program. PRASA has included several projects to address WWPSs in its CIP, and it is expected to see improvement in the following years. As for the telemetry system, PRASA's priority is implementing it first at the WSTs and WPS, then the WWPSs.

4.2.2.6 Water Storage Tanks

PRASA owns and operates 1,568 WSTs that vary in storage capacity (size) from 100 to 10M gallons. A total of 30 WSTs were inspected in FY2023. Each assessment consisted of a site inspection and an interview with the designated personnel. The facilities were evaluated using facility-specific and regional-specific criteria to better understand the facility's conditions and obtain an overview of the Regional Operational Areas. The facility-specific criterion considers a specific facility's operations, process control, and equipment. The regional-specific criterion considers maintenance aspects carried out on a regional or operational area basis and the staffing and training aspects. Staffing and training were included to evaluate the adequacy of PRASA's assigned monitoring and operations personnel.

Out of the 30 WSTs inspected, 11 (37%) received a Good rating, 16 (53%) were rated as Adequate, and three (10%) were rated as Poor under the overall rating. Note that the average overall rating was in the Adequate range (2.2); four WSTs (equivalent to 13% of tanks inspected) received an overall rating below 2.0 and, if left unattended, their condition could deteriorate, downgrading their rating to Poor or Unacceptable in the future. In addition, the overall Regional Evaluation of Operational Areas was rated as Unacceptable, Poor, Adequate, and Good. Table 4-13 summarizes the facility ratings by each evaluation criteria and the overall facility rating. Emphasizing the facility-specific criterion, the WSTs rating distribution for this evaluation is as follows: two (7% of inspected WSTs) WSTs

were rated as Poor, 11 (37% of inspected WSTs) were rated as Adequate, and 17 (57% of inspected WSTs) were rated as Good.

Table 4-13 WSTs – Number and Percentage of Ratings by Category

Rating Range	Facility Evaluation		Regional Evaluation		Overall Rating	
	Number	Percent	Number	Percent	Number	Percent
Unacceptable (0-0.4)	0	0	3	10	0	0
Poor (0.5-1.4)	2	7	12	40	3	10
Adequate (1.5-2.4)	11	37	12	40	16	53
Good (2.5-3.0)	17	57	3	10	11	37
Average Rating	**2.4**		**1.4**		**2.2**	

The areas of opportunity in each facility that obtained a low score to improve its condition include replacing old equipment with new equipment or modifying the process control strategies. Table 4-14 lists the deficiencies of the two (7%) facilities rated as Poor in the facility-specific category.

Table 4-14 WSTs Rated as Unacceptable in Facility–Specific Category

Facility	2023 Observations
Juan Martín (East Region, Fajardo)	The facility is inspected once a month. The tank and water quality were not inspected. The local level indicator was not installed, there was no low- and high-level alarm, and remote monitoring (telemetry)was out of service. Also, minor cracking along the walls and minor exposed reinforcement steel. There was no adequate ladder to access the tank roof and no adequate fence. The overall facility appearance was deemed not satisfactory.
Hacienda Margarita (West Region, Fajardo)	The facility is inspected once a month. The tank and water quality were not inspected. The local level indicator was not installed, there was no low- and high-level alarm, and remote monitoring (telemetry) was out of service. Also, severe cracking along the walls with minor leaks through the cracks. There was no adequate ladder to access the tank roof. The overall facility appearance was deemed not satisfactory.

The observed deficiencies in the Regional evaluations are the same as described in the WPS section for potable water systems. PRASA has included several projects to address WSTs in its CIP, and it is expected to see improvements in the following years. In addition, remote monitoring is still recommended for visualization of tanks' levels and as a preventative measure against water losses in the distribution system. PRASA continues this initiative by providing remote monitoring to those tanks identified as critical in the distribution system.

4.3 Buried Infrastructure

Although buried infrastructure (i.e., water meters, water transmission and distribution pipes, buried valves, sewer trunks and collection pipes, and manholes) was not inspected, this section discusses indirect indicators of the condition of the buried infrastructure. PRASA continues to invest in developing and updating its Geographic Information System (GIS) database to better control, record, and manage its buried assets. Also, PRASA slowly continues with its buried infrastructure R&R program, mainly managed and implemented by the Operational Regions and as their assigned budget allows. R&R of distribution (water) and collection (wastewater) pipes, which target pipe breaks and leak-prone areas, are identified by PRASA's Operational Areas and prioritized according to the severity of the problem. Water meter replacements are programmed and managed through PRASA's NRW Reduction Program.

4.3.1 Water Meters

PRASA owns over 1.4M water meters ranging in diameter from 5/8 to 12 inches. PRASA continues its meter replacement initiative under the Revenue Optimization Program. As reported by PRASA, about 823,785 small meters (1-inch in diameter or less) and over 5,868 large meters (greater than 1-inch in diameter) were replaced between FY2009 and FY2023. However, due to PRASA's fiscal situation in the past few years, the initiatives included in the Revenue Optimization Program have been slowed down, and meter replacements are proceeding conservatively. As a result, about 51,538 small and 176 large meters were replaced during FY2023. These replacements were mainly due to maintenance, theft, or special client requests.

Due to available federal funding, PRASA focuses on planning and implementing the 2023 PRASA Fiscal Plan. One of the main initiatives in the Fiscal Plan is implementing a project to modernize PRASA's metering system, improve billings and collections, and reduce NRW. This initiative has been included in the Arcadis Program Management Consultant (PMC) CIP. In addition, PRASA will reactivate its meter replacement initiative utilizing advanced metering technology. Additional information on the metering system and NRW activities and initiatives are included in Section 4.3.2 and Section 5.6.

4.3.2 Water Distribution System

Based on PRASA's GIS updated in March 2023, PRASA owns over 15,250 miles of water pipelines, including transmission and distribution pipes ranging from 2 to 72 inches in diameter. As in previous years, Arcadis did not inspect the water transmission and distribution system. However, it is reasonable to assume that a portion of the water distribution system will require structural repairs and rehabilitation to reduce leakage.

NRW is water that has been produced but is not billed to customers. However, not all NRW is due to water losses. NRW has three main components: unbilled authorized consumption, commercial (apparent) losses, and physical (real) losses. Combined, commercial and physical losses comprise the System's water losses. Unbilled authorized consumption comprises unbilled metered and unmetered consumption, including water used by PRASA (measured and estimated) for operational and internal purposes and firefighting. Examples include potable water service provided to PRASA's facilities, water used to wash and clean PRASA's tanks and sanitary pipelines, tanker trucks for communities with deficient water service, firefighter usage, etc.

Table 4-15 summarizes key water distribution system metrics since FY2019, including current levels of water production, water losses, and NRW, as reported by PRASA. PRASA's NRW levels have recently started to decrease in FY2022.

Table 4-15 Water Losses and Non-Revenue Water

Fiscal Year	Total Water Production (MGD)[1]	Water Losses	Non-Revenue Water
		(MGD)	**(MGD)**
FY2019	542	342	349
FY2020	541	352	359
FY2021	551	356	368
FY2022	519	328	339
FY2023	513	310	328
Difference FY2023-2022	**-6**	**-18**	**-11**
Cumulative Difference FY2019-2023	**29**	**32**	**21**

[1] Includes a metering-error adjustment identified by PRASA in its water balance audits.

According to the FY2023 Fiscal Plan, PRASA aims to reduce water losses by 64.1 MGD by FY2028 by successfully implementing the WRO's three main programs:

- Master Meters: This initiative includes the installation of water meters at critical facilities to measure water production accurately.
- Pressure Management: This initiative includes installing best practices across the transmission and distribution network.
- Leaks Detection and Reduction: This initiative will aid PRASA with identifying, prioritizing, and resolving major leaks detected in the system.

PRASA recognizes that reducing its NRW and water loss volume and, in turn, its water production will positively affect its operations, financial results (lower O&M expenses and higher revenues, for example), and sustainability practices. Therefore, reducing NRW is one of the top priorities and is one of the main objectives of the 2023 PRASA Fiscal Plan.

In addition, PRASA's NRW office continues to focus on refining the validity and credibility of the data of the annual water audits and reducing NRW by, among other measures, continuing the Revenue Optimization Program, installing flow meters at PRASA facilities to measure more significant percentage of the authorized unbilled consumption and reducing the unmetered production by installing additional flow meters at WTPs to measure daily production to distribution flows adequately. PRASA aims to reach a metered reading of 94% of the water production by the end of FY2024. During FY2023, PRASA exceeded the expected goal of 93%.

4.3.2.1 Leak Monitoring and Control

Table 4-16 shows that leaks reported in FY2023 amounted to 61,102 and the average annual leaks per 100 miles of water piping for recent fiscal years. In FY2023, there was an increase of approximately 4% compared to FY2022.

PRASA's reported rate of leak occurrence continues to be extremely high compared to other utilities in the United States and Canada (average annual combined leaks and breaks per 100 miles are between 7.2 and 36.1, with a

median of 18.8)[7]. Although this high rate is not surprising, given the existing infrastructure's age, size, complexity, and significant changes in elevations of the System, it still influences PRASA's NRW.

Table 4-16 Reported Leaks from FY2019 Through FY2023

Fiscal Year	Total Annual Reported Leaks	Annual Leaks per 100 miles Using 15,219 miles of Water Pipeline
2019	57,997	393
2020	56,536	383
2021	56,831	375
2022	58,553	385
2023	61,102	401

Source: PRASA Systems, Applications, and Products in Data Processing (SAP) (Commercial) Database.

Refer to the FY2023 ACA for additional details on statistics related to leaks and the backlog of repairs. Regarding the water storage tank's overflow issues, PRASA has been implementing continuous monitoring of water storage tanks across its Operational Regions to help control and minimize overflow (water losses) occurrences as funds become available and repair prioritization allows. In addition, to help optimize the System's operation and reduce potential leaks through valves, PRASA has included its pressure regulator/sustaining valves in the IMP and has indicated that it is training its employees to carry out the necessary maintenance activities.

4.3.3 Wastewater Collection System

PRASA's GIS, updated in March 2023, shows that PRASA owns approximately 5,811 miles of wastewater pipelines. Although the wastewater collection system was not inspected, it is reasonable to assume that a significant portion of the system will require structural repairs and rehabilitation (replacement) to reduce inflow, infiltration, and overflow occurrences and address the impacts of damaging events.

4.3.3.1 Overflow Monitoring and Control

PRASA indicates that overflows reported in FY2023 were 27,888 (refer to Table 4-17). Note that data is unavailable for the frequency of overflows in (a) combined sewer systems compared to separate systems or (b) dry weather overflows compared to wet weather overflows. Dry weather overflows are often caused by (a) insufficient cleaning and maintenance of the collection system, resulting in a buildup of roots or grease, restricting or blocking flow, or (b) pump station failures due to old or insufficiently maintained equipment, poor design, or lack of reliable backup power supply. Wet weather overflows indicate leaking sewers, stormwater connections to sanitary sewer systems, or under-sized pipes or pump stations.

Table 4-17 also shows the average annual overflow occurrence per 100 miles of sewer. In FY2023, an average of 526 overflows per 100 miles of sewer were reported. In FY2022, an average of 549 overflows per 100 miles of sewer were reported. In FY2021, an average of 467 overflows per 100 miles of sewer were reported. As with the

[7] Source: 2022 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

increase from FY2021 to FY2023, Arcadis has not made an independent evaluation to identify the root causes of this increase. In FY2020, there was a negligible increase of 1% in reported overflows. In FY2021, there was an increase of 5% in reported overflows. In FY2022 to FY2023, there was a negligible decrease of 2% in reported overflows.

PRASA reported rate of overflow occurrence continues to be extremely high compared to other utilities in the United States and Canada, with combined operations (average annual overflows) per 100 miles between 0.6 and 9.0 overflows (with a median of 3.3)[8]. However, this high rate is not surprising given the size and complexity of the System. Contributing factors to these high overflow rates could be aging infrastructure, damages from hurricanes and earthquakes, and inadequate customer use (i.e., illegal connections and discharges).

Table 4-17 Reported Overflows from FY2019 through FY2023

Fiscal Year	Reported Overflows	Annual Overflows per 100 miles Using 5,811 miles of Wastewater Pipeline
2019	27,253	455
2020	27,478	455
2021	28,769	467
2022	28,555	549
2023	27,888	526

Source: PRASA SAP (Commercial) Database.

Refer to the FY2023 ACA for additional details on statistics related to weekly overflows and the backlog of overflow repairs. PRASA continues to work towards improving its sewer overflow response time and metrics tracking across its Operational Regions. Also, PRASA continues with the Fats, Oils, and Grease (FOG) Program, which helps reduce overflows.

4.4 Conclusions

Arcadis visited 180 facilities throughout PRASA's five Operational Regions between January and April of 2023 to conduct a condition assessment of PRASA's facilities. Of the inspected facilities, 80 (44%) were treatment (WTP and WWTP) facilities. The assessment included a visual inspection of the physical condition of the equipment and the facilities, process controls, and an evaluation of the regulatory compliance performance, O&M practices, staffing, and training. Table 4-18 summarizes the inspection's overall rating results. The data indicates that only 18% of the facilities inspected in FY2023 are in Good condition, and 68% are in Adequate condition. However, 26% (31 of 119) of the facilities rated as Adequate are below 2.0. If unattended, the condition of these facilities could continue to deteriorate and fall to a Poor or Unacceptable rating in the future.

Fourteen percent of the facilities are in the Unacceptable to Poor range. The major concern is the facilities' physical condition. However, PRASA expects to properly address several deficiencies highlighted by the projected inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) the System needs. In addition to the physical condition, the Staffing and Training criterion impacts the overall condition of the facilities. This

[8] Source: 2022 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

criterion was mostly affected by the ongoing personnel turnover and the need for certified operators and other support staff for the treatment facilities.

Table 4-18 2023 vs. 2022 Asset Condition Inspection Results Summary

Asset Category	Unacceptable		Poor		Adequate		Good		Total	
	2023	2022	2023	2022	2023	2022	2023	2022	2023	2022
Dams	-	0	-	4	-	4	-	0	**-**	**8**
Water Treatment Plants	0	0	1	0	52	45	4	3	**57**	**48**
Wastewater Treatment Plants	0	0	10	8	13	16	0	0	**23**	**24**
Wells	0	0	3	4	10	14	7	2	**20**	**20**
Water Pump Stations	0	3	3	10	18	17	9	3	**30**	**33**
Water Storage Tanks	0	0	3	2	16	21	11	8	**30**	**31**
Wastewater Pump Stations	0	0	4	7	10	13	0	0	**14**	**20**
Total	**0**	**3**	**24**	**35**	**119**	**130**	**31**	**16**	**174**	**184**
Percent of Total	**0%**	**2%**	**14%**	**19%**	**68%**	**71%**	**18%**	**9%**	**-**	**-**

(1)Results in this table do not include data from the Toa Alta and Arecibo Operational Areas (North Region) and Mayagüez Operational Area (West Region) in Regional Evaluation and Overall Rating since PRASA did not provide it.

Comparing the assessment results by asset category with those of the FY2023 condition assessment for treatment plants (WTPs and WWTPs), negative changes were observed for WTPs and WWTPs. Also, the overall rating for ancillary facilities increased to different degrees for Wells, WPS, WST, and WWPS.

4.4.1 Water and Wastewater Treatment Plants

Compliance with discharge permit limits and drinking water standards varied depending on the plant age, equipment condition, and process control. The overall compliance rating for WTPs was Good, with a 2.8 rating, and WWTPs were on the upper end of Poor, with a 1.2 rating. Based on the regulatory compliance results evaluated for this report, despite some operational (process control) and minor compliance issues, the water treatment facilities are generally producing and delivering potable water. Also, despite some concerns with compliance issues, WWTPs continue conveying and treating wastewater adequately. The WTP compliance results show that facilities generally perform better concerning compliance with the Safe Drinking Water Act (SDWA) and effluent discharge parameters.

Note that results might be misleading since several NPDES parameters only had interim limits or required monitoring. Whether the facility can meet the actual (permanent) limits when the interim/monitoring term expires is unknown. It is safe to say that interim limits will likely continue until PRASA can perform improvements, whether capital or non-capital, to improve the facilities' equipment to meet compliance requirements.

Overall, the WTPs inspected are mostly in Adequate condition. To the extent that the physical structures and operational and process controls are maintained or improved, they are expected to continue to serve their intended purpose of providing potable water supply in compliance with applicable regulations. Compared to the FY2022

inspection results, all criteria scores decreased. The Equipment and Maintenance criteria rating scores have remained fairly constant for the past years; this can be attributed to the same equipment being out of service or deteriorating, as previously reported.

The WWTPs generally range from Poor to Adequate conditions in the overall rating. Out of the 23 facilities inspected, 10 (43%) received a Poor overall rating, and 13 (57%) received an Adequate rating. Five of those ten facilities had a Poor rating in terms of Equipment and Maintenance. Compared to the FY2022 inspection results, Regulatory Compliance scores decreased despite interim limits or monitoring only on certain parameters. The Operations and Process Control and Equipment and Maintenance scores decreased while the Staffing and Training criteria decreased. The facilities' physical condition is the main concern. Process Control is also challenging in some facilities, even though plant operators indicated that SOPs and control strategies are followed. Also, PRASA must plan and make the necessary improvements to WWTPs and WTPs so that when the interim limits are lifted, the facilities can meet the permanent limits.

4.4.2 Wells, Water and Wastewater Pump Stations, and Water Storage Tanks

Regarding ancillary facilities, the facility criteria rating of wells, WPS, and WST increased significantly but remained at the Adequate. PRASA has included in its CIP program several projects to address WPSs, WSTs, and WWPSs, and it is expected to see improvements in the following years.

PRASA should address the deficiencies identified during inspections to improve the physical condition of its ancillary and treatment facilities, achieve/maintain continuous and consistent compliance, and optimize O&M expenses. Also, PRASA needs to upgrade its STS systems and make the necessary improvements so that when the NPDES interim/monitoring limits are lifted, they have the necessary tools and conditions to meet the permanent limits established in each WTP's NPDES permit. In addition, PRASA should continue to standardize processes and provide more tools and training to operators regarding process controls and actions to facilitate and improve plant operations and performance and optimize O&M expenses. PRASA should consider operational improvements, including new process control equipment and system automation, since Operators depend on manual operation for several processes. Also, based on the ratings and interviews with the operational staff during the site visits, it is evident that the lack of treatment plant operators and staffing needs is a concern.

4.4.3 Buried Infrastructure

To reduce NRW, PRASA continues to improve its leak detection, repair, and monitoring practices. By applying the established NRW reduction initiatives, PRASA has helped reduce water production and losses. The 2023 PRASA Fiscal Plan WRO's main initiatives are pressure management and optimization, water leak reduction (reported and unreported); WST overflow avoidance; and data quality improvement (reduce estimation), which shall help reduce physical water losses. The provision of meters or mechanisms to measure the water discarded as part of the System will allow PRASA to separate that water from the actual NRW from unbilled authorized consumption, commercial (apparent) losses, and physical (real) losses. Although the number of sanitary overflows is also high compared to the United States, PRASA has maintained its response time and attention/repair effectiveness to minimize these overflow events' duration and environmental impact. Prompt identification and actions enabled by remote monitoring should help PRASA mitigate overflows in the System. In addition, adding pre-treatment (screens, comminutors) and preventive maintenance to facilities would help lessen overflows.

4.4.4 Outlook

Because of the size and complexity of the System, it is reasonable to state that the System will continue to require significant capital investments and continuous maintenance and repairs. Also, it is likely that as the System ages and new compliance regulations are implemented, an additional O&M budget may be necessary to address maintenance, repairs, and compliance requirements.

5 O&M Practices and Strategic Plan

5.1 Introduction

Arcadis assessed the adequacy of PRASA's O&M practices, benchmarked O&M budgets, and obtained information from PRASA departments on implementing key operational and strategic initiatives. Arcadis used the information and facility observations obtained through the asset condition assessment efforts presented in Section 4 to develop this section. A summary of the O&M highlights, O&M costs (benchmarked against other industry utilities), and PRASA's Strategic Plan, programs, and operational initiatives are included in this section.

5.2 Facility O&M

Several WTP and WWTP facilities reported exceedances in compliance treatment parameters during the evaluation period due to the lack of appropriate tools for executing the O&M practices and the outdated versions of O&M manuals and equipment manuals. There are also deficiencies in other areas, such as no potable water flow meter, no calibration plan for the chemical feed pump, lack of control rooms, operators not performing jar tests consistently, inadequate pipe labeling, poor lighting, no working emergency generator unit, issues with the automatic transfer switches, and deficient housekeeping. Despite having some operations and process control issues, the WTPs deliver potable water adequately. Various WWTPs face challenges due to process control or equipment issues.

PRASA should consider operational procedure improvements like standardization of processes and providing more tools and training to operators on process controls and actions to facilitate and improve plant operations and performance. Also, including new process control equipment and system automation would benefit PRASA to help operators move from manual operation to automated processes. There is also room for improvement concerning prioritization, scheduling, and execution of corrective and preventive maintenance activities for optimizing and strengthening the System.

Despite all the challenges faced by PRASA in recent years, including slow recovery from the impact of Hurricanes Irma and María in 2017, a series of earthquakes in 2019 and 2020, the COVID-19 pandemic, and Hurricane Fiona in 2022, most of the facilities have been brought to operational status and continue to serve their intended purpose of providing potable water supply and treating the wastewater. However, it becomes imperative that projects and operational actions necessary to address the damages and improve conditions are implemented to guarantee safe drinking water production and wastewater treatment in compliance with applicable regulations. PRASA expects to properly address the deficiencies with the projected inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) its needs.

5.3 O&M Costs

PRASA continues to become more efficient by exercising greater management controls to reduce O&M costs and implementing various operational programs and initiatives.

PRASA's FY2023 O&M expenses preliminary projection for the water and wastewater system (combined) is approximately $820M (as of December 2023), of which $753M are directly related to the O&M of the System. The remainder of $67M is related to commercial activities and provision of customer services, including but not limited to

staffing and operation of customer service offices island-wide; meter reading; connection and disconnection services; invoice preparation, printing, and distribution; and customer service call centers, among others. PRASA estimates that during FY2023, approximately 73% of its System's O&M budget ($549M) was allocated to the water system and the remaining 27% ($173M) to the wastewater system. Estimated costs per million gallons (MG), per customer account, and per 100 miles of pipe for combined utilities' operations are summarized in Tables 5-1 and 5-2. A comparison to benchmark values is also provided.

Table 5-1 PRASA FY2023 O&M Water System Budget Benchmarks

Performance Indicator	FY2023 PRASA	2022 AWWA Benchmark Median[1]
Cost per Account[2]	$434	$436
Cost per MG Processed[3]	$2,934	$2,894
Cost per 100 miles of pipe[4]	$3,607,721	$2,785,179
Total O&M System FY2023 Results	$549M	-

[1] Source: 2022 AWWA Utility Benchmarking: Performance Management for Water and Wastewater. Values are rounded.
[2] Based on the total accounts at the end of FY2023 of 1,264,390 (water accounts) and 780,170 (wastewater accounts).
[3] Based on FY2023, total water production and distribution of approximately 513 MGD of potable water.
[4] Based on 15,230 miles of water pipeline obtained from PRASA's GIS Database.

Table 5-2 PRASA FY2023 O&M Wastewater System Budget Benchmarks

Performance Indicator	FY2023 PRASA	2022 AWWA Benchmark Median[1]
Cost per Account[2]	$222	$438
Cost per MG Treated[3]	$2,062	$2,449
Cost per 100 miles of pipe[4]	$2,979,113	$3,043,226
Total O&M System FY2023 Results	$173M	-

[1] Source: 2022 AWWA Utility Benchmarking: Performance Management for Water and Wastewater. Values are rounded.
[2] Based on the total accounts at the end of FY2023 of 1,264,390 (water accounts) and 780,170 (wastewater accounts).
[3] Based on FY2023, total treatment of an estimated 230 MGD of wastewater.
[4] Based on 5,811 miles of wastewater pipeline obtained from PRASA's GIS Database.

5.3.1 Chemical Expenses

In FY2023, chemical-related expenses were one of the largest operating expenditures at nearly $70M. PRASA's efforts to reduce overall chemical costs include non-capital initiatives such as procurement strategies and better handling of chemical usage. However, rising costs associated with chemical production and the compliance requirements for water quality have offset efforts to generate savings.

The chemical cost increase is out of PRASA's control since supply and demand market factors drive it. PRASA will continue to identify alternatives for chemical usage related to the System. In addition, PRASA issued a Request for Proposal (RFP) to hire an outside firm to evaluate the chemical selection process, inventory, costs, and purchase

strategy, among others, to identify additional cost savings opportunities. Two proposals are under evaluation, and selection is expected in FY2024.

5.4 Department Updates and Regional O&M Highlights

Arcadis conducted meetings with key PRASA department directors and other personnel to obtain an update on the various initiatives and activities for FY2022. A summary of the information provided by PRASA during the discussions is detailed in the following sub-sections.

5.4.1 Department Updates

5.4.1.1 Human Resources

At the end of FY2023, PRASA had a total staff headcount of 4,551. Staff decreased by 1.2% from FY2022 to FY2023; hence, staff limitations remain one of the greatest challenges for achieving efficiency. Plant operators, electromechanics staff, and maintenance crews are still needed island-wide. PRASA's Human Resources (HR) Department is currently focusing on these main objectives: 1) achieving PRASA's headcount goal of 4,950 employees by FY2028 (with no vacant positions) as presented in the 2023 PRASA Fiscal Plan, 2) understanding and implementing the requirements included in the series of acts that have been passed in recent years related to labor relations and 3) increase employee salary compensation to align with the labor market.

Ongoing initiatives by the HR Department include:

- The Voluntary Pre-Retirement Program was created in FY2016 due to the fiscal situation and incentivized eligible employees to retire early voluntarily. Although this program is no longer adding employee beneficiaries 216 employees remained in the program during FY2023.
- Implementation of "Smart Tools", a program used for recruiting purposes.
- Create job requisitions and advertise in various media outlets to attract candidates and qualified resources for the different positions.
- The plant operator candidates are given a tour of the facility before hiring to get exposure to the working environment and confirm if expectations align.
- My Portal Application: With this mobile application, employees can view their leave balances, access their W-2 forms, and request training. My Portal Application will integrate with SAP to obtain employee information.
- Updating in-house training modules and staff qualifications.

PRASA implemented the new pay scales in FY2023, except for appointed employees, to benefit all labor groups at PRASA. These changes are expected to improve personnel recruiting and retention, which may increase operating efficiencies. Further updates to compensation are recommended to focus on difficult recruiting positions. This approach will facilitate the growth of essential skills and foster avenues for career progression.

5.4.1.2 Customer Service

PRASA's Customer Service Department continues to focus on measuring and implementing metrics to improve invoicing, collections, billing adjustments, customer service complaints, service interruptions, service quality, actual meter readings, and waiting time in commercial offices and call centers.

PRASA is currently operating 12 commercial offices. Visits can be scheduled by appointments or walk-ins. PRASA has two private call centers currently contracted to assist with customer calls. In addition, PRASA has a mobile phone application in which customers can report service interruptions and/or pay their bills.

The Customer Service Department continues to measure KPIs set for measuring actual consumption at each water meter instead of estimating the quantity. In addition, PRASA plans to replace all the water meters in Puerto Rico with ultrasonic or electromagnetic technology. PRASA is awaiting to sign contracts with two proponents in to commence the pilot and select one proponent for the full deployment starting FY2024.

During the past several years, PRASA has worked with government accounts to reconcile outstanding balances and accelerate the collection of payments. As a result, government accounts (water consumption) are being read accurately in all Regions. This initiative has succeeded in recovering $185M through FY2023.

As the Department shifts its efforts into new projects, such as the Automatic Meter Reading and/or Advanced Metering Infrastructure (AMI) system, which will not require manual meter readings, they are looking at restructuring the positions at the Department as initiatives are being implemented. The Department is also updating SOPs and is currently working on SOP Nos. 601, 603, and 608.

5.4.1.3 Purchasing and Logistics

PRASA's Purchasing and Logistics Department operates mainly from the Central Administration Building but has personnel assigned to each region. There are various vacancies throughout the Department due to personnel turnover, including purchasing analysts, drivers, warehouse security guards, TSOs, and supervisors.

Since 2017, the Department has been developing a system to manage the inventory at each warehouse. This initiative is called Warehouse Management (WM) and was implemented successfully in Arecibo and Humacao in August 2022 and June 2023, respectively. WM will help identify, control, and manage inventory by:

- Reducing the inventory quantities discrepancies,
- Optimizing the use of the warehouse,
- Facilitating the execution of the cyclical count,
- Having information on the physical location of each material,
- Streamlining the time of operations within the warehouse and
- Being able to operate directly from the warehouse with mobile devices.

The WM initiative was scheduled to be fully implemented in FY2023 for Puerto Nuevo, Coamo, Aguadilla, and San Germán warehouses. PRASA plans to fully implement this initiative at all warehouses in the future. Note that Puerto Nuevo is piloting the WM system to track chlorine cylinders (150 pounds and 1 ton) and will go live at the end of September 2023. Also, the Department completed the purchase of new chlorine cylinders to replace the ones that do not pass the hydrostatic test due to aging. PRASA owns cylinders that are more than 50 years old, and in FY2023, the 116-ton cylinders and 100 150-pound cylinders were replaced.

Due to a lack of funds, the Department has not been able to create a new materials catalog. The Department plans to execute this activity in the future. The project for installing security cameras at the warehouses is still on the list, but funding has not been allocated. During Hurricane María, some of the cameras were damaged, and PRASA is looking to use FEMA funds to replace them at the following warehouses: Aguadilla, Trujillo Alto, Ponce, and Arecibo.

The Purchasing Department established a standby approval process, which includes nine resources that take turns reviewing and approving purchasing requests after regular working hours. They continuously update the software SAP R/3 with the Systems and Information Technology (IT) Department to improve workflow and reports.

Refer to Section 5.3.1 for an update on initiatives to reduce chemical costs. On a biweekly basis, the Department evaluates alternatives for chemical use. For example, at two WTPs, Enrique Ortega and Cubuy, PRASA has an active contract (3-year term) with AquaTech to purchase and optimize the use of chemicals at these specific facilities as a cost-saving initiative.

During FY2023 and FY2024, the Purchasing Department plans on updating two SOPs related to Procedures Nos. 399 and 400 to align with the updates to Law 73 from *Administración de Servicios Generales (ASG)*. Also, improvements will be established to the warehouses in the East Region, including air conditioning in Aguadilla and Yauco and rolling doors at Ponce and Mayagüez.

The KPI metrics being monitored by each region and island-wide every three months are:

- KPIs for average days for SOLPE (*Solicitud de Pedido* in Spanish) approval
- KPIs for average days for SOLPE to purchase orders
- KPIs for average days for purchase order approval
- KPIs for average days for the whole process
- KPIs for emergency orders
- KPIs for bids and reserves

5.4.1.4 Systems and Information Technology

The Systems and IT Departments continue the development of information technology areas and the implementation of various initiatives to improve software and hardware practices. The most important projects IT worked on during FY2023 include:

1. Updating SAP platforms in different departments and adding functionalities to the system.
2. Implementing 'Manage Engine Service Desk' to track IT service tickets.
3. Updating Kronos UKG to the latest version. The previous version was outdated and could no longer receive support.
4. Ensuring all computers in PRASA's system are running Windows 7.
5. Replace all core switches proactively island-wide. Previously, PRASA used the core switches run to fail, and once the equipment failed, communications at the WTPs or WWTPs were interrupted.
6. All employees have been provided with a corporate email address. This process will help the HR Department with the tracking of training.
7. Implemented RICOH print control software in all printers; this allows employees to print in any printer with their PRASA identification.
8. Implemented SIAH *(Sistema de Inspección Atomizada de Hidrantes)* – The approval of the Memorandum of Understanding between PRASA and the Puerto Rico Fire Department was executed. This application enhances the hydrants' inspection process.
9. Implementation of the new infrastructure for backup. This new infrastructure will be able to back up all information in PRASA's servers and provide anti-ransomware protection in case of a future threat against PRASA's data.

10. Mitigation of the current web platform *acueductospr.com* to a web flow in the cloud to secure client data.

The Systems and IT projects that will have the greatest impact on PRASA soon in FY2024 are:

1. Migrate website and customer service portal to acueductos.pr.gov by January 2024.
2. Implement a new telephone service island-wide
3. Integration of SCADA (Supervisory Control and Data Acquisition)-GIS- SAP platforms
4. Implementation of the “Manage Detection and Response” cybersecurity initiative
5. Meter Asset Management Application will be implemented during the second quarter of FY2024.

The IT Department continues to support all the departments within PRASA. Ongoing tasks include maintaining the IT equipment and infrastructure, updating PRASA’s website to comply with design guidelines established by the Government of Puerto Rico, and ensuring compliance with Puerto Rico Innovation and Technology Service (PRITS), among others.

5.4.1.5 Communications

PRASA’s Communications Department continues to focus on improving the utilization of PRASA’s website and social media platforms such as Instagram, Twitter, Facebook, YouTube, and LinkedIn. The quick availability of information and images from social media also allows PRASA to respond faster to its customers. PRASA continues using social media as an educational platform by constantly sharing information on treatment processes, their infrastructure, and project updates. Social media platforms are also being used to share information on repair status (including pictures of crews working), service interruption, construction projects, special events, retirements, employee and facility recognition programs, official campaigns, etc., to keep the public informed of ongoing and resolution of operational situations. Press conferences, design meetings, and other events are also shared on social media. Regional Communications Directors are in charge of producing materials for the accounts, and each director is responsible for addressing comments and messages on the posts. Note that the program to recognize the different facilities is named *Orgullo* and showcases before and after pictures of repairs performed at the facilities.

The Communications Department, in coordination with the IT Department, continues to update and improve PRASA’s website, which includes an investor relations section, Consent Decree information, press releases, the virtual office, information related to seasonal events (e.g., water service interruptions, hurricane season, water conservation, etc.), among others. The Department also incorporated an interactive map with information on the Infrastructure Department CIP projects. During FY2024, the website will be moved to a secure government domain, and the Communications Department will assist with the content and graphic design.

Two key positions related to the educational program and webmaster are pending to be filled in FY2024. Although the position has not been posted, the Department also needs an editor to improve the videos to be posted on social media.

The Communications Department's ongoing initiatives include:

- The internal newsletter *Boletin Digital,* including updates from all the Regions, is published once a month.
- Through YouTube, the Communications Department has been producing *AcueductosTV* once a month, focusing on educational programs and information on the different departments. At the end of FY2023, PRASA did not post monthly episodes and aims to post videos in FY 2024.
- The media tour for the infrastructure projects was introduced during FY2022 and will continue through this FY. This tour collaborates with the regional communications directors and the Infrastructure Department to promote CIP projects through social media, radio, TV, and the press.

- Educational events are in person unless the school or center asks for an online course. PRASA's participation in public events is ongoing.
- The Water Conversation Program (South Region Aquifer and the Guajataca Dam) and Educational campaigns related to grease traps and clean pipelines are ongoing.
- PRASA continues to use the hashtag #somosAAA.
- A recognition program was implemented in FY2022, and they continue promoting different departments throughout PRASA. The Department also creates posts on social media in collaboration with the HR Department to recognize employees with 20, 25, and 30 years of service. The recognition of the employees with 30 years of service was completed in FY2023, and during FY2024, the employees with 20 and 25 years of service will be recognized.
- Assist the WRO office with the logo and graphics for the College of Engineers and Land Surveyors of Puerto Rico (CIAPR by its acronym in Spanish) seminars and will continue to assist during FY2024 in February.
- Assist all departments with campaigns in addition to campaigns for droughts, hurricane season, etc.
- Adopt a Nonprofit Entity – This initiative started in FY2022 to assist the selected entity in each region. PRASA participated in various events and plans to participate in at least one quarterly event during FY2024.
- Visit each region to monitor the progress of all the projects.
- Collaborate in various campaigns with other governmental agencies, including *Administración de Servicios de Salud y Contra la Adicción* (ASSMCA) and *Administración de Desarrollo Socioeconómico de la Familia* (ADSEF), amongst others.
- Lead the yearly drawing contest where 12 children related to the employees are selected for the art included in PRASA's outreach calendar.
- The Department is in the process of signing the contract with the selected agency to assist with developing future campaigns.
- A meeting was held to train and educate field personnel, specifically WRO staff, to communicate with the press during repairs outside typical working hours.
- Participate in *Feria Fortaleza para Puerto Rico* every month when *La Fortaleza* selects the host municipality. During this activity, PRASA takes the water truck to distribute potable water and perform public outreach activities, including educational sessions for the attendees.
- A two-year agreement was established to obtain internships with the University of Puerto Rico Arecibo Campus.
- The Getting to Know PRASA (*Conócenos*) initiative collaborates with the Puerto Rico Education Department and PRASA's Presidency. Different schools will be selected to participate in visits to various PRASA facilities throughout the Regions. PRASA has commenced a pilot program for departments within the organization to select the facilities. The plant's manager guides the tour.
- The Annual Tap Water Taste Challenge at Plaza Las Américas Mall has occurred for the last few years. There are two awards, the People Choice and the Judges Award. The winner this FY will get to compete at the national level.

Additional initiatives for the Communications Department for FY2024 and beyond include:

- The Department is developing an initiative within PRASA's LinkedIn page to create content to get to know PRASA employees.
- Acquire sound equipment for each region to use in creating new content.

- The development of a summer internship program between PRASA and the University of Puerto Rico.
- A channel in the Telegram is in the process of being created and will be called *Acueductospr.* The channel communicates positive news and other information happening in PRASA. Subscribers cannot comment on news posted.
- Developing a 5K race on World Water Day in March 2024 for employees and their families.

5.4.1.6 Compliance

DBPs remain one of the greatest challenges for PRASA to achieve and maintain compliance. PRASA recognizes that no single corrective action will solve the DBP issues. Operational adjustments, treatment optimization, and capital projects at the WTPs and/or the distribution system must be implemented to achieve compliance. Ongoing efforts are focused primarily on the WTPs process optimization, maintaining low turbidity or organics concentration, and adding the least amount of chlorine to comply with CT requirements. PRASA continues to implement several operational strategies, as listed below, in addition to performing water quality modeling to identify the root cause of these non-compliance events and establish corrective actions with control measures.

These are some of the key initiatives that PRASA continues to implement for DBP compliance:

- Installation of in-line equipment to measure precursors of DBP formation
- Elimination/reduction of pre-chlorination
- Increasing the frequency of process tanks/systems cleaning
- Flushing program
- Hydraulic modeling to reduce retention time in tanks
- Lowering pH
- Evaluation of new chemicals for pre-disinfection and coagulation (e.g., polymers, chlorine dioxide)
- Tank levels oscillation
- Increase sampling frequency
- Use of portable TOC equipment
- Site visits and field data gathering
- Optimization of chemical dosing application and training
- Monthly meetings to discuss operational adjustments, challenges, and lessons learned.

PRASA has found that implementing Process Control procedures for reducing turbidity/organics in plants along with distribution system inspections and chlorine samples provide comprehensive data that allows them to address the issue more efficiently. Also, PRASA has established flushing metrics and an internal Power BI visualization tool to facilitate tracking and implementation of the different measures.

The Department monitors regulatory compliance in the System and maintains open communication channels with regulatory agencies. Since the damages from Hurricane María to the PRASA Central Laboratory, PRASA continues processing samples in the temporary laboratory units and through private laboratory services. The construction of the new PRASA Central Laboratory is expected to be finalized by March 2024. Therefore, PRASA will continue to use the temporary facilities and subcontracted laboratories until the new facility is completed. Regarding the smaller-scale laboratories, PRASA only has the Mayagüez Laboratory in operation.

PRASA diligently continues allocating efforts and resources to ensure compliance with the Agreements' requirements (2015 Consent Decree and 2006 PRDOH Settlement Agreement). Regarding the Consent Decree, PRASA continues the implementation of the Sewer System Operation and Maintenance Plan (SSOMP), Areas of Concern, Interim Limits, IMP, and Process Control System (PCS), among others. Also, PRASA continues integrating and updating data collected into the GIS database. During FY2023, PRASA had accomplished 98% of sewer line reconnaissance of the high-priority areas, 94% of sewer line reconnaissance of the 30-inch or greater mains, repairs or re-inspection of 86% of the sanitary defects, 96% of sewer line cleaning of the high-priority areas, and awarded contracts to complete some for the remaining works in different phases. In addition, training in SSOMP-related topics such as regulatory requirements, health and safety, preventive maintenance, and related on-the-job training was provided to 7,869 participants, according to the SSOMP 2022 Annual Report.

Regarding the Settlement Agreement, PRASA continues the implementation of the Remedial Measures, Mitigation Measures, Continuous Monitoring, and Future Violations Action Plans, among others. PRASA also identified CIP projects to address some facilities' compliance requirements and established the long-term schedule for outstanding projects. Refer to section 6.5 for detailed information regarding the status of each program included in the agreements.

Other compliance initiatives regarding NPDES and pre-treatment are:

- PRASA started PFAS sampling at selected locations of WWTPs effluent.
- Continue to request interim limits to achieve compliance temporally while assessments, CIP projects, or operational adjustments are completed.
- Internal Power BI visualization platform for monitoring permits.
- Contracted consultants to assist with the department's duties.
- Budget allocated for developing a tool to manage data transferring to facilitate the workflow – Compliance Information Management System (CIMS).
- Acquired tablets to facilitate field data collection and data management.
- In FY2024, it is expected to complete the approval of electronic signatures to begin implementing the Selected Analytical Methods program. This step is crucial to completing the digital inspection process and being able to upload the information to the cloud.

PRASA recognizes that the forthcoming greatest challenges are the upcoming regulations due to the complexity, limitations of staff, and budget. Some key regulatory actions that could impact the water system operations include the Fifth Unregulated Contaminant Monitoring Rule (UCMR5), the Revised Lead and Copper Rule Revisions, and the proposed PFAS Rule. These upcoming regulations will require capital improvements to the facilities. As a result, the Infrastructure, Compliance, and Operations Departments work together within the CIP to ensure open communication channels to meet project expectations. Note that the Compliance Department is significantly understaffed, resulting in implementation delays in program initiatives.

Additional details related to compliance agreements and future regulations can be found in Section 6.

5.4.1.7 Legal

The Legal Department deals, among other things, with the following:

- Claims resolution (courts and extra-judicial).

- Litigation activities including damages, contract non-compliance (service and construction contracts), bid injunctions, bankruptcy, and administrative (bills, water theft, injunctions).
- Management of the contracted external counsel for damages and prejudgment litigation to insurance claims, among others. During FY2023, there were approximately 11 firms under contract to handle litigations and other legal matters, as needed. They also had contracts with two administrative judges and with an expert in economic matters for cases that were needed.
- Support all PRASA's departments' initiatives.
- As needed support for funding allocation, miscellaneous clauses, regulatory compliance, interagency agreements, land acquisition, and expropriation cases.

The Legal Department receives approximately eight monthly claims (approximately two or three weekly). Approximately 90% of the claims fall under insurance policies and public responsibility. The fiscal situation has forced the Legal Department to use in-house lawyers to reduce contracting costs. The Department has various vacancies, including two legal resources, one administrative resource, and one auxiliary director.

The invoice objection and water theft litigations are managed through virtual and in-person administrative proceedings, with an average of eight to nine daily administrative hearings. In addition, hearings are held from Tuesday through Friday within a fixed schedule. As for PRASA's financial debt negotiations and Fiscal Plan, counsel is managed exclusively by external law firms.

The Legal Department also provides support and legal guidance in re-negotiating Consent Decree stipulations, amendments, and deadlines associated with force majeure events. The Consent Decree modifications were negotiated during FY2023, and preliminary documents are to be submitted to the Court for a period of public comments during the beginning of FY2024. Preliminary comments are anticipated and the final modified Consent Decree will be submitted to the Court during FY2024. There are no negotiations of the 2006 PRDOH Drinking Water Settlement Agreement; however, the parties have been addressing several changes in due dates for remedial or interim actions, among others, which are addressed via individual motions submitted to the Court for the specific system. Hence, there may be additional negotiations in the future.

Ongoing initiatives in FY2023 that will continue into FY2024 include:

- The Management Systems Office (reports directly to the Legal Department) developed a work plan to revise and organize internal procedures (institutional documents). The first stage was implemented in October 2021 and included 34 procedures. The schedule of the future stages is uncertain at the moment.
- Through the *Customiza* application, PRASA can see the status of the professional services contract requested. PRASA is in the training phase, and for FY2024, the application is expected to be in use.
- The following metrics continue to be implemented and are reported in meetings at the Presidency level:
    - KPI to measure contract processing time. Since not all the responsibility for this KPI is within the Legal Department, the Department continues to modify the workflow to improve this metric. The KPI goal for contract processing time is five days once the Legal Department receives the contract request with all required documents.
    - KPI to measure the management of information requested from legislative bodies (*ponencias*). Since not all the responsibility for this KPI is within the Legal Department, the Department continues to modify the workflow to improve this metric.
    - KPI for administrative hearings (monitor only) to compare the pending cases against the ones that will expire.

The Legal Department expects an upturn in contracts, claims, and land acquisition cases for the next fiscal years due to implementing the CIP and the funding available to PRASA. As a result, the Department is experiencing increased procurement activities and expects increased claims and complaints.

5.4.1.8 Infrastructure

PRASA's Infrastructure Department continues to oversee and manage PRASA's CIP. The Infrastructure Department also manages the asset damage assessments and estimates for claims negotiations with PRASA's insurance company and FEMA. Currently, the Interim Executive Director for Infrastructure, in coordination with PRASA's EMT, has contracted four PMCs to assist with the CIP implementation. Refer to Section 6 for additional details.

5.4.1.9 Strategic and Corporate Planning

PRASA's Strategic and Corporate Planning Department oversees and manages the Project Management Office (PMO), the IT Department, the Training and Continuing Education Program, the Customer Service Department, and the WRO. Most of the efforts of the Department are towards the WRO and the NRW reduction efforts, the PMO, and the implementation and renewal of the Strategic Plan.

5.4.1.9.1 Project Management Office

The PMO Director has been appointed and is responsible for ensuring the successful execution of the measures outlined in the 2023 PRASA Fiscal Plan and other important internal projects, such as rate structure simplification, metering optimization, and physical water loss reduction. The contract to establish structure, process, roles, and responsibilities for the PMO was executed in FY2023.

5.4.1.9.2 Water Recovery Office

The Water Recovery Office (WRO) focuses on NRW and operational optimization. The WRO goals are to provide continuous support to PRASA’s Operations, specifically related to reducing costs, optimizing income, becoming more cost-efficient, determining where to invest and get the most benefits, and standardization throughout all Regions, among others. NRW is a priority for PRASA and is being implemented in all departments. Refer to Section 5.6 for additional details on the WRO initiatives.

5.4.1.9.3 Customer Service Department

The Customer Service Department continues to focus on four pillars throughout FY2023 to optimize revenue. The first pillar is the improvement of billing accuracy by implementing the pilot and full deployment of the AMI project, where new water meters will be installed to collect accurate readings remotely. The second pillar is related to the increase of billings collection through contracting collection agencies to settle payments of overdue accounts. The third pillar is the client experience improvement, where PRASA plans to update applications, use call centers to report problems, collect payments, and implement a chatbot. The fourth pillar is related to organizational transformation, which includes reorganizing the Department and implementing new strategies.

5.4.2 Regional Updates: Initiatives and Challenges

Meetings with four regional directors were conducted to assess the progress of each region based on the established KPIs, impacts of the fiscal situation, the ongoing challenges, programs, and initiatives developed in FY2023, overall operational activities updates, and future initiatives. Despite efforts to coordinate the meeting with the East Region, it did not take place; therefore, the updates for this region are limited. The most common challenges among all Regions are listed below:

- The lack of personnel for O&M activities is mainly due to the workforce deficit caused partly by the population migration to the United States and the Voluntary Pre-Retirement Program. Efforts are focused on filling these vacancies. One of the greatest challenges that regional O&M groups experience is finding and keeping operators and electromechanics, among other vacancies.
- Although PRASA has installed remote access to many assets in the System, various telemetry systems are still pending to be installed to achieve full remote visualization of the water facilities. In addition, efforts have been focused on monitoring the water storage tanks remotely. Wastewater systems, in general, have limited remote visualization.
- There is a limited availability of fleet vehicles due to age, long repair times, and a limited budget for purchasing new vehicles. It was reported by all Regions that there is still a significant need for new fleet vehicles.
- Delays in obtaining approvals of purchase orders.
- Aging infrastructure and lack of maintenance.
- Length of time to complete and close out work service orders.
- Maintaining and/or reaching compliance with the DBPs regulations, mainly due to a limited budget, which prevents investment for repairs, additional sampling, and exploration of new technologies, among others.

During FY2023, the Regions reported a shortfall in qualified employees, which has caused an increase in overtime costs and the contracting of external private staff; this represents a direct impact on the System's operations, resulting in repair delays and making more challenging the ability to maintain and/or achieve regulatory compliance.

DBP compliance has been another common challenge identified throughout the Regions. PRASA's efforts to maintain and/or reach compliance with these parameters (THMs, HAA5, TOC) are currently focused on operational adjustments. As a result of the implementation of SOPs and the Optimization Program, the interviewed Regions reported improvements in compliance with the DBPs requirements while recognizing that additional measures and capital investments may be needed. The CIP has included several projects, and the water systems are expected to improve soon. Also, the Regions continued their efforts to control costs and improve the System’s optimization to the extent possible. Other programs implemented during previous fiscal years are proceeding slowly due to the current lack of personnel and funding competing priorities, including reduction of SSOs and combined sewer overflows (CSWOs), NRW reduction, and Energy Consumption Reduction, among others. However, as described more in detail in Section 2, PRASA’s fiscal situation looks promising and continues to improve. In addition, PRASA is receiving an inflow of federal funds to cover (with appropriate contributions from PRASA’s internal funds) its CIP needs, allowing for a more robust infrastructure and an efficient and resilient System.

Other challenges specific to each region are important to note and summarized below.

- West Region – Although fleet maintenance and vehicle upgrades, addressing corrosion at the WWTPs, and performing plant upgrades are still challenging, equipment maintenance and budget for new equipment represent the greatest challenge for the region. Water main breaks and hidden leaks also represent a challenge,

especially for the Aguadilla Operational Area. In addition, STS presents significant equipment and management issues for the region. Achieving and maintaining compliance with BOD, TSS, Enterococcus, and chlorine are the main focus of wastewater systems.

- Metro Region – The sewer main inspections and cleaning are still challenging due to fleet and staff limitations (over 100 vacancies). Despite this limitation, the Metro Region continues cleaning sewer mains and identifying sanitary defects and illegal connections per the SSOMP requirements. The greatest challenge is the deteriorated condition of the collection system, where there are several ongoing emergency projects for sewer line replacements. Executing these projects is challenging due to budget limitations and increased labor and material costs in recent years.
- North Region – The greatest challenges are the budget limitations for pipeline repairs (in kind or full replacement) and the fragile electric infrastructure owned by PREPA and its distributor system operator LUMA, resulting in exorbitant costs for alternate power. The region continues experiencing issues associated with pipes bursting because of high pressures in the water system and is still dealing with the saline intrusion in the Islote trunk sewer and the Manatí trunk sewer, which collapsed in several segments. The region is working to reduce water system pressures by switching several wells to standby mode and installing pressure regulators at strategic locations.
- South Region – Funding limitations are still one of the main challenges. The market volatility, supply chain, and increase in inflation rates resulted in an excessive increase in equipment, chemicals, products, asphalt material, and services costs for the region. Also, the fleet and staff limitations are still a great challenge.
- East Region – Similarly to other Regions, financial and staff limitations restrain the performance of the Region.

Refer to Appendix A for a summary of various initiatives and projects being implemented or planned during FY2023 and initiatives to be implemented during FY2024, subject to funding availability.

5.5 Strategic Plan

PRASA's latest Strategic Plan is for the 2021-2025 period. Note that the 2023 Fiscal Plan includes critical high-level KPIs to be tracked monthly and reported to FOMB. Additional KPIs are summarized below. PRASA also plans to update the 2021-2025 Strategic Plan in 2025.

5.5.1 Key Performance Indicators

PRASA establishes KPIs each fiscal year and evaluates the results of the metrics in the Strategic Plan and the Productivity and Performance Annual Report. PRASA has developed a Power BI to track the KPIs from the Strategic Plan, summarized in Table 5-3. Note that the process of how to measure various KPIs is in flux and PRASA is looking to update the tracking methodology.

Table 5-3 FY2023 Key Performance Indicators

Strategic Plan Initiative	Key Performance Indicator	FY2023 Goals	FY2021	Results as of June 2023
	Drinking Water Compliance	Increase to 100%	99.97%	99.85%

Strategic Plan Initiative	Key Performance Indicator	FY2023 Goals	FY2021	Results as of June 2023
Public Health & Environment Summary	Sampling Compliance	Increase to 100%	100%	No Data Available for FY2023
	Schedule Performance Index (SPI)	Reach 0.98 or above	0.77	0.73
	NPDES Parameters Compliance	Maintain 97% or above	97.46%	97.39%
	Average Lineal Feet Cleaned	100% (Reach 200,000 lineal feet per month)	78.86%	113.39%
	Overflow Caused by FOG	Lower to 45%	61.92%	54.29%
	People Reached per Campaign	100% (Reach 100,000 clients per month)	85.27%	73.70%
Operational Efficiency Summary	Complaints in Customer Service (per 1000 Actives Accounts)	Reduce to 10.39 claims per month or below	15.83 claims/month	13.89 claims/month
	Average Time to Resolve Claims	Less than 15 minutes	19.16 min	No Data Available for FY2023
	Service Interruptions	Reduce to 2% or below	29.66%	59.53%
	Cost Performance Index (CPI)	Reach 0.98 or below	1.07	0.974
Leadership Development Summary	Training (Cumulative Hours per Employee)	More than 24.4 cumulative hours per employee per year	15.36 hours per employee	17.67 hours per employee
	Work-Related Injuries	Reduce to 10 injuries per month	19.42 injuries per month	22.42 injuries per month

Strategic Plan Initiative	Key Performance Indicator	FY2023 Goals	FY2021	Results as of June 2023
	Sickness absence days	Reduce to 4.81 days per FTE	2.61 days per FTE	2.58 days per FTE
	Employees per 1,000 Connection	3.07 or less Employees per 1,000 connections	2.78	2.80
Financial Sustainability Summary	Billing Adjustment	Less than 2%	5.67%	3.31%
	Operating Expenses	100% (Spend $831,000 or Less per month)	96.03%	98.61%
	Self-Funded CIP (excluding federal funds)	More than 25.00%	100%	100%
Innovation & Accountability Summary	Process Digitalize	Reach 100%	94.26%	17 processes were completed[1]
	Average Communication	Reach 100%	93.10%	Data was not provided for FY2023
	Employee Engagement Coverage	Reach 95%	75.08%	40.93%

[1] Provided by PRASA in the number of processes and not in percentage; hence, a comparison with the FY2021 percentage was not performed.

5.6 Ongoing Programs and Initiatives

The following sections are additional programs and initiatives that PRASA continued to work on in FY2023 and will continue to be implemented in future fiscal years. Below is a brief description and status of these programs and initiatives.

5.6.1 Integrated Maintenance Program and Asset Management

The 2015 Consent Decree with USEPA and the 2006 PRDOH Agreement required that PRASA continues to develop a comprehensive IMP to include both corrective and planned (i.e., preventive, predictive, and proactive) maintenance activities to ensure the proper O&M of its treatment plants and other critical facilities.

Updates on the ongoing IMP initiatives and programs include the following:

- IMP metrics are implemented, but not all Regions achieve the established goals. For example, one of the metrics they wish to measure is actual repair time since it is not being captured at the moment. Note that a possible reason for the Regions not being able to comply with the established KPIs is that they are short-staffed.
- Installation of flow meters at all WTPs to measure production to account for NRW. This ongoing initiative reports 83% of the water produced through SCADA. The water meters needed are for smaller plants and wells.
- Improvements to SAP for IMP process optimization are ongoing.
- Improvements in the integration of IMP routes in SAP for optimization are ongoing.
- PRASA has 15 procedures related to the IMP. All procedures have been updated and approved on July 19, 2021.
- A predictive maintenance program for WTPs and WWTPs is in place for all Regions. Some predictive maintenance techniques include ultrasound technology and vibration, among others, to make sure the preventive maintenance is effective and to be able to predict future failures. The end goal of this initiative is to train PRASA personnel to continue implementing predictive maintenance internally; however, the program continues to be contracted with a private company since PRASA does not have the required personnel.
- PRASA continues to evaluate the most critical facilities to develop an action plan case-by-case for the Corrosion Control Program (CCP). The Department has 895 facilities in this program and has completed the site visits. PRASA plans to align the facilities where the corrosion improvements are a high priority with the CIP to incorporate it as part of existing projects. Also, collaboration with the Infrastructure Department will take place to integrate the developed corrosion protocols into the design phase of CIP and IMP projects.
- During FY2023, IMP achieved 85% remote visualization of the WST and completed 100% of installation.
- The WPS remote visualization related to installing new panels capable of operating the WPSs is completed. For FY2024, PRASA plans to install ten new panels per region, except for the Metro Region.
- The initiative to remotely monitor wells continues and has achieved 33% completion in FY2023, and the goal for FY2024 is to reach 45% completion.
- PRASA installed 191 EGUs and 25 portable units through Phase 1 (100% completed). Phase 1.5 (100% completed), 12 EGUs were installed in the South Region and four EGUs in the West Region. In FY2022, the procurement process for Phase 2 (11% completed) to install 97 units was contested and canceled; thus, the bidding was restarted. However, the contract for Phase 3 (33% completed) to purchase and install 73 units has been awarded and is awaiting to be executed. Phase 4 (82% completed) of the emergency generator program is ongoing, and the next facilities will be selected pending budget availability.
- In August 2023, the assessment for implementing the Asset Management Program in PRASA was started. The project is in the initial phase and evaluation process.
- Maintenance Planning and Scheduling (MPS) procedures need to be updated to focus more on the planning aspect of the program. During FY2023, the initiative was completed and is held in the biweekly region meetings.

Critical factors affecting PRASA's ability to implement a more robust and efficient IMP include the fiscal situation and the limitations to hiring new staff. As stated by the IMP staff, a consistent issue is the limitations of not having enough technical staff. As a result, PRASA needs to recruit additional staff to support the program.

PRASA continues contracting external resources to provide repairs and maintenance services to critical vehicles to ensure the continuity of operations. It is important to mention that the IMP has an inventory of vehicles available for repair or replacement; 32 new cranes (Dodge and RAM) have been received through July 2023. They expect to receive 43 vehicles before December 2023 and 43 cranes before July 2024.

5.6.1.1 Asset Management

Asset management involves balancing costs, opportunities, and risks against the desired performance of assets to achieve an organization's objectives. Asset management also enables an organization to examine the need for and performance of assets and asset systems at different levels. Additionally, it enables the application of analytical approaches towards managing an asset over the different stages of its life cycle (which can start with the conception of the need for the asset through to its disposal and includes managing any potential post-disposal liabilities). It is making the right decisions and optimizing the delivery of value. A common objective is to minimize the whole-life cost of assets. Still, there may be other critical factors, such as risk or business continuity, to be considered objectively in this decision-making.

In August 2023, PRASA started the assessment to implement an Asset Management Program. Between August 2023 and January 2024, the following tasks will be implemented: comprehensive evaluation of the Asset Management Program and organizational structure, gap analysis, and establishment of improvement priorities. Various strategies/tools will be used to analyze, prioritize, and implement the roadmap.

5.6.2 Non-Revenue Water Reduction Program

Reducing Non-Revenue Water (NRW) is a high-priority initiative for PRASA, as it will have both revenue enhancement and expense reduction impacts on finances. Therefore, PRASA has invested in different departments within PRASA to implement this initiative. The two main programs are Metering Optimization and the Water Recovery Office.

5.6.2.1 Metering Optimization

To reduce commercial water losses and improve customer experience, PRASA has outlined three initiatives under the Customer Service Department. The initiatives include Efficiency and Customer Service Optimization, Commercial Water Loss Reduction, and AMI.

PRASA is undergoing an RFP process to obtain new water meter technology and an island-wide AMI system. The AMI system will allow PRASA to remotely read customer meters, increasing meter accuracy and reducing operational labor costs. In addition, with an AMI system, PRASA will be able to obtain real-time customer consumption data, which benefits both PRASA and the customer.

PRASA is in the process of executing contracts with the proponents who will participate in the pilot phase of the AMI project. Concurrently with the pilot phase, PRASA plans to have a separate bid for the installation of both the water meters and AMI infrastructure island-wide. With improved meter accuracy and precision, revenues will increase. In addition, having accurate meter readings will allow for more precise identification of unauthorized water consumption users, and the remote readings will improve customer service efficiency.

5.6.2.2 Water Recovery Office

The WRO focuses on recovering physical losses throughout the water distribution system. In pursuing the vision of achieving long-term sustainability, PRASA included the reduction of NRW as one of the three key focus areas of the 2023 PRASA Fiscal Plan and has established three main programs for reducing physical losses to achieve a reduction of 64.1 MGD by FY2028. These programs are:

- Master Meters – Accurately measure water production by installing water meters at critical facilities.

- Pressure Management – Incorporating pressure management best practices across the transmission and distribution network.
- Leak Detection and Reduction – Improving identification, prioritization, and resolution of major leaks across PRASA assets.

To track water loss, the WRO conducts annual water audits. The WRO is responsible for implementing controls and developing action items to address NRW and meet the established goals. The WRO also is looking at new technologies to identify leaks. The WRO further established the NRW team (“TeamORA”), which includes the WRO staff and integrated operation personnel to address the NRW initiatives more efficiently and effectively in each region. PRASA's WRO includes two contracts, one for oversight and project management and another for office and field personnel. The WRO also includes GIS personnel that support other departments within PRASA.

The WRO continues its outreach to the Regions by implementing Annual NRW symposiums for all employees and the general public at the CIAPR. During FY2024, the WRO will participate in the Puerto Rico Water and Environmental Association (PRWEA) Convention to continue spreading knowledge of the office's work and the need to work together to achieve the goals set by the 2023 PRASA Fiscal Plan.

5.6.2.2.1 Master Meters

To accurately measure water production at PRASA’s facilities, water meters at the WTPs and wells must be validated, calibrated, or replaced. During FY2023, the WRO visited facilities to validate the conditions of the master meters. The process for validating a meter is to visit the facility, verify if the meter complies with the run-length upstream/downstream specified by the manufacturer, verify the hydraulics of the pipeline to ensure the meter is reading accurately, and validate the local display with SCADA. In addition, the WRO will purchase a new meter that complies with the field conditions if the existing meter is not operational. The goal is to reduce the percentage of estimated water production to 5% or less by the end of FY2025.

To present visibility of the water produced, the WRO created a dashboard that monitors, with up to two days' delay, the island-wide water production. This tool has helped create conscience at both presidential and regional executive levels to help reduce the amount of water produced.

5.6.2.2.2 Pressure Management

Typically, lowering the water pressure of the system will reduce the amount of water loss by preventing water leaks and reducing the number of water losses. As part of the pressure management initiative, 45 pressure zones have been identified, evaluated, optimized, and monitored. Once these areas function at optimal pressure, new areas will be identified and included in the pressure management initiative.

Another pressure management initiative is the implementation of Innovyze; a software used to monitor flow, pressure, and tank levels throughout PRASA’s water system. Once implemented, the software will combine PRASA’s GIS and SCADA information to reduce pressure in certain areas of interest. WRO expects to visit over 100 pressure zones by FY2028 to reduce 11 MGD.

5.6.2.2.3 Leak Detection and Reduction

The Leak Detection and Reduction Program, which will be performed in parallel with the Pressure Management Program, covers the whole island and has a 2-person crew assigned to each region. Currently, the WRO team has actively been locating leaks. The Regional Department Director also notifies the WRO team when areas with water deficiencies are identified. Several leaks have been located, reported, and repaired using this approach. The WRO

continues to obtain additional funds to expand its field resources. WRO is in the process of incorporating new technologies to obtain information on possible areas with water loss. The software implemented for pressure management, Innovyze, will also be used to define areas with suspected leaks.

During FY2023, the WRO recovered approximately 9 MGD which exceeds their goal for the FY, and has a goal of 8.95 MGD for FY2024.

5.6.3 Electricity Management Program

PRASA's energy cost is the second largest expense and depends on the fluctuations in electricity rates established by the Puerto Rico Energy Bureau (PREB) based on oil prices. Therefore, PRASA continues implementing initiatives to reduce energy consumption, as summarized below.

- Regional Measures – PRASA continues to implement non-capital energy conservation measures in the System at a regional level. Since FY2013, PRASA has reduced its electricity consumption from over 740M kWh to 640M kWh through facility consolidations, minor repairs, operational optimization, and miscellaneous improvements. PRASA aims to reduce its energy consumption by 15M kWh by FY2028.
- PPAs – PRASA manages ten facilities under PPAs for lower energy unit costs per kWh than what PRASA pays to PREPA/LUMA. The PPAs allow these facilities to use photovoltaic energy, producing approximately 11.3M kWh per year at a $0.15 per kWh blended rate. Annual savings for these facilities vary based on PREPA rates. The ten facilities operating PPAs and their average annual solar energy production are shown in Table 5-4. Also, PRASA is working with the PPAs to upgrade certain systems, such as integrating batteries at Los Filtros WTP and adding solar systems to the Vieques WTP.

Table 5-4 PRASA's Current PPAs Average Annual Solar Energy Production

Facility	Average Annual Solar Energy (Million kWh)
El Yunque WTP	3.43
Arecibo WTP	1.71
Canóvanas WTP	1.71
Cayey WWTP	0.86
Humacao WWTP	0.86
Aguada WWTP	0.86
Guaynabo - Los Filtros WTP	0.86
Culebra WWTP	0.49
Vieques WWTP	0.33
Arcadia WPS	0.19
TOTAL kWh	**11.30**

PRASA continues to find ways to implement renewable energy in existing facilities. Various renewal energy projects are in the planning and design phases, and Table 5-5 provides additional details for the projects for which PRASA

has already identified funds. In addition, PRASA is awaiting funding for three additional projects for the Sergio Cuevas WTP, Mayagüez WWTP, and Fajardo WTP and WWTP.

Table 5-5 PRASA Renewable Energy Projects

Facility	Type of Renewable Energy	Capacity	Estimated Savings	Status
Caguas WWTP	Solar Panels with Battery Backup	6 MW DC	50-95%	Planning
Santa Isabel WWTP	Solar Panels with Battery Backup	2 MW DC	50-90%	Design
Maunabo WWPS	Solar Panels with Battery Backup	205 KW AC	80-95%	Design
Guardarraya WWPS	Solar Panels with Battery Backup	205 KW AC	80-95%	Design
SACN MicroGrid	Natural Gas and Solar Panels with Battery Backup	9 MW Natural Gas 10 MW Solar Panels	-	Planning

5.6.4 Master Plan Update

PRASA develops its Water and Wastewater Master Plan (Master Plan) every ten years to align with the United States Census population information. The latest Master Plan was completed in 2010 and then updated in 2014 for population projection adjustments. During FY2023, PRASA continues to coordinate with a consultant to finalize the next Master Plan update to create the roadmap for the next years for a safer, resilient, efficient, and financially viable System.

The Master Plan will incorporate the 2015 Consent Decree and PRDOH agreements amendments, climate change adaption strategies, and electricity management strategies. The Master Plan update will also determine the priority of the projects included in the CIP horizon.

5.7 Conclusions

During FY2023, PRASA remained focused in its O&M endeavors on re-establishing the System after the aftermath of hurricanes, the 2020 Earthquakes, staff shortages, and the constant juggle of competing priorities for funding. As described in Section 2, PRASA's fiscal situation looks promising and continues to improve due to the implementation of various financial initiatives and the inflow of federal funds. This positive trajectory positions

PRASA to move forward with its CIP, aiming to tackle critical system requirements and address pertinent O&M issues.

Despite certain O&M-related observations made during facility inspections, PRASA O&M practices are adequate. Common challenges identified through the Operational Regions and Departments continue to be funding availability and personnel availability for O&M functions, fleet shortage, aging infrastructure, and length of time to complete and close out maintenance work orders, among others.

PRASA acknowledges the extensive journey ahead in addressing these challenges, which have historically impeded O&M performance. However, PRASA remains hopeful that pivotal operational initiatives will pave the way for indispensable improvements within the System. Initiatives such as the reduction of NRW, enhancements in meter accuracy, billing precision through the procurement of advanced metering solutions, and the forthcoming Master Plan update all stand as pillars to support the much-needed enhancements in the System's operations and maintenance standards. These strategic initiatives, when realized, are expected to play a pivotal role in transforming and fortifying PRASA's operational landscape.

6 Capital Improvement Program and Regulatory Compliance

6.1 Introduction

PRASA has developed a multi-year CIP to improve and maintain its System. The CIP's main objectives are to maintain (renew and replace), modernize (new technology), and simplify the System to achieve operational efficiency, protect public health, safeguard environmental quality, enable continued economic development, and meet all regulatory requirements. In addition, PRASA has included the restoration of damaged infrastructure to its condition before the 2017 Hurricanes, Hurricane Fiona, and the 2020 earthquakes as part of the CIP objectives.

The CIP is a dynamic program that evolves and undergoes revisions as needed, and sources of funds are identified as projects transition from pre-construction to the construction phase to finally reach start-up and commissioning. The CIP is subject to review and approval by PRASA's Governing Board. PRASA's financial circumstances have improved due to the implementation of various initiatives, including recent debt refunding, resulting in debt service savings without increasing the maturities of the refunded debt, and projected inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) its CIP needs, allowing for more robust infrastructure and more efficient and resilient System. Refer to Section 2 for information on PRASA's fiscal situation and CIP funding strategy.

The CIP presented in this Report refers to the six-year CIP included in the 2023 PRASA Fiscal Plan. The execution of this six-year CIP is contingent upon funding availability and proper allocation of funds.

6.1.1 CIP Status Updates

PRASA has engaged the services of four PMCs to support its Infrastructure Department in the planning, design, permitting, procurement, construction, and management of the CIP projects in each of the five Regions. As of March 31, 2023, PRASA had 224 active projects in the CIP at different stages for a total investment of $4,414M, as shown in Table 6-1.

Table 6-1 Active CIP Projects by Stage

Stage	No. of Projects	Estimated Investment ($, million)	Percentage (%)
Pre-Planning	5	$921	20
Planning	61	$1,196	27
Design	37	$845	21
Bidding	38	$757	28
Construction	57	$632	13
Completed	26	$63	1
Total	**224**	**$4,414**	**100**

The major projects under construction as of March 2023 include the dredging of Lake Carraízo, the Guayama WWTP rehabilitation, the Los Angeles trunk sewer lining project, the Caguas Laboratory, the Dorado,

Arroyo/Guayama, Ponce, Río Grande Estates and Salinas/Guayama trunk sewers rehabilitation, the rehabilitation of the trunk sewer from Road 684 to the Barceloneta WWTP, improvements to the Arroyo WWPS, the Coabey sewer system, the Coto Laurel WTP and the Ponce WTP. In addition, the main projects under design or bidding phases include water meter replacement, Enrique Ortega WTP rehabilitation, the Isabela Aguada trunk sewer, the rehabilitation of the Camuy, Caguas, Hormigueros/Mayagüez, and Patillas/Guayama trunk sewers, the Buena Vista Community drainage, sewer and water system improvements, the Carolina and Mayagüez WWTPs improvements, El Yunque WTP improvements, the elimination of the Maunabo WWTP and the Maunabo/Patillas trunk sewer, the new Salinas WTP, improvements to the Vieques WWTP, rehabilitation of the Hatillo/Camuy WTP and improvements to the Santa Rosa water intake.

6.2 CIP Implementation Management

PRASA's and the PMC’s goal is to oversee the implementation and management of CIP projects throughout the pre-construction, construction, and post-construction phases. As part of the pre-construction activities, the PMCs manage key tasks that drive CIP project budgets, such as defining project scopes, negotiating consultant contracts for studies and design services, reviewing project constructability, preparing project construction cost estimates, preparing bid packages, and managing bid processes (in close coordination with PRASA's Bidding Board). As part of the construction management services, the PMCs serve as PRASA's representative on CIP projects and include managing project schedules, negotiating project change orders, and administering construction contracts. In addition, the PMCs support project start-up, training, and closeout activities as part of the post-construction services.

6.3 CIP Project Distribution and Costs

CIP projects are divided into categories, groups, and types. PRASA has implemented a prioritization system to better manage the large and complex CIP. Projects included in the CIP are major capital improvements identified throughout all five Regions, as well as island-wide system improvement initiatives such as integration of technological advancements, telemetry implementation, and general R&R. PRASA developed the CIP with the following key points in mind: a) recovery of the System after hurricanes and earthquake impacts and focus on improving the System efficiency and modernization b) ensuring water quality, c) meeting regulatory commitments as stipulated in the Consent Decree, administrative orders, and other agreements with regulatory agencies and d) determining current and future infrastructure and operational needs identified from System planning studies.

Once the need for a capital improvement project is identified, a project creation form is prepared. The form includes the project scope, preliminary schedule, and cost estimates. The project is then assigned a CIP project number and added to the CIP inventory, which is categorized according to PRASA's classification and prioritization system. Updates to the CIP are presented to PRASA's Governing Board at least once a year for revision and approval.

PRASA allocates costs associated with the construction of facilities to the CIP projects, including direct costs, planning, studies, engineering design, inspection, services during construction, owner-controlled insurance program (OCIP), project management, administrative expenses, financing costs (if applicable) and other expenses related to and inherent to construction. In addition, the CIP cost projections include a contingency reserve for unexpected costs that could arise during the project life cycle. If the contingency is not spent after construction is completed, the reserve is released for other CIP projects.

6.3.1 Project Classification and Prioritization

CIP projects, as defined in the 2023 PRASA Fiscal Plan, are classified into the following categories:

- FAASt or Reconstruction & Recovery Projects – These projects are to repair the infrastructure impacted by the 2017 Hurricanes, Hurricane Fiona, and the 2020 Earthquakes to industry standards and based on the work plan submitted to FEMA on April 8, 2021, and subsequently updated.
- R&R – These projects are related to renewing or replacing aging infrastructure at or near the end of its useful life (pipelines, pumps, motors, etc.).
- Compliance (Mandatory and Non-Mandatory) – Project required or expected to be required by agreements with USEPA and PRDOH, civil actions, administrative orders, court orders, and other requirements.
- Mitigation and Resiliency – Projects to reduce risks posed by natural disasters and protect life and property from future disasters.
- Quality – These projects are meant to increase the quality of the water and wastewater service provided to the customers.
- Fleet and IT – These projects are intended to replace vehicles in PRASA's fleet and improve IT infrastructure.
- Electrical Generators and Meters – These projects aim to address the rental and purchasing of electrical generators and replace water and master meters to measure water consumption.
- Safety and Growth – These projects allow System growth and increase security at PRASA's facilities.
- Others – These projects are considered necessary and do not fall under the previous categories.

Projects are further classified as either water or wastewater system projects. Water system projects include improvements or construction of new facilities for water supply, water distribution, WTPs, WPSs, and tanks, among others. Wastewater system projects include projects for improvements or construction of new facilities for wastewater collection, WWTP, and WWPSs.

In addition to project classification, mandatory projects used to be ranked according to a prioritization score. This score resulted from the weighted sum of the evaluation criteria adopted in the 2010 Master Plan and negotiated with regulatory agencies. Four main criteria were selected to prioritize CIP mandatory projects: Regulatory Compliance (40%), Quality of Service and Reliability (30%), Operational Efficiency Improvements (20%), and Population Impacted by the Project (10%). PRASA understands that too much time has passed to use the same criteria, and a clear objective project prioritization process must be established for CIP projects. Therefore, PRASA is updating the methodology for all projects during the 2022 Master Plan project, which is expected to be completed during FY2024. The implementation schedule of future long-term projects will be subject to the prioritization system and funds availability.

In addition, PRASA has identified the following priorities in its pursuit of immediate restoration of all infrastructure damaged by the hurricanes and continued compliance with regulatory agencies:

1. Projects needed to restore the infrastructure damaged by Hurricanes Irma, María and Fiona.
2. Mandatory compliance projects were included in the Consent Decree, the 2006 PRDOH Settlement Agreement, and subsequent negotiations.
3. Construction projects that were stopped and postponed with the suspension of the CIP in 2016.
4. R&R needed to rehabilitate and replace its System assets to maintain and improve its service and infrastructure performance.

6.3.2 CIP Metrics and KPIs

PRASA continues to monitor the established project metrics, compliance, and execution through a CIP tracking tool. The tracking tool is used to manage project time, develop a detailed project baseline, track the progress, milestones, and metrics of all projects monthly, keep track of projects on target and off target, and identify causes for delays. In addition, PRASA implemented a module in SAP to review and update its current tracking tool to enhance compliance with the expected execution schedules and costs.

In addition, PRASA continues to implement KPIs to allow for detailed tracking of CIP compliance and success and to evaluate the PMCs' performance. Since construction is typically the phase with the highest potential for deviations in cost and time, PRASA tracks two industry standards KPIs - Cost Performance Index and Schedule Performance Index. The Cost Performance Index measures the cost efficiency of resources committed to the project compared to the budget, assessing whether the project will be completed on budget. The Schedule Performance Index measures the relationship between the executed work against planned work, assessing whether the project will be completed on time.

6.4 Six-Year CIP (FY2023-FY2028)

PRASA's six-year CIP for FY2023 through FY2028, as included in the 2023 PRASA Fiscal Plan, amounts to $6.55 billion. Figure 6-1 and Table 6-2 show annual capital expenditures by project category. Almost 80% of the six-year CIP comprises Reconstruction & Recovery, Compliance (mandatory), and Mitigation and Resilience projects of the total forecasted expenditures.

Reconstruction & Recovery, totaling 62% of the total CIP, increased by 87.6% compared to FY2022 to $2,157.8M and is the largest category in terms of dollars throughout this CIP period. Mandatory Compliance-driven projects are the second largest expense, with an annual average expenditure of $933.2M and a total of $559.5M. The Mitigation and Resiliency category is now the third largest expense, with an annual average expenditure of $79.5M and $476.8M (7.3% of the total CIP) over six years.

Compared to the 2022 PRASA Fiscal Plan six-year CIP ($3,454.9M), the 2023 PRASA Fiscal Plan CIP was increased by a total expenditure of $3,090.4M, an 89.5% increase. The difference is mainly attributed to the increase in Recovery and Reconstruction projects. Other categories increased as well. However, the FY2023 PRASA Fiscal Plan CIP did have some reductions in projects and expenditures for the Quality and Fleet and IT categories with annual average expenditures of $15M (1.4% of the total CIP and $10.1M (0.9% of the total CIP), respectively.

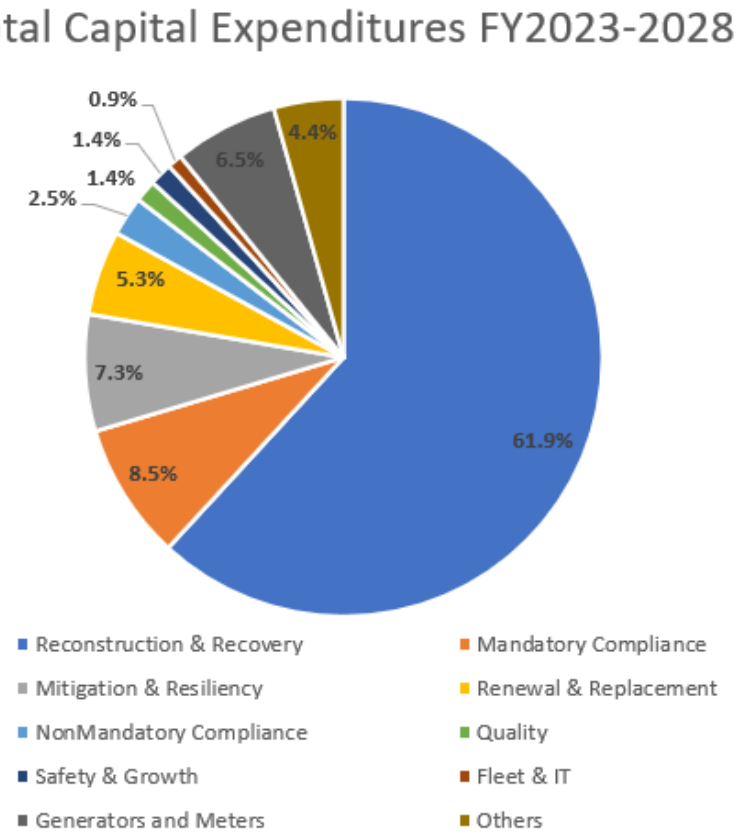


Figure 6-1 Six-Year CIP Capital Expenditures by Category

Table 6-2 CIP FY2023-FY2028 by Category ($, Millions)

Project Category	Fiscal Year Ending June 30						
	2023	2024	2025	2026	2027	2028	2023-2028
Reconstruction & Recovery	$117.0	$526.8	$925.0	$1,106.1	$828.1	$545.2	**$4,048.3**
Mandatory Compliance	$34.4	$119.5	$165.2	$101.9	$84.3	$54.1	**$559.5**
Mitigation & Resiliency	$0.8	$7.1	$41.9	$171.2	$127.8	$128.1	**$476.8**
Renewal & Replacement	$49.4	$67.4	$44.1	$45.0	$65.0	$75.0	**$345.9**
Non-Mandatory Compliance	$34.4	$62.8	$40.9	$9.1	$5.7	$7.6	**$160.6**
Quality	$12.8	$30.7	$35.0	$10.2	$0.5	$0.7	**$89.8**
Safety & Growth	$7.3	$30.8	$39.9	$13.7	$0.3	$1.5	**$93.5**
Fleet & IT	$16.0	$13.8	$12.8	$5.0	$5.0	$8.0	**$60.5**
Generators and Meters	$16.1	$42.5	$115.4	$84.0	$82.3	$85.2	**$425.5**
Others	$21.1	$54.5	$82.1	$66.0	$46.3	$14.9	**$284.9**
Total	**$309.2**	**$955.9**	**$1,502.4**	**$1,612.3**	**$1,245.3**	**$920.3**	**$6,545.3**

[1]Numbers may not add up due to rounding.

PRASA's six-year CIP consists of 440 projects, of which 209 have already been assigned to PMCs, with a CIP investment estimated at over $4.2 billion. As funding allocation is approved for other projects, PRASA will continue distributing the projects within the four PMCs.

6.4.1 Water System Projects

The water system projects include projects to improve compliance (mandated and not mandated), upgrades to WTPs, STSs, water distribution systems, and the construction of new water infrastructure. Total capital expenditures in water system projects for FY2023 through FY2028 are estimated at approximately $2,288.8M. Approximately $204.1M is allocated for projects classified as Mandatory Compliance, and approximately $1,924.3M is allocated for projects classified as Reconstruction & Recovery, among others.

6.4.2 Wastewater System Projects

The wastewater system projects include improving compliance, new WWTPs, and upgrading wastewater collection systems. Total capital expenditures in wastewater system projects for FY2023 through FY2028 are estimated at $2,527.5M, of which approximately $343.0M is allocated for projects classified as Mandatory Compliance, $127.1M is allocated for projects classified as Non-Mandatory Compliance, and approximately $1,878.0M is allocated for projects classified as Reconstruction & Recovery, among others.

6.4.3 Additional Category Projects

Total capital expenditures for the remaining capital project categories are estimated at approximately $1,300.1M for FY2023 through FY2028. Approximately $345.9M is allocated for repairs to infrastructure impacted island-wide by Hurricanes Irma and María and others under the R&R program. Meters and Electrical Generators projects have $425.5M allocated, and Quality projects have $89.8M. Fleet and IT projects have $60.5M allocated. The remaining $378.4M is distributed between Growth, Safety, and Other upgrades.

6.5 Current Regulatory Compliance

One of the main six-year CIP objectives is regulatory compliance with the existing Consent Decree and the 2006 PRDOH Settlement Agreement. In addition, it considers proposed modifications to said Consent Decree and agreement between PRASA and regulatory agencies. Note that the actual cost to meet compliance with the Consent Decree and agreements and PRASA's total capital expenditures may vary substantially depending on:

- The inflationary environment for the costs of labor and supplies needed to implement the compliance program.
- Severe weather conditions could adversely affect construction schedules and consumption patterns.
- Population trends and political and economic developments in Puerto Rico could adversely impact the collection of operating revenues.
- Possibility of new environmental legislation or regulations affecting the System.
- Unanticipated costs or potential modifications to projects resulting from requirements and limitations imposed by environmental laws and regulations.
- The inherent uncertainty in the CIP projects of the magnitude undertaken by PRASA.

The Consent Decree and Settlement Agreement currently in effect with the regulatory agencies are:

- Consent Decree: U.S. v. PRASA and Government of Puerto Rico, Civil Action No. 15-2283 (JAG) – Addresses violations to Sections 301 and 402 of the Clean Water Act (CWA) and regulations promulgated there under, and PRASA's NPDES permits with regards to PRASA's WWTPs, WWPSs, and STSs, as well as several administrative orders.
- 2006 PRDOH Drinking Water Settlement Agreement, Civil Action KPE 2006-0858 (904) as amended – Addresses non-compliance and alleged violations with the Puerto Rico Potable Water Purity Protection Law, as amended, the SDWA and applicable regulations, and the General Environmental Health Regulation. The PRDOH and PRASA are addressing amendments to this Settlement Agreement through independent motions.

In September 2017, upon declarations of the State of Emergency for Hurricanes Irma and María, PRASA submitted a notification to both USEPA and PRDOH invoking force majeure and indicating the possibility of some delays in projects and program due dates. PRASA has maintained continuous communication with the USEPA and the U.S. Department of Justice (USDOJ), notifying the force majeure events that may delay performance or cause non-compliance with any obligation as stipulated by the Consent Decree Section XXVII. By the end of FY2023, PRASA, USEPA, and USDOJ completed negotiations and modifications to the Consent Decree, and notice of lodging was presented in court at the beginning of FY2024 to address the force majeure events. Shortly after began the 30-day public comment period. After this period expired, PRASA and the United States negotiated two additional minor modifications to the Consent Decree, which will be filed via motion seeking the Court's approval at the beginning of 2024.

In addition, PRASA continues using the Microsoft Power BI Compliance Monitoring Tool developed in 2019 to facilitate the review, monitoring, and tracking of the requirements of some programs stipulated in the Consent Decree and the 2006 Settlement Agreement, as amended. In FY2023, PRASA completed significant improvements to the tool, resulting in a more robust and efficient tool for monitoring and tracking compliance. Also, additional programs such as emergency power generators, capacity management, and corrosion control were added to the tool for tracking and monitoring.

6.5.1 Consent Decree and Settlement Agreement Progress Reports

The Consent Decree with USEPA and the Settlement Agreement with PRDOH require PRASA to implement remedial plans, develop and implement CIP projects to bring PRASA's Systems into compliance with regulatory requirements and conduct evaluations concerning specific System's infrastructure and operational issues. For this report, Arcadis reviewed the following progress reports submitted to regulatory agencies:

- 2015 USEPA Consent Decree Biannual Progress Report (BPR):
  - No. 14: March 1, 2022, through August 31, 2022
  - No. 15: September 1, 2022, through February 28, 2023
- 2006 PRDOH Agreement Quarterly Progress Reports:
  - No. 58: July 1, 2022, through September 30, 2022
  - No. 59: October 1, 2022, through December 31, 2022
  - No. 60: January 1, 2023, through March 31, 2023
  - No. 61: April 1, 2023, through June 30, 2023

A summary of these progress reports is presented in the following subsections.

6.5.1.1 2015 USEPA Consent Decree – Biannual Progress Reports

In FY2023, PRASA continues to be under force majeure protection for ongoing and upcoming work and deadlines and stipulated penalties under the Consent Decree; therefore, no penalties were accrued during the period evaluated. Once the modifications to the Consent Decree become effective, PRASA shall comply with the requirements stipulated.

The Consent Decree requires PRASA to submit BPRs. BPRs No. 14 and No. 15, reporting from March 2022 through February 2023, summarized below, include applicable programs, standards, and special conditions.

The Consent Decree specifies that PRASA shall continue implementing systemwide remedial measures at all WTPs, STS, and WWTPs and the corresponding sewer system owned and operated by PRASA. Remedial measures are comprised of several projects and action plans as stipulated within the Consent Decree in the following appendices:

- Appendix H includes the base list for remedial measures to address wash water discharges at WTPs, also known as STSs.
- Appendix I includes the capital projects subject to prioritization.
- Appendix J includes the base list of remedial measures for WWTPs.

PRASA is working on achieving project dates in Appendices H and J base list projects for wash water and WWTPs, respectively. The base list includes 23 projects, of which 10 are outstanding, with expected completion dates by 2028. Figure 6-2Includes the visualization by region and the distribution between pending and completed projects.

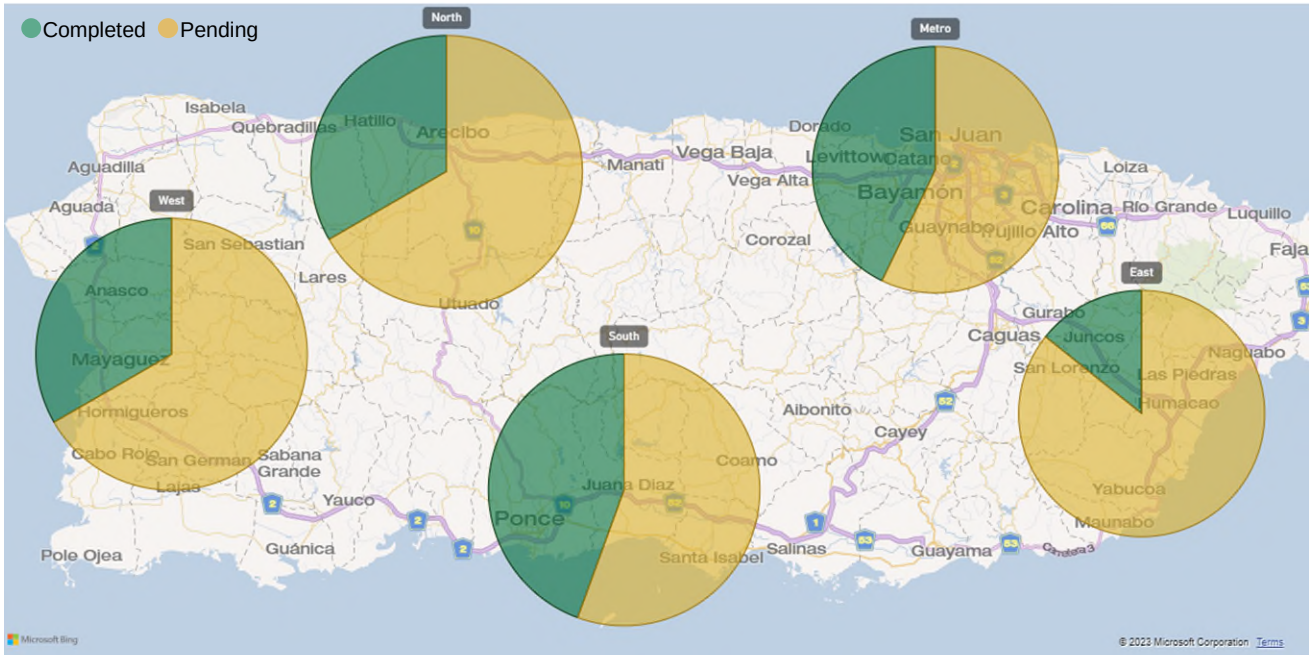


Figure 6-2 Base List Projects Visualization for STSs and WWTPs

PRASA continues to work with the high-priority projects related to Remedial Measures. The completion dates for the projects included in the base list continue as planned. A summary list of the high-priority projects is included in Table 6-3.

Table 6-3 Base List Projects Breakdown[1]

Region	CIP No.	Facility	Type	Project Description
East	3-40-6006	Ceiba Sur	STS	Eliminate one plant with the new Valenciano WTP or alternate project.
East	3-61-5020	Río Grande Estates	WWTP	Divert facility flows to the Fajardo WWTP. Some flows might be diverted to the Coco Beach private plant.
East	3-13-5065	Caguas	WWTP	Aguas Buenas/Caguas trunk sewer collection system improvements.
Metro	1-11-5067	Bayamón	WWTP	Overall improvement project: influent headworks, influent pumps, grit removal system, and clarifier's traveling bridges.
Metro	-	Puerto Nuevo	WWTP	Perform a study to determine the condition of the land portion of the facility's outfall. Install flow proportional chlorination equipment.
Metro	1-66-5111	Puerto Nuevo	WWTP	Installation of a degritter system.
North	2-24-5007	Corozal	WWTP	Retrofit existing facility to achieve nutrient removal.
South	4-58-5083	Ponce	WWTP	Phase II: Rehabilitation of trunk sewer (28 km).
South	3-56-5001	Patillas	WWTP	Divert facility to the Guayama Regional WWTP.
West	5-37-5021	Isabela	WWTP	Diversion of the Isabela WWTP discharge to Costa Isabela Resort.

[1]BPR No.15 Appendices Nos. 1 and 2.

In addition, as stipulated by the Consent Decree, flow meter devices with flow totalizers and level indicators were installed at the point of discharge for most STS at the WTPs. A total of 15 flow meters and totalizers, and three high-level alarms at STSs were reported out of service. During FY2023, ten flow meters, totalizers, and two high-level alarms at STSs were repaired. Regarding WWTPs, three flow meters and totalizers must be replaced by December 2023.

As part of the remedial measures included in the Consent Decree, PRASA completed analyzing the rain and wastewater flow relationships and infiltration/inflow (I/I) studies for 45 WWTPs sewer basins. As a result, repair projects for the sewer systems with completed I/I studies are included in the prioritization list, with an expected completion of 2034.

6.5.1.1.1 New Sludge Treatment System and Solid Handling

The Consent Decree stipulates that any new WTP that begins operation after the day of lodging shall include an alternative power unit and an STS with sufficient hydraulic capacity to manage wash water discharges. There were no new WTPs constructed in FY2023.

6.5.1.1.2 Sewer System Operation and Maintenance Plan

PRASA and USEPA agreed to submit a consolidated SSOMP Annual Report beginning May 2019 until the Consent Decree ends. PRASA submitted the 2022 SSOMP Annual Report in May 2023 as agreed. As part of the SSOMP efforts, PRASA continues integrating and updating data collected into the GIS database. In addition, training in SSOMP-related topics such as regulatory requirements, health and safety, preventive maintenance, and related on-the-job training were provided to more than 7,680 Metro Region and Central Administration Building employees through December 2022.

Reconnaissance and Cleaning

The sewer system reconnaissance effort has resulted in over 1M linear feet of sanitary sewer system pipelines having reconnaissance data. During the period evaluated, reconnaissance of an additional 20,910 linear feet of the High Priority Areas was performed. In addition, for the mains with a diameter of 30-inch or greater, 94% of sewer line reconnaissance has been completed. The remaining 30-inch or greater sewer mains were divided into four phases with an expected completion date of June 30, 2026.

During the period evaluated, 42 defects were identified, and four were corrected. Since the SSOMP's implementation, 282 defects have been identified, of which 211 defects (75%) have been corrected, 12 were included in the CIP, and the remaining are pending repairs. As part of the ongoing discussions between USEPA/USDOJ and PRASA, language has been developed that establishes sewer defect repair and re-inspection criteria for repair and/or iterative re-inspections of defects not corrected within one year of detection; this is expected to become effective as part of the Consent Decree modifications. No illegal interconnections to the Puerto Nuevo WWTP sewer system were found during the period evaluated.

PRASA is currently performing sanitary sewer cleaning activities through private contractors. Sewer cleaning efforts have resulted in cleaning a total of 870,000 linear feet for of the High Priority Area with less than 30-inch diameter sewer pipelines. PRASA awarded several bids for programmatic maintenance of sewer assets. As included in the 2022 SSOMP Annual Report, PRASA also executed multiple improvement projects, including raising manhole covers to the pavement or ground level, removing manhole construction debris, and cleaning sewer by drainage basin based on information disseminated after reconnaissance efforts. Table 6-4 shows the schedule of some of the main SSOMP activities completed and planned.

*Table 6-4 Summary of SSOMP Activities Schedule**

SSOMP Activity	Start Date	End Date
Reconnaissance of High-Priority Area (<30-inch diameter)	4th Quarter 2012	2nd Quarter 2022
Reconnaissance of High-Priority Area (≥30-inch diameter)	3rd Quarter 2021	2nd Quarter 2026
Reconnaissance of Remaining Areas	1st Quarter 2021	4th Quarter 2033

SSOMP Activity	Start Date	End Date
Sewer Cleaning of High-Priority Areas (<30-inch diameter)	4th Quarter 2015	2nd Quarter 2022
Sewer Cleaning of TS Lines (≥30-inch diameter)[b]	TBD	TBD
Sewer Cleaning of Remaining Areas	1st Quarter 2021	4th Quarter 2033
Sewer Flow Monitoring	1st Quarter 2013	2nd Quarter 2029
Receiving Water Flow Monitoring	4th Quarter 2012	4th Quarter 2025
Precipitation Monitoring	1st Quarter 2013	2nd Quarter 2029
Sewer Flow Quality Monitoring	2nd Quarter 2013	4th Quarter 2025
Receiving Water Quality Monitoring	2nd Quarter 2013	4th Quarter 2025
Model Refinement to Reflect Incoming Information	3rd Quarter 2027	2nd Quarter 2029
Implement Overflow Activation Sensing and Reporting	4th Quarter 2013	Ongoing
Update Current Maps with GIS Technologies	3rd Quarter 2015	Ongoing
Implement IMS	3rd Quarter 2015	Ongoing
Design Standards and Inspection Procedures for New Projects	Ongoing	Ongoing
Develop and Implement SSOMP Priority Scheduling Methodologies	3rd Quarter 2015	Ongoing
SSOMP Performance Tracking	4th Quarter 2018	Ongoing

[*]Obtained from the 2022 SSOMP Annual Report.

As for the wet and dry weather discharges from CSWO outfalls, PRASA installed level sensor devices with cellular connectivity to continuously monitor sewer flow depth to identify discharge occurrences and assess the conditions that may lead to Dry Weather Overflows (DWOs). PRASA maintains a network of 17 level-monitoring data loggers to trigger preventive maintenance work orders in the upstream sewers to maximize dry- and wet-weather flows toward the Puerto Nuevo WWTP. This approach has helped PRASA perform more efficient preventive sewer cleaning and investigations before the overflow occurs. CSWO volume will be estimated using model simulations of wet weather events measured by level meters. Modeling is pending calibration and validation for its implementation.

Fats, Oils, and Grease

Meetings were held with food associations, non-profit organizations, government agencies, and municipalities to discuss the requirements and guidelines of the FOG Control Program. PRASA continues the public education campaign entitled *Tuberías Limpias*. The campaign aims to educate citizens, establishments, and industries about the proper management of FOG. In addition, the campaign has a presence in mass media and social media.

PRASA continues inspecting businesses under the FOG Control Program, including, among others, food service establishments, car washes, and auto repair shops. The inspection schedule was established according to the prioritization system of the program. During inspections, educational material is provided to business owners and general managers. The total number of inspections conducted from March 2022 through February 2023 by region

is included in Figure 6-3. During the inspections, PRASA identifies if any FOG Program violations are observed and reserves the right to stipulate penalties to the business.

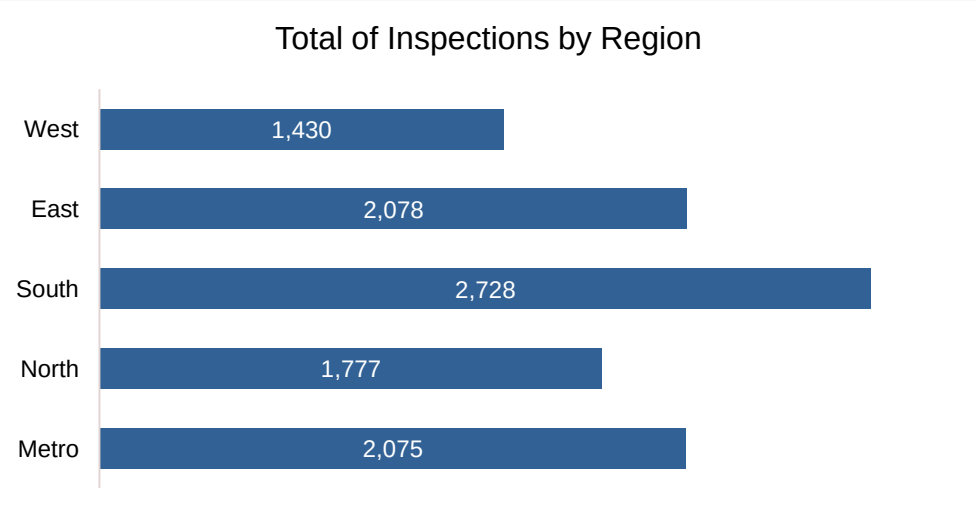


Figure 6-3 FOG Program Inspections Summary from March 2022 through February 2023

Sanitary Sewer Overflows (SSOs), DWOs, and Unauthorized Release

PRASA continues to use the pictographic method approved by USEPA to approximate SSOs or unauthorized releases. This method identifies through comparison the approximate overflow rate in gpm. Training on the selected method was provided to PRASA personnel associated with sanitary sewer system duties and the 24-hour overflow notification. During the evaluated period, the following events took place:

- Wet Weather Overflow: Paseo La Princesa outfall on July 18, 2022.
- DWO: No events were reported from September 2022 to February 2023.
- Two SSOs were reported that exceeded the six months to be corrected; however, they were repaired by October 2022.

6.5.1.1.3 Caño Martín Peña

The Caño Martín Peña projects were not performed during the period evaluated. These projects are contingent upon completing related prerequisite projects to be developed by parties not affiliated with PRASA.

6.5.1.1.4 Puerto Nuevo WWTP Sewer System Evaluation and Repairs

Barriada Figueroa Project

PRASA completed the requirement stipulated in the Consent Decree as the sewer inventory, and the final mapping report was submitted to USEPA on March 29, 2019.

Sewer System Maps

As PRASA agreed with USEPA, the Puerto Nuevo WWTP revised maps were included in the consolidated SSOMP Annual Report submitted in May 2023. According to the 2022 SSOMP Annual Report, PRASA continues to expand the management of sewer networks within the Puerto Nuevo WWTP sewershed to perform programmatic maintenance efforts successfully. PRASA's GIS capabilities have been expanded to include tracking SSOMP-

funded sewer repairs and retrofits based on previous findings of sewer defects. PRASA's GIS is continually updated as new information categories are added and previously captured information is refined.

6.5.1.1.5 Areas of Concern in the Puerto Nuevo WWTP Sewer System

As stipulated in Paragraph 36 of the Consent Decree, PRASA currently has 17 active Areas of Concern within the Puerto Nuevo RWWTP Sewer System. PRASA continues executing the required interim measures required while the sewer system is assessed and repaired, including inspections and educational campaigns in accordance with the Consent Decree.

6.5.1.1.6 Interim Effluent Limits for WTPs and WWTPs

PRASA continues to monitor compliance with the interim and final NPDES limits. Monthly Discharge Monitoring Reports (DMRs) following the NPDES permit for WWTPs and WTPs are submitted to USEPA as stipulated in the agreement. As depicted in Figure 6-4, PRASA has a combined (STSs & WWTPs) total of 1,263 active interim limits over 162 facilities; this represents a reduction of 42 interim limits compared to last year. The East Region has the highest number of active interim limits for STSs, and the North Region has the highest interim limits for the WWTPs. PRASA uses this dashboard to track when the interim limit for the parameters expires to have enough time to plan and start discussions with USEPA on addressing compliance or renegotiating the limit.

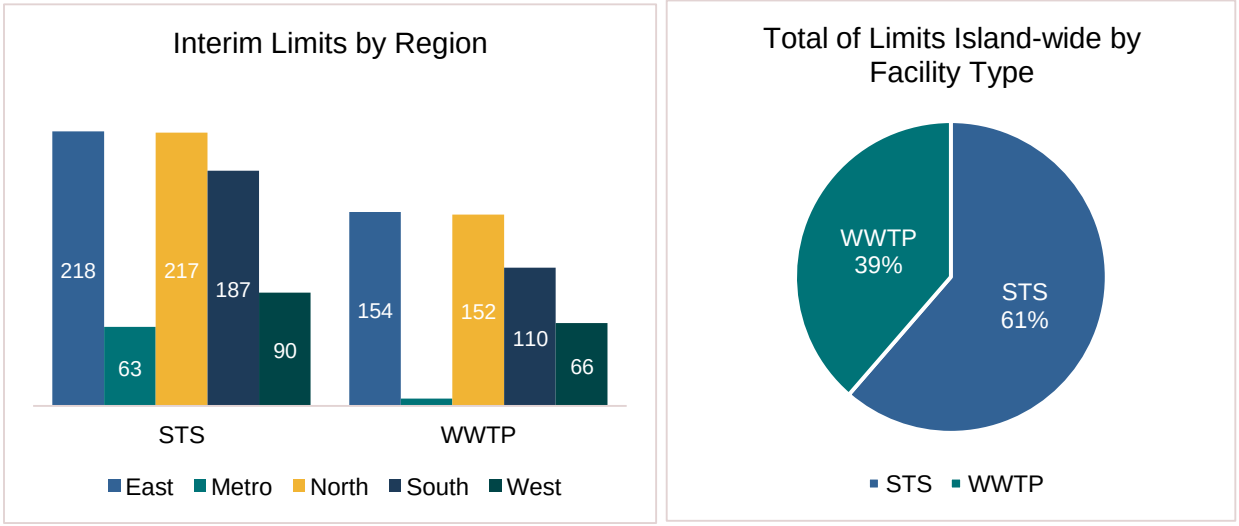


Figure 6-4 Summary of Interim Limits

During the period evaluated, no new interim limits were negotiated. PRASA continues to seek interim limits protection for NPDES obligations not being complied with, including new restrictive limits of various parameters. PRASA continues to move forward with the CIP planning, design, and construction of several facility improvements that will address treatment process issues and impaired equipment, among other identified deficiencies expected to decrease non-compliance issues. In addition, PRASA continues to conduct in-depth water analysis to determine feasible technologies that could be considered in projects.

6.5.1.1.7 Integrated Maintenance Program

Preventive and corrective maintenance continues to be implemented with limitations due to force majeure events and limitations in personnel. Currently, there is an initiative with the HR Department for intensive recruitment and efforts towards restructuring the IMP. PRASA conducts IMP activities mostly with subcontractors to comply with the requirements.

In addition, PRASA is implementing new strategies for identifying and documenting corrosion control activities as required by the Consent Decree. A summary of those initiatives is listed below:

- Corrosion inspection visits were completed in May 2023.
- Additional project scopes and cost estimates are anticipated to be completed by the end of 2023.
- Develop design specifications for projects.
- Modification improvements on the inspection procedure forms for corrosion preventive actions.
- Started corrosion training sessions utilizing existing modules. PRASA is working towards hiring a company to create new training materials and additional training modules.
- Created a new Power BI dashboard to visualize and track assessment reports and completion of inspected facilities.

Figure 6-5 shows the progress of developing the corrosion reports and respective cost estimates. As of December 2022, 645 facilities had been included in the corrosion assessment evaluation. PRASA prioritized the top 20 facilities with the highest corrosion deficiencies to be included in the CIP projects.

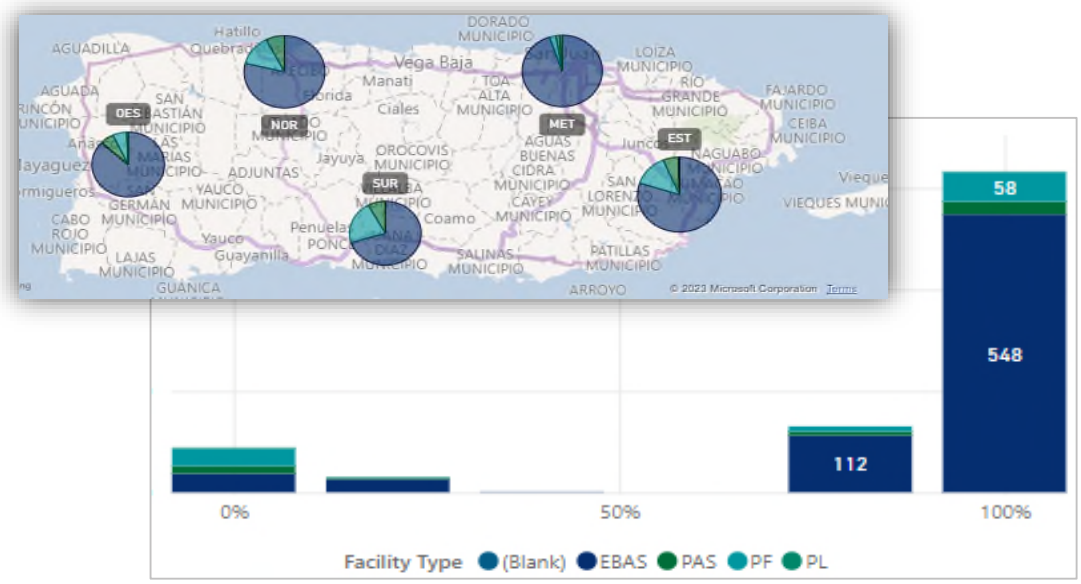


Figure 6-5 Corrosion Control Program by Facility Type

Note that equipment calibrations are being performed as required. The Maintenance Planning and Scheduling (MPS) procedures are being revised to focus more on the planning efforts. Although MPS meetings are not being formally conducted, topics in this regard have been included as part of the biweekly regional meetings. Refer to Section 5.6 for additional IMP and CCP updates.

In FY2023, PRASA expanded the Compliance Power BI Tool to track and monitor the EGUs at the WWTP and WWPS. Figure 6-6 depicts the status of EGUs by region.

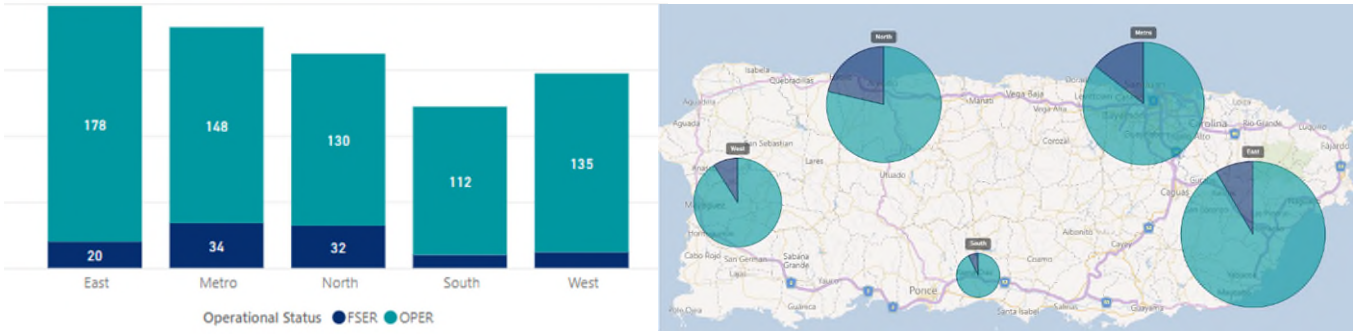


Figure 6-6 EGUs Status Summary by Region

6.5.1.1.8 Training and Additional Requirements for Operators

The Consent Decree stipulates that all new STS or WWTP operators hired by PRASA must be trained in monitoring, recording, and reporting requirements of the individual NPDES permits as applicable. According to BPR No. 14 and No. 15, PRASA hired 66 operators for STS or WWTP between March 2022 and February 2023. PRASA offered over 1,500 training courses for in-person and online modalities during the evaluation period. Following the recent restructuring of the Training and Continued Education group, improvements to SAP are ongoing to accommodate and adjust the needs as part of the automation process changes regarding PRASA's training program. Implementing online training and digital platform improvements have increased the efficiency of operations. In FY2023, PRASA expanded the Compliance Power BI Tool to track operators' licensing and NPDES training. These improvements allow more visibility to ensure compliance with the Consent Decree requirement.

In addition, PRASA has experienced delays toward license renewal or acquisition of new licenses to comply with the treatment plant required category due to force majeure events. In such instances, supervisors or managers are responsible for the facility's operation. Therefore, PRASA continues pursuing protection by force majeure for the delays incurred to the Training Program and licensing of operators.

6.5.1.1.9 Process Control System

The PCS has been implemented at PRASA's STSs and WWTPs as stipulated by the Consent Decree. PRASA completed the revisions and updates to the PCS manuals at the STSs and WWTPs in all regions by the end of FY2023.

6.5.1.1.10 Spill Response and Cleanup Plan

Although PRASA utilized Android technology to facilitate and improve the data reporting process during the period evaluated, it received pushback from field staff. As a result, most of the field data is collected manually on paper. PRASA is working on an initiative with the HR Department to train staff on the data collection technology for use in the field.

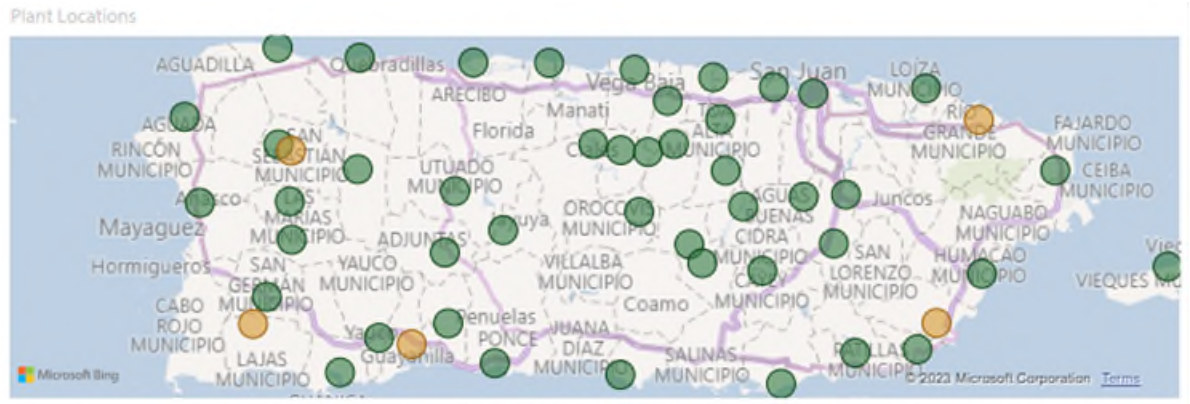
6.5.1.1.11 Stipulated Penalties

PRASA continues to monitor and report to the USEPA the NPDES exceedances, including limits, sampling results, and violation codes. It is important to note that stipulated penalties have not been imposed or settled due to the prevailing force majeure protection.

6.5.1.1.12 Wastewater Treatment Capacity and Flow Management

As stipulated in Paragraph 67 of the Consent Decree, PRASA's Existing Sewer Connection Policy, effective management of wastewater treatment capacity is essential for protecting the environment while also allowing economic growth and development in Puerto Rico. PRASA implemented a monthly average permitted flow tracking tool that allows the monitoring, planning, and management of WWTP flows. In addition, this program was included in the Power BI dashboards as part of the expansion of the tool.

As depicted in Figure 6-7, no violations were recorded during the period evaluated, and five facilities were close to exceeding the 105% monthly average of permitted flow.



Plant Name	NPDES	Max Flow	Max Capacity Used	Avg Flow	Avg Capacity Used	Stated Limit	Limit (105%)	Exceedances	Violation
Guayanilla WWTP	PR0020494	0.92	140.7%	0.61	93.8%	0.62	0.65	!	✓
San Sebastian (OLD) WWTP	PR0020851	0.54	129.5%	0.33	78.8%	0.40	0.42	!	✓
Lajas WWTP	PR0020575	1.33	105.6%	0.87	69.0%	1.20	1.26	!	✓
Yabucoa WWTP	PR0021717	6.99	443.5%	1.37	87.3%	1.50	1.58	!	✓
Rio Grande Estates WWTP	PR0023264	0.82	104.0%	0.52	65.4%	0.75	0.79	!	✓
Adjuntas WWTP	PR0020214	0.43	73.9%	0.32	55.9%	0.55	0.58	✓	✓
Aguas Buenas WWTP	PR0020273	0.27	42.4%	0.23	37.0%	0.60	0.63	✓	✓
Ciales WWTP	PR0020427	0.56	35.6%	0.47	29.6%	1.50	1.58	✓	✓

Figure 6-7 Capacity Management Tracking Tool

6.5.1.2 2006 PRDOH Drinking Water Settlement Agreement

As part of the 2006 Drinking Water Settlement Agreement between PRASA and the PRDOH, PRASA submits a Quarterly Settlement Agreement Report (QSAR) every quarter. Arcadis reviewed QSARs Number 58 through 61, covering the period from July 1, 2022, through June 30, 2023.

6.5.1.2.1 Remedial Measures

Per the Settlement Agreement, several remedial actions needed to be implemented in multiple systems or components. These remedial measures were classified as short (LTP1), mid (LTP2), and long-term (LTP3). PRASA completed remedial measures LTP1 and LTP2. A summary of the LTP3 projects and status is included in Table 6-5.

Table 6-5 Long-Term Projects 3

Region	CIP No.	System	Facility	Project Description	Status
East	-	Culebras	Culebras WTP	Installation of modules for operation improvements	Completed
East	-	Río Blanco	El Duque WTP	WTP rehabilitation	Completed
East	3-40-6005	Juncos Urbano	Ceiba Sur WTP	WTP rehabilitation	Pending
East	-	Juncos Urbano	Quebrada Grande WTP	WTP rehabilitation	Completed
North	2-38-6049	Canalizo	Canalizo WTP	Improvements and expansion	Pending
North	2-20-6107	Frontón	Frontón WTP	Expansion of WTP: installation of 0.5 MGD module including storage tank, treatment, and telemetry system	Planning
North	2-38-6049	La Pica	La Pica WTP	WTP elimination and water transfer to another facility	Pending
West	5-48-6006 5-48-9001	Monte del Estado	Monte del Estado WTP	Intake and WTP rehabilitation	Planning

(1) Source: QSARs Number 58 through 61.

During FY2023, PRASA completed several LP3 measures components for the following WTPs: El Duque, Fronton, Monte del Estado, and Ceiba Sur. The LP3 measures for Quebrada Grande WTP were completed.

The Continuous Monitoring Program is implemented at all WTPs. At each filter, effluent, and combined filter effluent, turbidity analyzer equipment is installed for continuous monitoring and data reporting to the PRDOH. Also, an in-line chlorine residual analyzer is installed before the first customer for continuous monitoring and data reporting to regulatory agencies. In addition, PRASA calculates and reports the CT as part of the Continuous Monitoring Program monthly requirements. During the period evaluated, PRASA performed field verification of continuous monitoring equipment installed in treatment facilities to ensure its adequacy and condition for accurate data gathering, reporting, and regular maintenance procedures. In some facilities, equipment was installed in safety hazard locations, limiting its assessment. CIP projects will include these deficiencies as part of the facilities improvements.

PRASA developed and implemented the Optimization Program and site visits to the water facilities. In addition, the program was expanded to include procedures to reduce and control DBPs. PRASA established process controls for reducing turbidity and organics at WTPs. Currently, PRASA is identifying resources to perform studies and evaluations for chemical optimization. PRASA implemented preventive measures on those systems with frequent DBP violations. The progress and status of the program are summarized in quarterly reports.

6.5.1.2.2 Preventive Measures

As stipulated in the Agreement, the Preventive Measure Program is intended to prevent future violations in Potable Water Systems (PWS). The program requires implementing preventive measures to establish operational controls and vigilance measures to eliminate or minimize violations for the following parameters: Bacteriology, Turbidity, DBPs, and Nitrates. During the evaluation period, PRASA complied with the preventive measures for Bacteriology Turbidity, and Nitrates. However, PRASA continues to evaluate and execute operational adjustments to systems with exceedances in DBPs, including but not limited to pre- and post-chlorine application, CT calculations, continuous flushing program, sample point relocations, and training.

6.5.1.2.3 Integrated Maintenance Program and Standard Operating Procedures

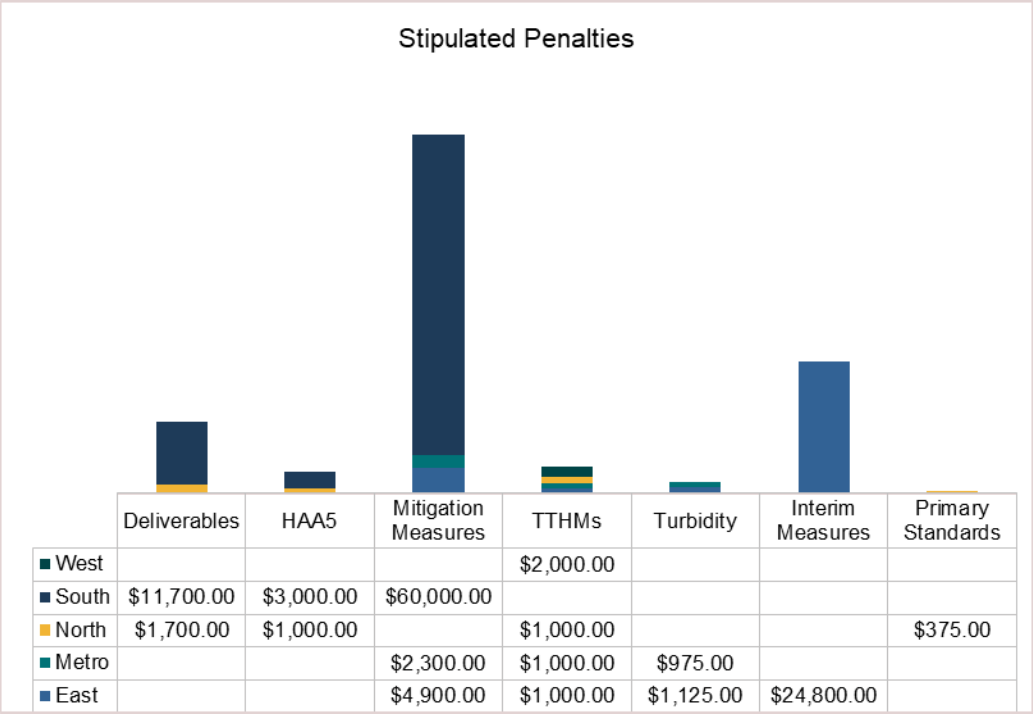
The IMP aims to ensure the PWSs are operated and maintained in optimum condition. Minimum program requirements established in the Agreement include equipment logs, record keeping/archives, log sheets of activities, maintenance schedule, inventory and storage, and repairs action plan. As the QSARs indicate, PRASA complies with the program requirements and the SOPs. PRASA was able to accomplish additional initiatives within the program. During the period evaluated, several bids were announced for contracting services related to critical equipment repairs, calibration, and telemetry. Also, the optimized maintenance plans were integrated into the SAP platform, resulting in a more efficient implementation. In addition, PRASA upgraded digital devices for processing preventive and corrective work orders in the field. Refer to Section 5.6 for additional updates on the IMP. Currently, PRASA is exploring external resources to develop and provide training material for the program.

6.5.1.2.4 Operators Training and Licensure

Operator Training and Licensure Program establishes that PRASA must train all operators and supervisors who work in a PWS and ensure that they are certified in a licensure category according to the facilities they are responsible for. In 2022, 743 employees were enrolled in courses required by the Agreement; however, only 68% completed the assigned courses. In 2023, PRASA identified 211 employees required to be enrolled in the training program, from which 15 have already completed the courses assigned by the end of June 2023. PRASA is working with the HR Department to improve training participation to achieve this requirement.

6.5.1.2.5 Stipulated Penalties

PRASA incurred penalties for exceeding the primary standards, required deliverables, remedial measures, and credit for mitigation measures. Figure 6-8 illustrates the penalty distribution by category and region.



	Deliverables	HAA5	Mitigation Measures	TTHMs	Turbidity	Interim Measures	Primary Standards
West				$2,000.00			
South	$11,700.00	$3,000.00	$60,000.00				
North	$1,700.00	$1,000.00		$1,000.00			$375.00
Metro			$2,300.00	$1,000.00	$975.00		
East			$4,900.00	$1,000.00	$1,125.00	$24,800.00	

Figure 6-8 Stipulated Penalties

During the period evaluated, the penalties amounted to $116,875. As depicted in Figure 6-9, the Mitigation Measures category was 58% of the total penalties amount, while Interim Measures was 21% of the total amount.

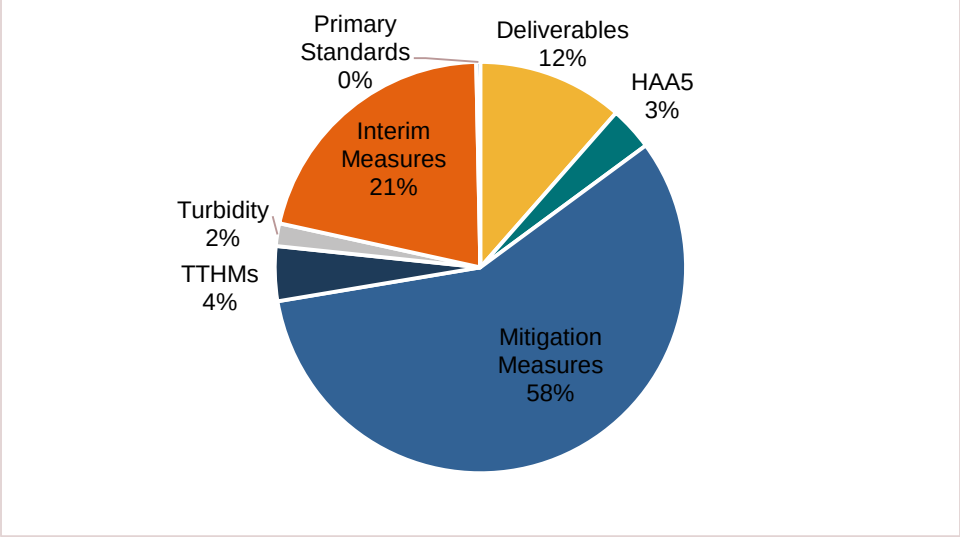
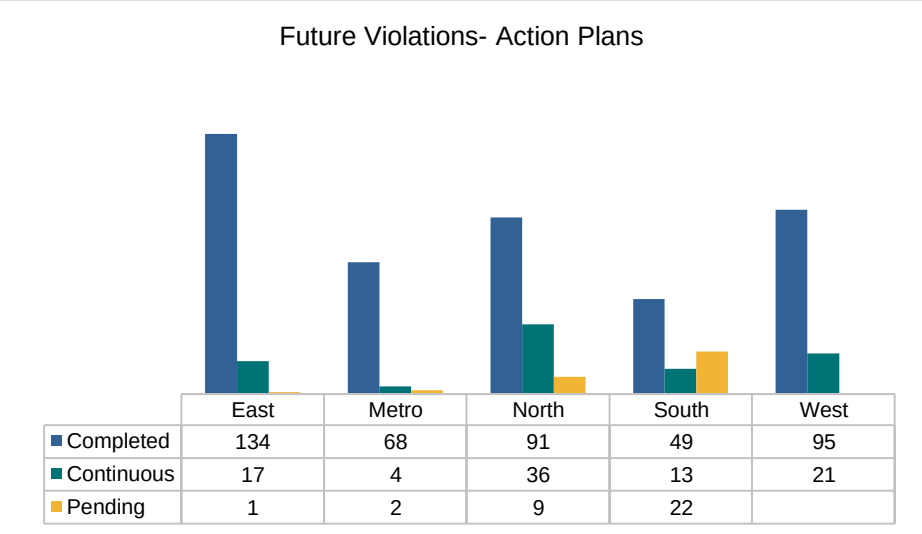


Figure 6-8 Penalty Category Percentage

6.5.1.2.6 Future Violations – Action Plans

The Future Violations Program requires implementing action plans approved by PRDOH that include remedial and/or corrective measures to address non-compliance and systems incurring violations of DPBs, TOC, Long-Term 2 Enhance Surface Water Treatment Rule (LT2ESWTR), and exceedances to lead and copper action level.

Figure 6-10 illustrates the number and status of Action Plans by region.



	East	Metro	North	South	West
Completed	134	68	91	49	95
Continuous	17	4	36	13	21
Pending	1	2	9	22	

Figure 6-9 Future Violations – Action Plans by Region

There are 34 pending action plans. PRASA is working to address the pending action plans and, in some cases, requested a time extension to the regulatory agency to meet the requirements.

Following the Agreement, once the action plans are developed and approved by PRDOH, PRASA and PRDOH shall request the Justice Department a joint motion for remedial measures action plan to become part of the Settlement Agreement formally.

During the period evaluated, the following joint motions were issued to the Justice Department:

- Juncos Urbano Remedial Measures and Interim Measures
- Supplementary Project PAS III time extension and approval
- Esperanza WTP Remedial Measure Amendment
- Quebrada WTP Remedial Measure Amendment
- Pilot study certification for the aeration technology in the WST in the Metropolitano water system
- Long Term 3 remedial measures for Canalizo and La Pica water systems

6.5.2 Current Applicable Drinking Water Regulations

PRASA is subject to the SDWA requirements of 1974, as amended in 1986 and 1996. The amendments extended the regulatory responsibility of the USEPA to set national health-based standards for drinking water to protect against natural-occurring and man-made contaminants that may be found in drinking water. SDWA amendments

enhanced the existing law by recognizing source water protection, operator's training, funding, and public information as important components for safe drinking water.

Applicable regulatory requirements for PRASA and implementation status are summarized in Table 6-6.

Table 6-6 Regulatory Requirements

Regulatory Requirement	Summary of Requirements	Implementation Status
Surface Water Treatment Rule	Require systems that use surface water sources or groundwater sources under the direct influence of surface water (GWUDI) to filter and disinfect water sources.	Implemented
Revised Lead and Copper Rule (LCRR)	The Lead and Copper Rule was revised in 2021. It addresses the control of copper and lead that may leach from home plumbing systems.	In progress
Revised Total Coliform Rule	The Total Coliform Rule requires water systems to routinely monitor for total Coliforms at specific locations throughout the distribution system.	Implemented
Disinfectants and Disinfection By-products Rule (Stages 1 and 2)	This rule regulates levels of disinfectants and disinfection by-products.	Implemented
Consumer Confidence Report Rule	Requires the to issue an annual report on treated water quality to its consumers.	Implemented
Ground Water Rule (GWR)	The Groundwater Rule (GWR) is designed to reduce disease incidence associated with harmful microorganisms in drinking water and enhance groundwater users' protection from fecal contamination.	Implemented
Chemical Contaminants Rules	The Chemical Contaminant Rules regulate 65 contaminants in three categories: inorganic contaminants, volatile organic contaminants, and synthetic organic contaminants.	Implemented
Unregulated Contaminant Monitoring Rule (UCMR)	The SDWA requires that once every five years, the USEPA issues a new list of no more than 30 unregulated contaminants to be monitored by select public water systems.	Implemented
PFAS National Primary Drinking Water Standard	EPA proposes individual MCLs of 4.0 nanograms per liter (ng/L) or parts per trillion (ppt) for PFOA and PFOS. The Rule is expected to be finalized by the end of 2023.	Refer to Section 6.6

6.5.3 Current Applicable Wastewater Regulations

PRASA is subjected to the CWA enacted in 1948, reorganized, and expanded with amendments in 1972. The CWA establishes the structure for regulating the discharging of pollutants into the waters of the United States and regulating quality standards for surface waters. As a result, the NPDES permit program was developed to control what a municipal facility can discharge and establishes monitoring and reporting requirements and other stipulations to protect human health and the environment. PRASA has NPDES permits in place for all WWTPs and STS facilities that meet the criteria as required by the regulation. Also, PRASA performs sampling for parameters at the required

frequency as established on the NPDES permit, and reporting procedures are recorded on the DMRs. PRASA's Compliance Department has a procedure implemented to ensure NPDES permit renewal occurs within the required period.

Regarding biosolids requirements, the Standards for the Use or Disposal of Sewage Sludge regulates sewage sludge applied to land, fired in a sewage sludge incinerator, or placed on a surface disposal site. It includes pollutant limits, requirements for pathogen and vector attraction reduction, management practices, monitoring, recordkeeping, and reporting, among other requirements. The constituents removed in wastewater treatment plants, composed primarily of grit, scum, sediment, and biological solids, are known as sludge or biosolids, depending on whether they have been stabilized or not. PRASA performs Semiannual Compliance Report Sludge Management per the 40 CFR Part 257 of the Code of Federal Regulations.

In 2022, 81% of the solids produced were landfilled, and only 19% were composted. Although several sludge handling methods are in use, a thorough evaluation is necessary to develop a sustainable solution for the overall program. Continued dependence of landfilling of wastewater solids could place PRASA's wastewater and water treatment operations in jeopardy depending on the capacity and availability of current landfills. Improving the diversity of sludge management by PRASA will require investment of capital and operation and maintenance resources for existing operations and future facilities.

6.6 Future Regulations and Other Regulatory Requirements

The CIP was evaluated for adequacy to comply with future regulations and other regulatory requirements that could impact compliance limits for PRASA's water and wastewater facilities. Concerning the water systems' new discharge limits for residual chlorine, total nitrogen, and total phosphorus, PRASA mostly uses interim limits due to its inability to meet the stringent permit limits. Despite PRASA's compliance with the interim limits, the permit limits established for the parameters are very restrictive. They have resulted in a challenge for PRASA to implement available treatment technologies to comply with the permit requirements. PRASA is evaluating available technologies and/or the consolidation of facilities that could be considered to meet permit requirements. In addition, this challenge has been brought up to the regulatory agencies to explore alternatives to re-evaluate these stringent permit limits.

Regarding wastewater collection systems, PRASA has indicated that once the sewer system improvements in the Puerto Nuevo WWTP service area are completed, it will expand the program to the rest of the Metro Region and, eventually, to the rest of the island (where applicable). At this time, PRASA does not have a specific timeframe for when this will occur.

6.6.1 Water Future Regulations and Rule Revisions

Regarding the water system, future regulations for PWSs will continue to become more stringent. The following regulatory actions will impact PRASA's water system operations in the future.

- UCMR5 – In progress
- Lead and Copper Rule Revision (LCRR) – In progress
- PFAS Rule – In progress

6.6.1.1 UCMR5

The UCMR was designed to evaluate and prioritize contaminants for inclusion in federal drinking water regulations to protect public health. The rule intends to document the occurrence of the contaminants on the Candidate Contaminant List (CCL) to determine if future regulation is warranted. The list includes pesticides, DBPs, chemicals used in commerce, waterborne pathogens, pharmaceuticals, biological toxins, perfluorooctanoic acid (PFOA), and perfluorooctanesulfonic acid (PFOS), among others. Every six years, the USEPA reviews the list of contaminants, largely based on the CCL. The UCMR 5 was published on December 27, 2021. UCMR 5 requires sample collection for 30 chemical contaminants between 2023 and 2025 using analytical methods developed by USEPA and consensus organizations. Consistent with USEPA's PFAS Strategic Roadmap, UCMR5 will provide new data that is critically needed to improve USEPA's understanding of the frequency tin which 29 PFAS are found in drinking water systems and at what levels. This data will ensure science-based decision-making and help prioritize the protection of disadvantaged communities. PRASA began UCMR5 sampling requirements in January 2023.

6.6.1.2 LCRR

The USEPA revised the federal Lead and Copper Rule (LCR) on January 15, 2021. USEPA's new LCRR strengthens every aspect of the LCR to better protect communities and children in elementary schools and childcare facilities from the impacts of lead exposure. By October 16, 2024, the LCRR will require community water systems (CWSs) and non-transient non-community water systems (NTNCs) throughout the United States to inventory service lines and determine the material of those lines and fittings. On January 20, 2021, federal Executive Order 13990 directed all federal agencies to undertake review and action. Consequently, USEPA delayed the effective and compliance dates established in the LCRR to December 16, 2021, and October 16, 2024, respectively. Table 6-7 includes the summary of the LCRR requirements.

Table 6-7 Lead and Copper Rule Revision Summary

Action	Description
Action Level and Exceedances	• Action level of 0.015 mg/L maintained • New "trigger level" of 0.010 mg/L if exceeded at the 90th percentile • Additional monitoring, corrosion control treatment (CCT), lead service lines (LSL) replacement, and public education to reduce lead in drinking water before exceeding the action level.
Lead Service Line Inventory and Replacement	• Develop and maintain a publicly accessible inventory. • LSL replacement plan within the first three years of the published rule. • LSLs exceeding trigger or action level at the 90th percentile are required to conduct full LSL replacement for at least two years at pre-determined rates.
Tap Sampling	• Shifts tap compliance sampling to locations with the highest lead, requiring systems to collect from 100% LSL sites, if available.
Corrosion Control Treatment	• Systems with existing CCT that exceed the Action Level or Target Level would be required to conduct a CCT study.
Public Notification	• Systems with a 90th percentile lead level or customers whose individual lead tap samples exceed 0.015 mg/L must notify customers within 24 hours.

Action	Description
Find-and-Fix Assessment	• Any lead sample (compliance or voluntary) that exceeds 0.015 mg/L, systems would be required to sample water quality parameters within five days and collect a follow-up lead tap sample within 30 days to “find” the cause and then “fix” it within the utility control.
Schools and Childcare Facilities	• CWSs would need to collect lead samples annually at 20 percent of all schools and childcare facilities.

The revised LCRR requires that water systems prepare and maintain an inventory of service line materials by October 16, 2024. At PRASA, this effort is being led by the Infrastructure Department with the support of the Compliance Department to ensure compliance with the regulatory requirements. In FY2023, PRASA issued an RFP to have a consultant complete the service line inventory activities. USEPA intends to promulgate further revisions before October 16, 2024, with anticipated changes focused on the following:

- Removal of trigger level and reduced action level
- Mandated removal of all lead (and Galvanize Requiring Replacement) service lines
- Prioritizing removal of lead service lines in disadvantaged communities
- Revising tap sampling - 1st and 5th-liter collection at the lead service line and use the higher result

6.6.1.3 PFAS

PFAS are man-made chemicals used in various industries and consumer products, such as carpeting, apparel, upholstery, food paper wrappings, fire-fighting foams, and metal plating. PFAS are prevalent in the environment, and studies have shown them at extremely low levels to have adverse human health effects. In March 2021, USEPA published regulatory determinations for contaminants on the Fourth CCL, which included a final determination to regulate PFOA and PFOS in drinking water. As USEPA undertakes this action, the agency is also evaluating additional PFAS and considering regulatory actions to address groups of PFAS. USEPA anticipates finalizing the rule by the end of 2023. The proposal will include a non-enforceable Maximum Contaminant Level Goal and an enforceable standard, or Maximum Contaminant Level or treatment technique. PRASA started the initial PFAS testing under the UCMR5, which is expected to be finalized by December 2025 as established in the agreed schedule with EPA. PRASA recognizes this regulation's challenges, for which it has started regular communications with PRDOH and proactive planning activities to mitigate the impact on water and wastewater facilities.

Note that PRASA is evaluating the availability of funds in the Bipartisan Infrastructure Law to assist with implementing the LCRR and PFAS regulatory requirements. In addition, PRASA may identify additional CIP needs to bring the water system into compliance with the Stage 2 Disinfection Byproducts Rule (DBPR). PRASA is implementing changes in its O&M practices to bring or maintain the PWSs in compliance. Further, PRASA became one of the defendants in the case *In RE: Aqueous Film-Forming Foam Products Liability Litigation*, MDL No. 2: 18-mn-2873 (RMG), 2: 23-cv-02352 (RMG), with the Commonwealth of Puerto Rico and other government agencies. PRASA is requesting damages from several PFAS manufacturers regarding PFAS contamination in its raw water, which could impact the treatment of its drinking water and the treatment of its wastewater. PRASA has accepted settlement offers from DuPont and 3M groups, which money will be used to bring the systems into compliance with the new regulation, among other things. The amount of money to be awarded to PRASA will be determined at a

later date since damages will be computed using a formula taking into account all the plaintiffs that will participate in the settlement, the amount of contamination found, and water flow in the systems.

6.7 Conclusions

PRASA's comprehensive six-year CIP addresses the System's needs and fulfills PRASA's commitments to reconstructing the damage caused by the 2017 Hurricanes, Hurricane Fiona, the earthquakes, and regulatory requirements. The CIP encompasses a wide range of projects identified by PRASA, as mandated by the Consent Decree and Settlement Agreement, to meet current and future needs. It allocates funding for minor and major repair projects in various categories. Most of the projected CIP investment over the six years is dedicated to Reconstruction and Recovery, Mandatory Compliance, and Mitigation and Resiliency projects. PRASA's six-year CIP also provides funding for essential quality improvements and other infrastructure projects, including water meter replacement, fleet, generators, nonmandatory compliance, and safety measures, which are crucial for maintaining and preserving utility assets.

While PRASA has made initial efforts to assess the potential impact of forthcoming regulations, the full extent of their impact on PRASA's System remains uncertain. Some regulations may necessitate minor process adjustments, while others may require significant capital investments, such as constructing new treatment processes or intensive repair and replacement programs. PRASA remains attentive to potential future regulations, including the LCRR and PFAS, which could affect the System and compliance requirements. PRASA has encountered additional compliance challenges concerning NPDES permit limit requirements for WWTPs and STS at the WTPs. In recent years, NPDES permit limits have become more stringent for certain parameters like total nitrogen, total phosphorous, and residual chlorine, among others. PRASA is conducting investigations and analyses to explore viable alternatives while maintaining open lines of communication with regulatory agencies to ensure future compliance.

However, as the impact of future regulations becomes clearer and NPDES permit limits become more stringent, modifications to the CIP may be necessary to address the resulting needs adequately. Consequently, the reprioritization of CIP requirements and implementation schedules will depend on PRASA's financial capacity.

7 Insurance Program

7.1 Introduction

Section 7.08 of the MAT establishes that “PRASA shall employ an insurance consultant to review the insurance program of the Authority from time to time (but not less frequently than biennially). If the insurance consultant makes recommendations for the increase of any coverage, PRASA shall increase or cause to be increased such coverage following such recommendations, subject to a good faith determination of PRASA that such recommendations in whole or in part are in its best interest.

The data, opinions, and comments included in this section have been based solely on PRASA’s copies of policies for the 2023-2024 period provided by PRASA for this purpose unless stated otherwise.

7.2 Risk Management

Risk is loss exposure. It is the chance of something happening that will lead to a loss or an undesirable outcome; it is measured in terms of consequences and likelihood. Risk management is an effective process directed toward managing risks and hazards to produce a desired set of results.

The treatment of risk takes the following forms:

- Loss Control:
  - Elimination or reduction of risk by physical, technical, or mechanical means, loss prevention techniques, and loss prevention engineering.
- Contractual transfer:
  - Hold harmless agreements, and indemnity agreements in contracts with suppliers, contractors, service providers, and customers agreements.
- Transfer of risk through insurance:
  - Self-insurance.
  - Insurance policies and coverage available from insurance companies.
  - Insurance products and programs available from FEMA and the Government of Puerto Rico, including workers' compensation and health/medical coverage, among others.

7.2.1 PRASA Insurance and Risk Department

The risk management function is an integral part of the management function. Within PRASA, all departments, at all levels, perform risk identification and treatment in conformity with local and federal regulations, including the Occupational Safety and Health Administration (OSHA) regulations. Risk management is applied by employing independent engineering and consulting firms in planning, design, and construction and by implementing excellence in practices and processes. New construction is carried out following applicable building codes and regulations.

7.2.2 Identification of Risk

The risks affecting PRASA can be broadly categorized as follows:

1. Risks to property, facilities, and physical assets from natural and human causes.
2. Financial risks arising from damage to or loss of physical assets, such as loss of income, interruption of operations, and increased operating expenses to continue operations.
3. Financial risks resulting in management liability related to economic downturns.
4. Regulatory issues that might result in liability or service interruption.
5. Theft of owned and non-owned property.
6. Theft of water production.
7. Liability risks, including suits from third parties for injury or loss of property, fines/penalties, injuries caused by vehicles or properties, advertising injury, products, libel, slander, false arrest/detainment, and injuries occurring on or off-premises.
8. Pollution liability claims and fines.
9. Public authority/errors and omissions liability arises from the financial loss incurred by others that do not result in physical injury to persons or property.
10. Reputation risk includes incidents, events, or human actions that seriously damage the organization's image and reputation.
11. Epidemic or pandemic that causes widespread injury or sickness to PRASA employees.
12. Kidnap, ransom, extortion risks.
13. Privacy and cyber liability arising from alleged failure to secure customer data adequately.
14. Acts of terrorism affecting PRASA's facilities or customers.
15. Strikes and labor unrest cause loss of income, interruption of operations, and increased operating expenses to continue operations.

7.3 Insurance Program Assessment

7.3.1 Property Insurance

The following are the findings and recommendations under the Commercial Property Program currently placed through MAPFRE PRAICO Insurance Company (MAPFRE) and London Markets for policy from April 2022 to April 2023:

- PRASA's schedule of values amounts to $11,021,002,890 of property. PRASA’s property is insured by a policy issued by MAPFRE (42% of participation). It includes 18 London Markets (58% of participation) in the policy as subscribers, meaning they have agreed to bear their specific percentage portion of each loss.
- Coverage is written on an “all risks” basis. The policy insures real property (dams, WTPs, WWTPs, WSTs, WPSs, WWPSs, meters, wells, and buried infrastructure), business personal property, and covers business interruption resulting from covered physical damage/loss to the property for up to 18 months.

Major policy limits and deductibles are shown in Table 7-1.

Table 7-1 Property Coverage, Limits, and Deductibles

Coverage	Limit	Deductible
Total Insurable Value (TIVs)	$11,021,002,890 Real Property: $10,321,002,893 Personal Property: $100,000,000 Business Interruption: $600,000,000	As stated below.
Property – All Other Perils (AOP) (including Data Processing, In Transit, and Equipment Breakdown)	$150M per occurrence, combined single limit for property damage and business interruption, excess of applicable deductibles.	$100M combined for property damage and business interruption, including extra expenses.
Windstorm	Included in the $150M limit.	$100M combined for property damage and business interruption, including extra expenses.
Earthquake (EQ)	$300M combined single limit for property damage and business interruption, excess of applicable deductibles.	$100M combined for property damage and business interruption, including extra expenses.
Flood	$300M combined single limit for property damage and business interruption, excess of applicable deductibles.	$100M combined for property damage and business interruption, including extra expenses.
Business Interruption	Within $150M for AOP, including wind and $300M EQ and flood coverages.	$100M combined for property damage and business interruption, including extra expenses.
Extra Expense	Within $150M property for AOP, including wind, and $300M EQ and flood coverages.	$100M combined for property damage and business interruption, including extra expenses.
Contingent Business Interruption	Within $150M property for AOP, including wind and $300M EQ and flood coverages, subject to a $35M sub-limit.	$100M combined for property damage and business interruption, including extra expenses.
Newly Acquired Locations	Included in $150M property for AOP, including wind, and $300M EQ and flood coverages.	$100M combined for property damage and business interruption, including extra expenses.
Boiler and Machinery	Included in $150M property primary layer.	$100M combined for property damage and business interruption, including extra expenses.

Coverage	Limit	Deductible
Asbestos Sublimit	$1,000,000	$100M combined for property damage and business interruption, including extra expenses.
Professional Fees Sublimit	$2,000,000	$100M combined for property damage and business interruption, including extra expenses.

7.3.2 Policy Observations and Recommendations

This section summarizes observations and recommendations related to the April 2022 through April 2023 policy coverage.

1. The named insured under the extended named insured and conditions (page 10 of 145 in the pdf) of the property program should read as follows: “Autoridad de Acueductos y Alcantarillados de Puerto Rico and/or Government of Puerto Rico and/or Gobierno de Puerto Rico Departamento de Hacienda c/o Area de Seguros Públicos and/or PRASA and/or Government of Puerto Rico and/or Government of Puerto Rico Department of Treasury c/o Bureau of Public Insurance and/or any subsidiaries, affiliated associated, newly acquired or controlled Company and or corporation and or individuals as may now be constituted or hereafter formed, as their respective interests may appear for which the Named Insured is responsible for placing insurance and for which no other specific insurance is provided.”
2. The business description throughout the policy contract currently reads Water Company. It is recommended that it be amended to the following: “Water and Wastewater Company, including but not limited to, Dams, Water Manufacturing, Water and Wastewater Treatment Plants, Water and Wastewater Filtering Plants, and Distribution, as per Law 40 of May 1st, 1945, as amended.”
3. To make sure the insurer does not use the “Other Coverage” condition at the time of a covered loss, it is suggested that the following changes be included on the written declaration page, and elsewhere in the policy, stating the covered interests and property covered, considering that PRASA maintains an OCIP Builder’s Risk for its construction projects: “Real and Personal Property of the Assured, including owned, leased or rented, or in which the Assured has an assurable interest. This includes the property of others in the Assured’s care, custody, and control or for which the Assured is legally or contractually liable. Property of the Assured in the care, custody, and control of others, the interest of the Assured in the improvement and betterments to non-owned property, property in the course of construction, renovation, installation, erection or assembly, and while in transit, if not covered under the OCIP Builder’s Risk of the Assured.”
4. Deductibles: The property policy program has a deductible applicable per each occurrence, combined (property damage and business interruption) of $100M. The policy should include a lesser deductible to cover non-catastrophic perils like equipment breakdown (Boiler and Machinery), data processing equipment, transportation, etc.
5. Under Conditions, Item 6, Limit of Liability, in the second paragraph for the earthquake and flood first layer coverage, it is recommended that the phrase “(Not including wind-driven water)” be more specific and mention that only windstorm-driven water is not included. Therefore, it should read “(Not including windstorm-driven water)”.
6. In the Property and Business Interruption Insurance section (page 20 of 145 in the pdf), Definitions, A, iii. Earthquake section, the term (consecutive hours) to determine “an occurrence” and the limits of liability and

deductible applicable should be 168 hours, as per ISO Form CP 1040, Earthquake and Volcanic Eruption Endorsement, instead of the current 72 consecutive hours stated on the policy.

7. It should be included on the policy that in the event of inconsistencies between coverage forms, general conditions, special conditions, clauses, or any other written document or statement that is part of the Policy, the broadest coverage, condition, and/or definition shall supersede any other.
8. On the General Conditions, page 15 of 145 in the pdf, Item 7 Permissions, letter B, the 90-day reporting requirement condition to the insurer for additions, alterations, repairs, new construction, and/or premises should be deleted. Automatic coverage is already provided, without time limitation, during the policy period for "additional property and interests not exceeding five percent of the total insurable values" on page 18 of 145 in the pdf under Automatic Acquisition/Capital Additions.
9. On the General Conditions, page 16 of 145 in the pdf, Item 9 Cancellation, discrepancies were found between the policy and certain insurance requirements in the Bureau of Public Insurance of the Treasury Department. The 45-day cancellation notice from the insurer and the methods for determining premium refunds on the policy contradicts the Bureau of Public Insurance requirements. According to the Bureau of Public Insurance, the insurer should give a written cancellation notice with at least 90 days prior notice instead of the 45 days stated on the policy.
    a. In the event of non-payment of premiums, a 90-day written notice is provided by the Bureau instead of the ten days given in the policy.
    b. With respect to any "unearned premium", the methods for determining premium refunds should always be on a "pro-rata basis", with no distinction of who elects to cancel the insurance program instead of the short rate calculation stated on the policy.
    c. In the sixth paragraph, which relates to the period of limitation for cancellation notices being void by "any law controlling the construction thereof", it is recommended to include after "law" "or any requisite of the Bureau of Public Insurance of the Treasury Department."
10. Under the General Conditions, on page 17 of 145 of the pdf, Item 14 Audit, states that "The Insurers "may examine and audit the assured's books and records at any time during the policy period and extensions thereof and within three years after the termination of this policy. Government Entities and Public Corporations, like PRASA, work on FY budgets. Therefore, if an audit is performed to corroborate the total insurable values after the termination of the policy, it might result in additional premiums being owed to the carrier, affecting PRASA's budget, especially if conducted years after the termination of the policy contract.
11. Under the General Conditions, on page 17 of 145 of the pdf, Item 15 Misrepresentation and Fraud, the word "Assured" is too broad and should be limited to executive officers, risk managers, or the person designated by the insured.
12. Under the General Conditions, on page 17 of 145 of the pdf, Section 17 Dispute Provisions, Item A and B, limits the ability of PRASA to present a suit in the event of a dispute against the carrier, and it further states that "in the event of the failure of the insurers hereon to pay any amount claimed to be due hereunder, the insurers hereon, at the request of the assured, will submit to the jurisdiction of a court of competent jurisdiction within the United States. It should clearly state that Puerto Rico should be considered the only competent jurisdiction within the United States. We recommend that the wording be amended to read as follows: "will submit to the exclusive jurisdiction of the courts of Puerto Rico."
13. Under the General Conditions, on page 18 of 145 of the pdf, Section 24, Off Premises Services Clause, includes an exclusion for overhead transmission lines. It is recommended that said exclusion be deleted.
14. Under the General Conditions, on page 19 of 145 of the pdf, Section 26, Joint Loss Clause, states that this condition applies "in the event of loss of or damage to property and a disagreement between the insurers of

this policy and the insurers of the boiler and machinery policy ….". Only one policy covers both risks; therefore, this Condition should be eliminated.

15. Under the General Conditions, on page 21 of 145 of the pdf, Property Excluded, the following modifications are recommended to be made to the exclusions:
    a. Glass should not be excluded.
    b. Excavations, grading, and fillings must be included as property covered. The total insurable costs for buried infrastructure is $5.287 billion, according to the valorization conducted by Malcolm Pirnie in 2006. This represents 51% of the total real property replacement cost insurable values and 48% of the program's total insurable values, including excavation, grading, and filling costs. Therefore, this exclusion should be deleted from the policy contract, or an adjustment in insurable values should be conducted.
    c. Above-ground electrical transmission and distribution lines, poles, and related equipment shall always be covered, regardless of their distance (currently limited to less than 1,000 feet) from assured's generating facilities.
16. Section 1, Insuring Agreement, states that "the policy insures against all risk of direct physical loss or damage occurring during the policy period to property insured from any external cause except as hereafter excluded ….". Therefore, it is recommended that the word "external" be eliminated.
17. Page 34 of 145 of the pdf, Addendum B, Asbestos Endorsement and Windstorm, are currently excluded from the listed perils, which it is recommended to be included.

7.3.3 Observations and Recommendations Unrelated to Policy Contract

This section summarizes observations and recommendations unrelated to the policy contract for the policy coverage.

1. The insurable values stated in the policy program are the same as in 2013, based on the cost appraisal performed by Malcolm Pirnie in 2006. Therefore, factors like PRASA's CIP, inflation, acquisitions, etc., have not been considered for at least 16 years. It is strongly recommended that PRASA undertake a new valorization of its assets.
2. The $100M deductible applies whether the loss sustained by PRASA is due to a catastrophic or insurable peril. FEMA would only reimburse PRASA if:
    a. Direct damage has been caused by a catastrophic peril (windstorm, flood, or earthquake).
    b. The President of the United States has declared the affected area a disaster zone.
    c. Availability of funds.

    PRASA should consider establishing a fund to cover possible financial losses from any future catastrophic event, especially from non-catastrophic perils that may affect infrastructure and operations and, therefore, impose an unexpected financial burden.

3. The current Probable Maximum Loss (PML) estimates for PRASA for quantifying catastrophic risk exposures were performed in 2010 by Marsh Saldaña, Inc. (Marsh) through AIR Worldwide Corporation, based on a valorization study from 2006. Since then, modules, maps, and projections have changed, and new modules might prove economically beneficial to PRASA. This study will provide PRASA and its stakeholders with a scientific report representing the maximum foreseeable loss from catastrophic events, considering various scenarios in terms of intensity and return periods, corroborating if the current limits of insurance carried are adequate or if adjustments shall be made. This analysis may assist PRASA in complying with FEMA's insurance

requirements. It is strongly recommended that PRASA undertake a new PML study, which should be performed after a new valorization of PRASA's assets is conducted since any changes in the values of all insurable assets will affect the outcome of this study.

7.3.4 Crime

PRASA maintains a commercial crime policy issued by Chubb Insurance Company (Chubb), providing the coverage and limits shown in Table 7-2 for losses discovered during the policy period.

Table 7-2 Crime Coverage, Limits, and Deductibles

Coverage	Limit	Deductible
Employee Dishonesty	$1M	$50,000
Employee Retirement Income Security Act (ERISA) Extension	$500,000	$0
Forgery or Alteration	$1M	$50,000
On-Premises	$1M	$50,000
Computer Fraud/Fraudulent Transfer Instructions	$1M	$50,000
Audit Expense - For Audit required by State or Federal bodies as a result of employee dishonesty	$150,000	$0
In transit	$1M	$50,000
Securities	$1M	$50,000
Claims Expense	$150,000	$0
Voice Initiated Transfer	$1M	$50,000
Voice Computer System Fraud	$1M	$50,000
Extortion Threat to Persons	$100,000	$50,000
Extortion Threat to Property	$100,000	$50,000
Money Orders	$1M	$50,000
Counterfeit Currency	$1M	$50,000
Policy Aggregate	$1M	

7.3.4.1 Crime Coverage Recommendations

This section summarizes observations and recommendations for commercial crime coverage.

1. Consideration should be given to increasing the limits of the commercial crime policy in line with peers. An analysis was performed to benchmark limits carried by PRASA to those carried by peers and found that limits are well below the $10M in limits carried by peers.
2. Consideration should be given to purchasing an ERISA Bond. The commercial crime policy includes a $500,000 ERISA extension. The Employment Retirement Income Security Act of 1979 requires that the fidelity bond be placed with sureties that are Treasury-listed. ERISA bonds have a three-year term; the full-term premium is generally about $500.
3. Consideration should be given to including social engineering coverage. Phishing attacks are a primary source of loss. Therefore, it is recommended that PRASA seek a policy offering this coverage extension. Generally, the same is sub-limited to $250,000. Please note that this coverage always carries a call-back provision, and internal procedures must be consistent with this requirement.
4. Consideration should be given to including readily available coverages not currently included in the commercial crime insuring agreements. For example, the full limit should also include incoming check forgery and depositors' forgery. In addition, credit debit or charge card forgery should be included.
5. The commercial crime policy should be reviewed for inconsistencies in contract language. In addition, the second paragraph No. 6 Notice (page 7 of 57) should be eliminated so that the endorsements and policy forms are consistent with reporting requirements.

7.3.5 General Liability

MAPFRE issued PRASA's commercial general liability program with the limits detailed in Table 7-3. Aggregate limits apply per location and project as per ISO forms CG-2504 (05-09) and CG-2503 (05-09) attached to the MAPFRE policy. A $100,000 self-insured retention (SIR), which contemplates indemnity and claims adjustment expenses, applies to each occurrence. This SIR has a $750,000 aggregate or limits to claims adjustment expenses. Once PRASA pays this amount, the insurance company will pay these claims expenses from the first dollar, and the SIR would apply to Indemnity payments only.

Table 7-3 General Liability Coverages and Limits

Coverage	Limit
General Liability – Each Occurrence	$1,000,000
General Liability – General Aggregate	$2,000,000
Personal and Advertising Injury	$1,000,000
Products-Completed Operations Aggregate	$2,000,000
Employer's Liability Stop-Gap	$1,000,000
Employee Benefits Liability	$1,000,000
Fire Damage	$250,000
Medical Expense	$10,000

7.3.5.1 General Liability Recommendations

This section summarizes observations and recommendations related to general liability coverage.

1. It is recommended that the extended name schedule endorsement be modified to read as follows to correct errors in the present form.
   a. "Autoridad de Acueductos y Alcantarillados de Puerto Rico and/or Government of Puerto Rico and/or Gobierno de Puerto Rico Departamento de Hacienda c/o Area de Seguros Públicos and/or PRASA and/or Government of Puerto Rico and/or Government of Puerto Rico Department of Treasury c/o Bureau of Public Insurance and/or any subsidiaries, affiliated associated, newly acquired or controlled Company and or corporation and or individuals as may now be constituted or hereafter formed, as their respective interests may appear for which the Named Insured is responsible for placing insurance and for which no other specific insurance is provided."
2. Under the "Special Conditions" endorsement attached to the MAPFRE policy, it is recommended that the following amendments be performed.
   a. The first paragraph of this endorsement should read:
      i. "All the terms and conditions included in this Special Conditions Endorsement replace and supersede any other related or similar conditions contained anywhere else on this policy".
   b. Broad Form Named Insured (page 2 of 9, Item 6) should read:

      "Autoridad de Acueductos y Alcantarillados de Puerto Rico and/or Government of Puerto Rico and/or Gobierno de Puerto Rico Departamento de Hacienda c/o Area de Seguros Publicos and/or PRASA and/or Government of Puerto Rico and/or Government of Puerto Rico Department of Treasury c/o Bureau of Public Insurance and/or any subsidiaries, affiliated associated, newly acquired or controlled Company and or corporation and or individuals as may now be constituted or hereafter formed, as their respective interests may appear for which the Named Insured is responsible for placing insurance and for which no other specific insurance is provided."

   c. Severity of Interest (page 3 of 9, Item 9) should be revised to read Severability of Interest.
   d. The language used under Erroneous Notice of Occurrence (page 4 of 9, Item 12) is confusing. Therefore, it is recommended that it be substituted with the following:

      "It is agreed that only an executive officer, risk manager, or person designated by the insured, shall be responsible to give notice to the insurer after knowing of an accident, occurrence, claim or suit. Failure to give immediate notice of any loss or damage, or any suit, or to forward to the insurer any demand, notice, summons, or other process received shall not invalidate any claims made by the insured or free the company from any responsibility under this policy."

3. It is recommended that the "Damage to Premises Rented to You" limit be increased to at least $1,000,000. This is a very latent risk exposure given the large number of rented premises the insured occupies.
4. It is recommended that the ISO Form CG 2142 (12-04) "Exclusion, Explosion, Collapse and Underground property Damage Hazard" be eliminated to avoid confusion as it is eliminated by the conditions of the "Special Conditions" Endorsement.
5. It is recommended that the ISO Form CG 0300 (01-96) "Deductible Liability Insurance" be eliminated to avoid confusion as it is defined by the conditions of the "Special Conditions" Endorsement.
6. It is recommended that terrorism coverage be considered under PRASA's commercial general liability program. The commercial general liability program excludes coverage for any terrorist event. Considering the insured operations, an act of terrorism is an important and potentially severe exposure with considerable implications.

7. It is recommended that an endorsement in the policy be included that states that the SIR will not apply to medical expenses; hence, coverage would be the first dollar. The applicability of the medical expenses coverage should be addressed within the policy. PRASA's commercial general liability program provides a $10,000 per person limit for medical expenses, but the policy has a $100,000 SIR.
8. The employee benefits liability coverage form U-110 (1/92) is recommended to change the "Retroactive Date" to the date MAPFRE first wrote this coverage for PRASA. This policy currently illustrates 07/01/2021, which is inconsistent with usual and customary practices, severely limiting the scope of the coverage.

7.3.6 Automobile Liability

PRASA maintains automobile liability coverage through MAPFRE for:

- Bodily injury and /or property damage caused by any automobile, including hired and non-owned, with a $1,000,000 combined single limit per accident.

7.3.6.1 Automobile Liability Recommendations

This section summarizes observations and recommendations related to automobile liability coverage.

1. It is recommended that the physical damage to owned autos of the insured be included in the policy for specific catastrophic events, which include lightning, fire, explosion, windstorm, hail, flood, and earthquake, with a limit of $2,000,000 per event and subject to a $50,000 per event deductible.
2. It is recommended that Form CA 03 01 10 13 "Deductible Liability Coverage" be eliminated from the policy. The policy shows no deductible under the liability coverage; therefore, we understand that the form was included as an oversight.
3. It is recommended that the hired and non-owned physical damage coverage be included with a limit of no less than $50,000 per vehicle in case any vehicle is rented or an employee is using their vehicle for work duties. Form U-6 (11-93) "Liability Coverage Exclusion Endorsement" should be eliminated. The language utilized in this endorsement is broad and may present coverage interpretations unfavorable to PRASA. The trailer interchange coverage is recommended to be included in the policy, covering any trailer owned by others. Comprehensive and collision trailer interchange coverage for non-owned trailers, with a physical damage limit of $35,000 for each trailer; $35,000 for each tank/refrigerated unit; $20,000 for each non-refrigerated or van unit; and $15,000 for each flatbed, chassis and generator. All are subject to a $500 comprehensive and collision deductible. Losses to the chassis will be paid on a replacement cost basis.
4. It is recommended that the other driver's car coverage be included for liability, physical damage, and medical payments coverage; this would cover management employees who are furnished with a company auto but use a non-owned auto on any occasion.
5. It is recommended that the Errors and Omissions (E&O) Endorsement be revised. The wording of the endorsement should read as follows:
    a. "It is hereby understood and agreed that the coverage afforded or the quotation submitted shall not be invalidated or affected by errors, omissions, or improper description of the premises, property, autos, or any other applicable detail."
6. It is recommended that the extended named insured includes all entities – "Autoridad de Acueductos y Alcantarillados de Puerto Rico and/or Government of Puerto Rico and/or Gobierno de Puerto Rico Departamento de Hacienda c/o Area de Seguros Publicos and/or PRASA and/or Government of Puerto Rico and/or Government of Puerto Rico Department of Treasury c/o Bureau of Public Insurance and/or any

subsidiaries, affiliated associated, newly acquired or controlled Company and or corporation and or individuals as may now be constituted or hereafter formed, as their respective interests may appear for which the Named Insured is responsible for placing insurance and for which no other specific insurance is provided."

7. Including "Special Policy Conditions" on the first declaration page under Forms and Endorsement made as part of this policy at the time of issue is recommended; this avoids any confusion and states that the special policy conditions are part of the program.

7.3.7 Garage Keeper's

PRASA maintains a garage keeper coverage and is included on a legal liability basis for comprehensive and collision with a limit of $1,000,000 per event for each covered location for "autos left with you for service, repair, storage or safekeeping". Comprehensive coverage is subject to a $250 per event deductible, a maximum of $1,000 per event, and collision coverage is subject to a $250 deductible. The premium for this coverage totaled $18,000.

7.3.7.1 Garage Keeper's Recommendations

This section summarizes observations and recommendations related to the garage keeper's coverage.

1. Covered locations should be corrected to "Anywhere in Puerto Rico".
2. Legal liability coverage should be changed to direct primary coverage.
3. Garage keeper's coverage from Primary Insurance box should be marked.

7.3.8 Umbrella and Excess Liability

PRASA maintains a primary umbrella policy with a $20M limit excess of the primary general, automobile, and employer's liability policies. The umbrella is otherwise subject to a $1M SIR for bodily injury, property damage, and personal and advertising injury losses not covered by the primary insurance. Coverage is provided through Triple S.

PRASA also maintains an excess liability policy providing a $40M limit in excess of the $20M umbrella limit described in the preceding paragraph. Coverage is also provided through Triple S.

7.3.8.1 Umbrella and Excess Liability Recommendations

This section summarizes observations and recommendations regarding the umbrella and excess liability coverage.

1. Include the garage liability policy issued by MAPFRE under the commercial umbrella's "Schedule of Underlying Insurance" to achieve the higher limits provided by the excess liability program for any garage liability claim that could exceed policy limits or be excluded from coverage under said program.
2. The commercial umbrella program does not include an insuring agreement that would state what terms and conditions apply to the commercial umbrella and whether the excess liability program is following form or not; this needs to be included to avoid any misinterpretations at the time of a large loss which could trigger coverage under the excess liability program.

A risk exists for a catastrophic failure of a PRASA dam that could potentially cause a very large liability loss, especially if residential communities are located downstream of the dam. In such an event, a $60M total liability limit may not be enough to settle claims if PRASA is found to be negligent.

7.3.9 Directors' and Officers' Liability

PRASA holds $45M in Directors and Officers (D&O) liability insurance for claims filed against directors and officers, employees, and PRASA holdings structured in a primary policy and four excess policies. Coverage is written on a claims-made basis. The primary layer of D&O insurance is subject to a $500,000 SIR for claims against indemnified persons or a claim against PRASA alleging a breach of duties.

Concerning the terms and conditions of the policy, the policy form is a basic D&O liability coverage that provides limited coverage for allegations of wrongful acts made against an insured due to the exclusions added by endorsement.

Coverage is subject to retro dates (prior acts limitations) and prior and pending litigation dates, as summarized in Table 7-4.

Table 7-4 Directors and Officers Liability Program

Insurer	Limit	Retro Date	Prior and Pending Litigation Date
Chubb (Primary)	$15M	July 1, 2007	July 1, 2007
Berkley Insurance Company (First Excess Layer)	$10M excess of $15M	July 1, 2014	Information not included in the policy provided.
Liberty Mutual Insurance Company (Second Excess Layer)	$5M excess of $25M	Underlying	Information not included in the policy provided.
Antilles Insurance Company (Third Excess Layer)	$10M excess of $30M	July 1, 2021	July 1, 2020
Liberty Mutual Insurance Company (Fourth Layer)	$5M excess of $40M	Underlying	July 31, 2020
Total D&O Limit	$45M	-	-

7.3.9.1 D&O Recommendations

This section summarizes observations and recommendations related to the D&O coverage.

1. Review the retro dates and prior and pending litigation dates – It is strongly recommended that PRASA and their insurance consultant review the retro dates and prior and pending litigation dates of the D&O program. At this time, if a claimant were to mention acts occurring before 2014, only $15M in limits are available. In examining the $10M excess of $30M policy issued by Antilles Insurance Defense of Puerto Rico, the insurance agency is named instead of Antilles Insurance, the insurance carrier, the retro date is July 1st, 2021, and the prior and pending litigation date is July, 1st, 2020. The retro date establishes the date on which coverage begins, and it does not make sense that the prior and pending litigation date is before this date. To optimize coverage, retro dates should be consistent.
2. Renegotiate the pricing of excess limits of liability as pricing is inverted – Regarding the pricing of the excess limits of liability, all of the policies except for the policy issued by Antilles Insurance have a higher cost per

million dollars than the primary policy. PRASA should review and renegotiate increased limits factors to normalize the pricing of the D&O program.

3. Consider purchasing additional limits including side a difference in condition (DIC) coverage to better align with limits carried by other peers. It should be noted that in addition to the traditional D&O policies carried by PRASA, peers also carry a Side A excess DIC policy with an average limit of $15M. This policy protects only the D&O and has fewer exclusions than a typical D&O policy. If PRASA were to purchase $60M in total limits, its D&O program would better align with industry standards.
4. PRASA should consider renegotiating policy exclusions to cover principal risks faced by directors. If carriers are not amenable, consider restructuring coverage and purchasing higher limits of Side A excess DIC coverage.
    a. The primary D&O policy issued by Chubb has a securities exclusion with a carve back providing coverage for claims arising from private placements less than $50M. All other securities claims are excluded. The limit on private placements and the lack of coverage for securities claims should be reevaluated, limits adjusted, and coverage for securities claims sought.
    b. The definition of loss specifically excludes nonmonetary relief, and coverage for defense costs only should be sought.
    c. Consider eliminating the specific matter exclusion for regulatory and water prices. It is understood that the D&O policy does not respond to disgorgement remedies; however, this endorsement goes far beyond excluding all claims brought by clients, customers, or any entity on behalf of such clients or customers as it relates to the insured's regulator capacity in establishing tariffs for water consumption to clients, customers, and cogeneration companies.
    d. Consider eliminating specific matter exclusion related to claims arising from or related to general obligation bonds (GOs), notes or bonds issued by the Government of Puerto Rico, matters related to the Puerto Rico Oversight, Management and Economic Stability Act, or any work-related or advice given that might result in a claim. The wording of this endorsement is very broad and, together with the other exclusions added to the policy, drastically limits coverage under the policy.
5. As excess follows from markets, Berkley Insurance Company, Antilles Insurance, and Liberty Mutual, all incorporate the exclusion of the primary Chubb policy. We have noted that each excess carrier has incorporated additional and reinstated a more restrictive exclusionary language adopted by each successive excess carrier. The ultimate coverage for securities claims, including private placements, is eliminated in the excess layers, bankruptcy and insolvency exclusions are added, and a cyber liability exclusion is added. The latter is a cause for concern because PRASA does not purchase cyber liability.
    a. A drop-down endorsement should be requested on the excess layers. While excess policies drop down when the underlying limits are eroded, the drop-down endorsement provides greater flexibility. It would allow PRASA or any other entity to pay any amount under the policy that has not been fully eroded by payment of loss under the policy so that the excess layer is triggered.
6. PRASA should consider including a priority of payments clause to the policy specifying that the insurer is first liable to pay on behalf of the insured persons under Insuring Agreement A (Non-indemnifiable D&O claims); second, the insurer should pay that loss for which they may be liable to pay on behalf of the company under Insuring Agreement B (Corporate Reimbursement), and any payments under Insuring Agreement C (Company Securities Liability) would be made.
7. PRASA should consider accepting a noncancelable policy except for nonpayment as offered in the policy contract instead of imposing the government-mandated 90-day cancellation clause.
8. PRASA should consider requesting amendments so that the second layer follows form and drop-down. The second excess layer issued by Liberty Mutual should be amended to eliminate the bankruptcy exclusion, and

a drop-down exclusion allowing the underlying limit to be eroded by either payment under the policy or payment of the underlying limit by another source should be added.

9. PRASA should consider incorporating amendments to the claim reporting threshold endorsement. The policy has a claims reporting threshold that allows for periodic bordereaux. Instead of amending Section 7 Defense and Settlement, the endorsement should amend Section 6 Notice. It is recommended that a 45-day grace period be granted after the quarter ends for the reports to be submitted.

7.3.10 Employment Practices Liability

PRASA maintains primary and excess employment practices liability (EPL) policies, providing total limits of $10M in the aggregate annually for employee claims alleging wrongful termination, employment-related misrepresentation, sexual harassment, retaliation, or other violations of an employee's civil rights. A $100,000 SIR applies to each claim. Primary coverage is provided through Chubb. Excess EPL coverage is through Berkley Insurance Company. The pricing of the premium for the excess limit of liability is aligned with rates in the market.

7.3.10.1 Employment Practices Liability Recommendations

This section summarizes observations and recommendations related to the employment practices liability coverage.

1. A benchmarking study based on limits carried by other public corporations in PRASA's industry class with similar levels of corporate and economic characteristics showed that, on average, limits of $10M were carried.
2. Consideration should include affirmative coverage by negotiating for loss resulting from a claim made against PRASA by a union on behalf of an employee arising from a labor dispute, negotiation, or proceeding in connection with a CBA otherwise not excluded from the policy.
3. Consideration should be given to including coverage for defense costs related to Law 80 Statuary Severance claims when the remedy sought is *Mesada*.
4. Consideration should be given to renegotiating the EPL policy issued by Berkley to eliminate the Known Wrongful Act exclusion. In dealing with labor matters, there is always a chance that a claim might be filed. The exclusionary language is broad and gives the carrier discretion to decline.
5. The EPL Excess policy should include a drop-down endorsement that would allow excess layers to drop down either when the underlying is eroded by payment or the Insured or another entity pays the amount needed to erode the limit of liability fully.

7.3.11 Premises Pollution Liability

Chubb provides pollution liability coverage on a claims-made basis at $10M per pollution condition and a $10M annual aggregate limit for all pollution conditions. Coverage is subject to a $250,000 per accident SIR. A retroactive date of July 1, 2002, applies.

7.3.11.1 Premises Pollution Liability Recommendations

This section summarizes observations and recommendations regarding the premises' pollution liability coverage.

1. It is recommended that the broad named insured endorsement (CHB PPL-13 01/2017) be modified to read as follows to correct mistakes in the present form.

a. “Autoridad de Acueductos y Alcantarillados de Puerto Rico and/or Government of Puerto Rico and/or Gobierno de Puerto Rico Departamento de Hacienda c/o Area de Seguros Públicos and/or PRASA and/or Government of Puerto Rico and/or Government of Puerto Rico Department of Treasury c/o Bureau of Public Insurance and/or any subsidiaries, affiliated associated, newly acquired or controlled Company and or corporation and or individuals as may now be constituted or hereafter formed, as their respective interests may appear for which the Named Insured is responsible for placing insurance and for which no other specific insurance is provided.”

2. PRASA should consider increasing limits. The aggregate limit may be increased to $20M as well.
3. It is recommended that “Underground Storage Tank Coverage” is acquired. Storage tank schedule should be submitted, or a “blanket” coverage should be negotiated with the insurer.
4. It is recommended that terrorism coverage be considered under PRASA’s premises pollution liability program. The premises pollution liability program excludes coverage for any terrorist event. Considering the insured operations, an act of terrorism is an important and potentially severe exposure with considerable implications.

7.3.12 Accident Liabilities for Travel and Divers

Chubb issued PRASA’s accident coverage program for travel with the limits detailed in Table 7-5. The policy has a $2.5M annual aggregate limit. Coverage is available for PRASA employees named as insured. PRASA's premium for this policy is $1,000.

Table 7-5 Accident (Travel) Liabilities

Coverage	Limit
Accidental Death and Dismemberment	$500,000
Accidental Medical Expenses Reimbursement[(1)]	$7,000
Medical Sickness Reimbursement	$3,500
Emergency Medical Transfer	$50,000
Repatriation of Remains	$5,000
Cancellation and Interruption of Travel	$500
Loss of Personal Belonging	$1,000
Assistance Service	Included

[(1)]If a participant is covered under any medical health plan, the Company will cover the excess medical expenses incurred. If not covered by any medical health plan, the Company will cover charges after applying the $100 deductible.

In addition, PRASA maintains an accident coverage program for divers, as issued by Chubb. The policy has a $750,000 annual aggregate limit. Coverage is available for PRASA employees named as insured. Coverage includes a $250,000 limit for accidental death and $250,000 for accidental dismemberment. PRASA's premium for this policy is $19,900.

7.3.13 Cyber Liability

PRASA does not currently purchase cyber liability insurance. Prospective insureds should anticipate challenges in maintaining comprehensive coverage if controls are lacking. Concerns about ransomware activity and accumulation risk are the top trends impacting market conditions. Insurance carriers are focused primarily on controls, including multifactor authentication, endpoint detection, and backup testing.

PRASA retains client information as part of the operations that might include data considered Personal Identification Information (PII) in Puerto Rico. This information might include social security numbers, driver's license numbers, and bank account numbers, among other things. There have been well-publicized breaches, and cybersecurity awareness continues to grow and has impacted litigation, cyber claims, and how companies respond to cyber incidents. A cyber incident can impact PRASA's operations.

7.3.13.1 Cyber Recommendations

This section summarizes observations and recommendations related to cyber liability coverage.

1. PRASA should consider cyber liability coverage. It is recommended that PRASA complete a cyber self-assessment at least six months before purchasing the policy to help identify opportunities to strengthen controls before requesting quotations. Third-party reports, including security scorecards and Bitsight, should be examined early in this period to provide insights into how underwriters will view PRASA in the initial underwriting process. Benchmarking should also be completed to determine the potential frequency and severity of a breach, business interruption exposures, and the potential impact of a ransomware attack. Early preparation is key to a more favorable negotiation.
2. Active assailant coverage: High-profile mass shootings over the last decade in various public and private settings and various attacks involving vehicles have often been carried out with the sole intent of instilling public fear while causing as much loss of life as possible. Although traditional forms of insurance coverage can protect businesses and employees targeted in such attacks, their language can be ambiguous and may have sizable gaps.

   The active assailant or active shooter coverage offers a combination of property and casualty coverage and compliments coverage that you already purchased. It offers affirmative coverage that is triggered by deliberate malicious physical attacks by active assailants who are physically present and armed. These policies can typically offer:
   a. Property damage, business interruption, and extra expense coverage.
   b. Legal liability coverage.
   c. Non-physical damage coverage.
   d. Loss of attraction and denial of access coverage.
   e. Reimbursement for additional expenses can include forensic cleanup, public relations consulting, crisis management, medical services, including psychiatric care, hiring additional staff, and additional security.
   f. No exclusions for vehicles, attacks by employees, and terrorism.

7.4 Owner-Controlled Insurance Program

PRASA maintains an OCIP for its multi-year CIP. In addition to covering PRASA, the OCIP is designed to insure enrolled contractors and subcontractors (including design professionals for general liability only) of all tiers working on the CIP. The OCIP does not cover vendors, installers, truckers, delivery persons, concrete and asphalt haulers,

and/or contractors who do not have dedicated on-site payroll, except as otherwise endorsed in the policy. In addition, the OCIP program provides builder's risk, general liability, umbrella, pollution liability insurance, and miscellaneous errors and omissions professional liability insurance. These coverages are discussed below.

7.4.1 Contractors All Risk –Completed Value Builder's Risk

It is assumed that PRASA maintains the builder's risk policy, and Chubb is the insurer. PRASA did not provide the renewed builder's risk policy as part of its OCIP program; hence, the policy period included in this report is from June 23, 2021, until June 23, 2022. Coverage applies to all risks of direct physical loss, except as excluded by the policy. The estimated value of all projects is $346,033,317.22 per the project schedule prepared by PRASA and included as part of the policy. The schedule is dated June 21, 2021.

The annual premium is $1,629,272, and the Minimum Earned Premium is $1,140,490. The maximum limit per project value is $27,822,490. Any project with a contract value over $27,822,490 must be reported to Chubb individually. Chubb will then decide on its inclusion into the policy.

Each project is limited to its declared value on the policy, including all coverages and extensions, per one occurrence, including the sub-limits during the policy period. Refer to Table 7-6 for the OCIP builder's risk limits and sub-limits of Liability summary.

Table 7-6 FY2022 OCIP Builder's Risk Limits and Sub-limits of Liability Summary

Coverage	Sub-limit
Maximum Physical Loss of or damage to insured Property per Insured Project	$27,822,490 for one project, or the declared value of the affected project. Whichever is less.
Professional Fees	10% of the loss subject to a maximum of $1,000,000. Whichever is less.
Property in Transit	$1,000,000 for any one conveyance.
Principal's Existing Property	$1,000,000 per occurrence and in the aggregate for the policy period.
Offsite Storage	$1,000,000 for any one location.
Extra and Expediting Expenses	20% of the loss, subject to a maximum of $1,000,000.
Fire Brigade Charges/Extinguishing Expenses	$250,000 for any one occurrence.
Debris Removal	25% of the loss, subject to a maximum of $1,000,000.
Plans, Blueprints, Drawings, or Other Documents	$250,000 for any one occurrence.

The aggregate limits of liability or the maximum amount Chubb will pay for all losses or damages incurred by all the declared projects and always limited to the declared value of the affected project as it is indicated in the projects'

schedule, in one occurrence, and in the aggregate in all occurrences during the policy period and resulting from and contributed to or aggravated as summarized in Table 7-7.

Table 7-7 FY2022 Builder's Risk Policy - Limits and Deductibles Summary [1,2,3]

		Deductible	
Coverage	Limit	Projects with Declared Value up to $10,000,000.00	Projects with Declared Value higher than $10,000,000.00
Earthquake	$30,000,000.00	5% of VARTOL, minimum $50,000,000.00	5% of VARTOL, minimum $100,000.00
Windstorms, ensuing flood and storm surge	$30,000,000.00	2% of VARTOL, minimum $50,000.00	2% of VARTOL, minimum $100,000.00
Flood	$10,000,000.00	2% of VARTOL, minimum $50,000.00	2% of VARTOL, minimum $50,000.00
Any other peril (AOP)		$20,000.00 except 10% of loss, minimum $50,000.00 for testing	$20,000.00 except 10% of loss, minimum $50,000.00 for testing

[1] PRASA existing property is the property located on the project site as well as property surrounding the project site belonging to or held under custody, care, or control of persons named in the policy as the insured the deductible is $100,000.
[2] VARTOL is Values at Risk at the Time of Loss.
[3] Natural catastrophic deductibles apply per each affected or damaged project.

7.4.1.1 Contractors All-Risk Recommendations

This section summarizes observations and recommendations for the contractors' all-risk coverage.

1. PRASA should request an endorsement to include a "Partial Occupancy Provision" to grant permission for partial occupancy of project areas. Therefore, coverage will not cease or expire due to the partial occupation of any project area or the project's substantial completion.
2. PRASA should include wet works, roads, ways, expressway works, overpasses and bridges, viaducts, and tunneling works. These are usually impacted during the construction of water mains and sewer pipes and should be covered with at least a reasonable sub-limit.
3. PRASA should delete the special conditions endorsement construction and/or erection time schedule or negotiate a deviation from the schedule of more than the current four weeks.
4. PRASA should delete the special conditions endorsement safety measures concerning precipitation and flood.
5. The OCIP Manual limits and some of the sub-limits and deductibles are different from the policy, which could create confusion in the event of a loss.

7.4.2 Commercial General Liability

The OCIP commercial general liability policy is a "per occurrence" policy written by Chubb. It includes the limits shown in Table 7-8. Coverage remained the same as the previous year, but the premium increased to $2,391,207 minimum and deposit fully earned premium. The premium basis is the total cost of the named insured for operations performed for the named insured during the policy period by independent contractors, all work or work sublet in

connection with each specific project, including the costs of all labor, materials, and such work, whether furnished by the owner, contractor or subcontractors, including fees, allowances, bonuses or commissions made, paid or due. The policy period covers from July 2023 until June 2024.

Table 7-8 OCIP General Liability Coverages and Limits

Coverage	Limit
Each Occurrence	$1,000,000
General liability – General Aggregate	$2,000,000
Personal and Advertising Injury	$1,000,000
Products/Completed Operations - Aggregate	$2,000,000
Employer's Liability Stop Gap	$2,000,000 Each Accident and Aggregate
Damages to Premises Rented to You (Any One Premises)	$250,000
Medical Expense (Any One Person)	$5,000

7.4.2.1 Commercial General Liability Recommendations

This section summarizes observations and recommendations related to commercial general liability coverage.

1. The completed operations coverage extension (page 21 of 44 of the pdf) is for five years from the policy's termination date or renewal(s). The aggregate limit is for an extended period of five years and is not an annual limit. It is recommended that PRASA extend the period to 10 years to cover the full statutory limit (Statute of Limitations Law) and change to an annual aggregate per year. In addition, the period should start from the completion date of each project and not from the policy termination or non-renewal date.
2. The “Term of the Project” (page 22 of 44 of the pdf) covers only from February 1, 2021, until February 1, 2022, and until each project completion date. PRASA should correct this oversight by endorsement of the policy. The OCIP policy only covers CIP projects.
3. A $5,000 per claim deductible applies for bodily injury, and a $5,000 per claim deductible applies to property damage for each loss. However, the Deductible Liability Insurance Endorsement Form CG03 00 01 96 also states that the property damage deductible per claim is $5,000,000. If this is an oversight, it must be revised or clarified with an endorsement. The policy is silent as to who is responsible for deductibles. The OCIP Manual specifies that the contractor should assume this deductible.

7.4.3 Commercial Umbrella Liability

Chubb writes the OCIP commercial umbrella liability policy. The renewal certificate indicates a limit of insurance of $25,000,000 for each occurrence and aggregate in excess of $25,000,000 for each occurrence and aggregate. The schedule of underlying insurance only includes the commercial general liability policy and its insurance limits. The OCIP Manual prepared by a previous producer indicates that the umbrella or excess policy has a limit of $25,000,000.

7.4.3.1 Commercial Umbrella Liability Recommendations

This section summarizes observations and recommendations related to commercial umbrella liability coverage.

1. The completed operations coverage extension is for five years from the policy's termination date or renewal(s). PRASA should consider requesting a change to 10 years to cover the full statutory limit (Statute of Limitations Law) and to begin from the completion date of each specific project.

7.4.4 Contractor's Pollution Liability

Chubb writes the OCIP contractor's pollution liability policy. Coverage applies on an occurrence basis and covers pollution arising from construction activities involving PRASA's OCIP. The insurance policy limits are $20,000,000 per occurrence and $20,000,000 aggregate, subject to a $25,000 SIR per pollution incident. The policy covers PRASA and the PRASA OCIP contractors, subcontractors, and consultants' participants. The annual premium for this policy is $786,660.

7.4.4.1 Contractor's Pollution Liability Recommendations

It is recommended to include a completed operations extension of 10 years after the completion of each project.

7.4.5 Professional Liability

PRASA maintains a miscellaneous E&O liability policy through Chubb, providing a $25M per claim limit and annual aggregate limit, subject to a $150,000 per claim deductible. The policy is written on a claims-made basis, and claims and defense costs are included within the limit. The coverage applies to contract administration, design, engineering, consulting, inspection, and construction management, including planning, permitting, regulatory compliance services, land acquisition, construction assistance, procurement assistance, start-up services, testing, and extended commissioning under the PRASA multi-year CIP. The policy includes a one-time reinstatement option for an additional premium equal to 100% of the annual premium.

7.4.5.1 Professional Liability Recommendations

This section summarizes observations and recommendations related to professional liability coverage.

1. The value of the contracts under the CIP should be revised versus the limits carried out to ensure adequate risk transfer. Given the influx of funding for projects as a result of hurricanes and other natural disasters, it is probable that PRASA is underinsured.
2. PRASA should clarify in Extended Reporting Period Endorsement (Endorsement A) the intent to provide an extended reporting period for all projects. Endorsement A includes an extended reporting period for all projects initiated or declared as commencing during the policy period. However, as worded, it appears to restrict coverage for projects begun prior to the policy inception date. It is recommended that the endorsement language be amended to clarify that all projects commenced before the policy inception date as part of the CIP are covered or that a schedule of projects specifically to be covered be included. The endorsement should be amended to apply to all projects initiated during the "Policy Period" or subsequent to any applicable retroactive date. A specific list of projects would eliminate potential future controversies.

7.5 Conclusions

Key recommendations for PRASA's insurance program are provided below.

1. The insurable values stated in the policy program are the same as in 2013 based on the cost appraisal performed by Malcolm Pirnie in 2006. Therefore, factors like PRASA's CIP, inflation, acquisitions, etc., have not been considered for at least 16 years. It is strongly recommended that PRASA undertake a new valorization of its assets. Arcadis Caribe, P.S.C. has been retained during 2023 to perform an asset valorization update which is expected to be completed at the latest by March 2024.
2. The current PML estimates for PRASA for quantifying catastrophic risk exposures were performed in 2010 by AIR Worldwide Corporation based on a valorization study from 2006. Since then, modules, maps, and projections have changed, and new modules might prove economically beneficial to PRASA. This study will provide PRASA and its stakeholders with a scientific report representing the maximum foreseeable loss from catastrophic events, considering various scenarios in terms of intensity and return periods, corroborating if the current limits of insurance carried are adequate or if adjustments shall be made. This analysis may assist PRASA in complying with FEMA's insurance requirements. It is strongly recommended that PRASA undertake a new PML study, which should be performed after a new valorization of PRASA's assets is conducted since any changes in the values of all insurable assets will affect the outcome of this study.
3. Once the new valorization of PRASA assets and PML study are completed, PRASA will be better positioned to determine if its current insurance limits and deductibles are adequate.
4. It is recommended that a loss control assessment plan be set in place to reduce the possibility that a loss will occur and reduce the severity of those that do occur. Periodic inspection of WTPs and WWTPs, focusing on safe working conditions and proper maintenance, will be an integral part of the Loss Control Assessment Plan.

8 System Assets and Financial Analysis

8.1 Introduction

Following the MAT (as amended), Arcadis hereby provides a statement of the estimated cost of all additions to the System and the retirements of property made in FY2023. The statement relies on the most recent preliminary data provided by PRASA. Also, Arcadis evaluated PRASA's financial forecast as included in the 2023 PRASA Fiscal Plan and as certified by the Oversight Board on May 26, 2023, and evaluated the appropriateness of rates and charges. A summary of the findings is provided in this section.

8.2 System Assets

Table 8-1 summarizes PRASA's preliminary book value of fixed (capital) assets as of June 30, 2022. Including land and other non-depreciable assets and "Construction (Work) in Progress", the preliminary ending book value balance of PRASA's capital (fixed) assets amounts to $5,573M (net of accumulated depreciation). The fixed assets book value balance for FY2023 will be included in next year's CER.

Table 8-1 Preliminary Fixed Assets Balance through June 30, 2022 ($, Millions)

	Book Value	Accumulated Depreciation	Net Book Value[1]
Fixed Assets	$10,817.3	($5,873.6)	$4,943.7
Construction (Work) in Progress	$554.1	-	$554.1
Land and other Non-Depreciable Assets	$75.1	-	$75.21
Total Capital (Fixed) Assets	$11,446.5	($5,873.6)	$5,572.9

[1] Based on preliminary results; subject to change.

Table 8-2 summarizes the fixed assets changes from FY2021 to FY2022.

Table 8-2 Fixed Assets Changes ($, Millions)

	FY2021 to FY2022[1]
Fixed Assets (Net of Accumulated Depreciation)	($179.0)
Construction (Work) in Progress	$120.3
Land and other Non-Depreciable Assets	$0.0
Total Fixed Asset Changes	($58.7)

[1] Based on preliminary results; subject to change.

8.3 PRASA's Rate Structure

For PRASA to provide water and wastewater services to its customers without reducing critical infrastructure investments in its System through its CIP, there should be adequate revenue levels over time to cover operational and capital obligations. Until June 30, 2022, PRASA provided a maximum annual rate adjustment of 4.5% up to a cumulative 25%; however, additional revenues are required to continue delivering reliable and safe water and wastewater services to its customers. As of July 1, 2022, PRASA implemented a simplified rate structure, and for FY2024 and beyond, the financial projections assume a minimum 2% annual rate adjustment across all customer categories. Annual adjustments are capped at 5% per year, subject to actual needs, with a cumulative rate increase cap of 30%. Adjustments beyond the cap should follow the procedure required by Act 21-1985. The projected accumulated benefit of future rate increases is $327M through FY2028.

8.4 FY2023 Preliminary Results and FY2024-FY2028 Forecast Period

Arcadis reviewed the financial information provided by PRASA, the 2023 PRASA Fiscal Plan, and the FY2024 Annual Budget certified and approved on June 30, 2023, by the FOMB. This section summarizes Arcadis's review and provides an assessment of PRASA's financial condition as it relates to PRASA's financial preliminary results for FY2023 and the reasonableness of PRASA's assumptions in the preparation of the five-year financial projections from FY2024-FY2028 (the forecast period). The sufficiency of the revenues necessary to support the projected operations and capital costs, as shown in Exhibit 1, was evaluated. The evaluation includes revenues, O&M expenses, debt service payments, and required deposits in compliance with the MAT (as amended). Additionally, Exhibit 1 includes the anticipated debt service coverage (DSC) for the forecast period.

The following information provided by PRASA was reviewed:

- MAT as amended and restated.
- Preliminary revenue and expense projections for FY2023.
- Revenue and expense projections for FY2024.
- The 2023 PRASA Fiscal Plan was certified on May 26, 2023.
- PRASA's FY2024 Annual Budget was certified and approved on June 30, 2023.
- Debt service schedules for currently outstanding debt service, preliminary projected debt obligations, and DSCs.
- The amount required to be deposited in the Operating Reserve Fund to make the amount on deposit therein equal to the Operating Reserve Requirement.
- The amount required to be deposited in the Capital Improvement Fund.
- The amount, if any, must be deposited in the Rate Stabilization Account of the Surplus Fund.
- The amount of Operating and Authority Revenues (as per amended MAT) will be sufficient to meet the Rate Covenant for FY2024-FY2028.
- The amount received and expected to be received from FEMA due to the impacts from the 2017 Hurricanes Irma and María and Hurricane Fiona in 2022 for expense reimbursement.

- The amounts expected to be received from FEMA and other federal programs to fund PRASA's CIP such as the SRF and RD Programs, the FAASt, ARPA, HMGP, and CDBG.

8.4.1 Operating Revenues

As defined in the MAT, **Operating *Revenues*** *"shall mean all moneys received by or on behalf of the Authority, including (i) the moneys derived by or on behalf of the Authority from the sale of water produced, treated or distributed by, or the collection, transmission, treatment or disposal of sewage by the Systems, (ii) any proceeds of use and occupancy insurance on the Systems or any part thereof, (iii) except as provided in the following sentence, any income from the investments made under this Agreement, (iv) any special assessments, including assessments in the nature of impact fees, (v) amounts, if any, paid from the Rate Stabilization Account into the Operating Revenue Fund in any Fiscal Year minus the amounts, if any, paid from the Operating Revenue Fund into the Rate Stabilization Account during the same Fiscal Year; and (vi) regularly scheduled payments received under any Qualified Swap or Hedge Agreement during such period. In no event shall Operating Revenues include (i) income from the investment of moneys on deposit to the credit of the Construction Fund, proceeds of insurance (except use and occupancy insurance) or condemnation awards (which are required to be deposited directly to the credit of the Capital Improvement Fund), (ii) proceeds of sales of property constituting a part of the Systems (which are required to be deposited directly to the credit of the Capital Improvement Fund), (iii) the proceeds of Bonds or other Indebtedness, (iv) any governmental grants or appropriations available to pay Current Expenses of the Authority, including grants or appropriations received by the Authority and specifically made for the payments of principal of and interest on obligations of the Authority or for reimbursing the Authority for such payments, (v) any amounts received from the Government of Puerto Rico on account of Commonwealth Guaranteed Indebtedness (which is required to be deposited directly in the Commonwealth Payments Fund) or Commonwealth Supported Obligations (which is required to be deposited in the Commonwealth Payments Fund), (vi) any amounts transferred from the Budgetary Reserve Fund to the Trustee and (vii) any termination or similar payment under any interest rate swap or similar hedge agreement received by the Authority (which are required to be deposited directly to the credit of the Capital Improvement Fund)."*

In connection with the issuance of the 2020 Senior Bonds, PRASA and the bondholders executed a Ninth Supplemental Agreement authorizing the amendment of certain provisions in the MAT, subject to and effective upon compliance with Section 9.02 of the MAT. The proposed amendments include a change to the Operating Revenue definition, further discussed in Sections 8.5 and 8.6. Note that these amendments will only become effective upon receiving the written consent of the bondholders of all Outstanding Bonds of each lien priority under the MAT and the holders of certain other Outstanding Senior Indebtedness.

PRASA's annual Operating Revenue projections for FY2023 through FY2028, including the 2023 PRASA Fiscal Plan revenue-enhancing initiatives, presented on a cash basis following the MAT, are summarized in Table 8-3.

Table 8-3 PRASA Operating Revenues ($, Millions)

Fiscal Year	Operating Revenues
FY2023 Projection, based on Preliminary Results	$1,083.5
FY2024 Annual Budget[1]	$1,127.3
FY2025 Projected	$1,174.6
FY2026 Projected	$1,199.5
FY2027 Projected	$1,225.8
FY2028 Projected	$1,255.3

[1] As certified by the FOMB on June 30, 2023.

PRASA's Operating Revenue assumptions are discussed below:

1. Service Revenues, Net of Subsidies (Exhibit 1, Line 1) – PRASA's single largest source of revenue is Service Revenues, which includes monthly base charges, volume rate charges for services, and the FY2023 annual rate adjustment. Table 8-4 shows PRASA's Service Revenues (Net of Subsidies) for FY2023 through FY2028.

   Table 8-4 PRASA Service Revenues, Net of Subsidies ($, Millions)

Service Revenues Category	FY2023 Preliminary[1]	FY2024 Annual Budget	FY2025 Projected	FY2026 Projected	FY2027 Projected	FY2028 Projected
Base Fee and Volume Charges[2]	$1,098.2	$1,102.8	$1,099.1	$1,095.1	$1,092.6	$1,089.2
Rate Increases[3]	0.0	19.9	42.3	65.1	88.2	111.8
Total (Net of Subsidies)[4]	**$1,098.2**	**$1,122.7**	**$1,141.4**	**$1,160.2**	**$1,180.83**	**$1,201.0**

   [1] Preliminary projection as included in the 2023 PRASA Fiscal Plan.
   [2] Includes accumulated revenues generated from rate adjustments implemented FY2018-2023 and the adjustment for billings not collected (net of collections from prior years). Billing to collections adjustments are $(41.9), $(46.0), $(45.8), $(45.6), $(45.5), and $(45.4) M in FY 2023 through FY 2028, respectively.
   [3] Includes rate adjustments for FY2024 through FY2028 as presented in the 2023 PRASA Fiscal Plan.
   [4] Numbers may not add up due to rounding.

   Table 8-5 summarizes the number of residential customers who were provided a subsidy for water and wastewater bills as of June 30, 2023.

   Table 8-5 FY2023 Water and Wastewater Subsidized Customer Accounts

Subsidy	Number of Customers	Percent of Total Residential Customers[1]
PAN Subsidy	83,910	6.9%
TANF Subsidy	9,090	0.8%
ASES Subsidy	5,389	0.4%

Subsidy	Number of Customers	Percent of Total Residential Customers[1]
Fixed Tariff (Public Housing)	48,936	4.1%

[1] Based on a total number of residential customers of 1,208,392 provided by PRASA as of June 30, 2023.

PRASA's Service Billings projections are based on certain assumptions, including growth and consumption assumptions that could be affected by various factors. Continued economic and population growth uncertainty could negatively impact the consumption patterns of PRASA customers. The 2020 Census data shows a total net population decline of about 440,000 compared to the 2010 Census results for an approximately -11.8% change in population[9].

Further discussion of PRASA's Service Revenue assumptions is detailed below.

Growth and Consumption Assumptions

Figure 8-1 shows that PRASA experienced annual customer or account reductions by about 0.1% per year from FY2019 through FY2020. However, from FY2021 through FY2023, customer accounts increased by approximately 0.9% per year. This increase could be attributed to a few factors, including the surge in real estate purchases due to Act 22 for tax incentives to investors and ongoing efforts by PRASA to reduce illicit accounts; this can also be seen in Table 8-6, where the growth in customers from FY2022 to FY2023 is 0.3%. In FY2023, the total average monthly billed consumption increased by approximately 0.9% compared to FY2022, while the average monthly consumption per account increased by 0.7% compared to FY2022, as shown in Tables 8-7 and 8-8, respectively.

[9] Source: https://www.census.gov/library/stories/state-by-state/puerto-rico-population-change-between-census-decade.html

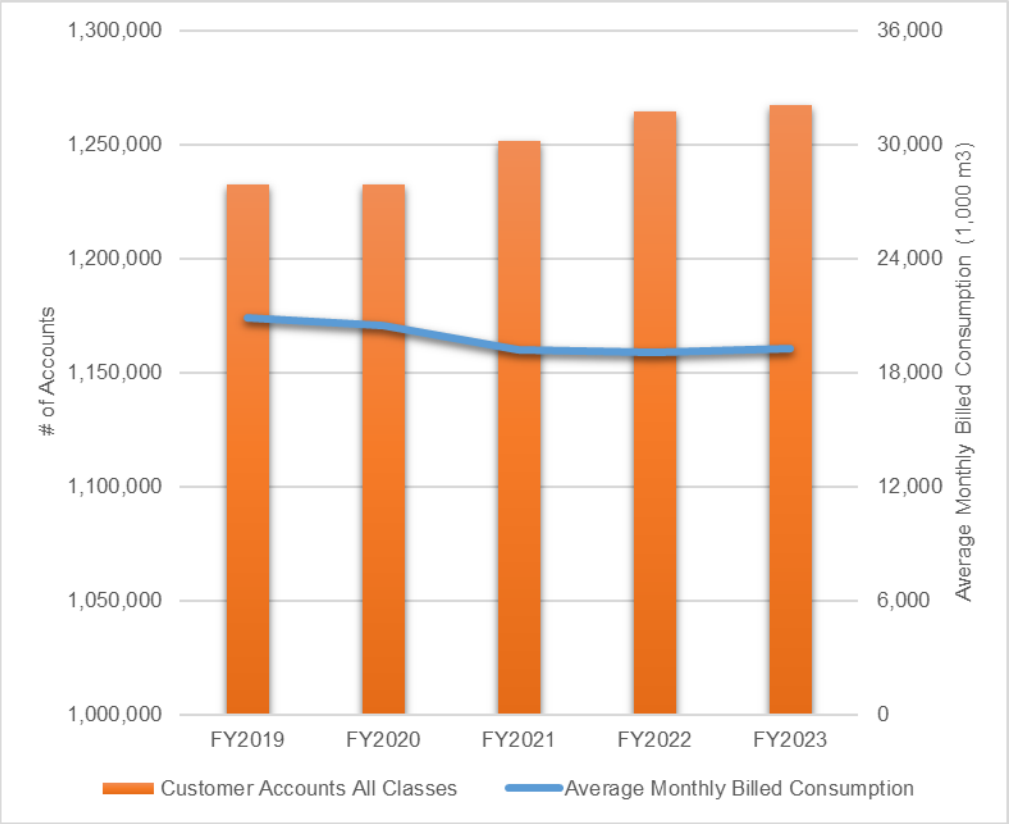


Figure 8-1 Customer Accounts and Average Monthly Billed Consumption FY2019-2023

Table 8-6 PRASA Customer Accounts

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY2022[1]	1,205,394	49,539	734	8,654	1,264,321
FY2023[2]	1,208,392	49,653	735	8,638	1,267,429
% Difference	**0.3%**	**0.2%**	**0.1%**	**-0.1%**	**0.3%**

[1] Number of accounts by customer class through June 30, 2022.
[2] Number of accounts by customer class through June 30, 2023.

Table 8-7 Average Monthly Billed Consumption by Class (1,000 Cubic Meters)

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY2022[1]	13,790	2,170	1,169	1,923	19,052
FY2023[2]	13,690	2,243	1,189	2,108	19,231

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
% Difference	**-0.5%**	**2.6%**	**1.5%**	**9.2%**	**0.9%**

[1] Based on billed consumption through June 30, 2022.
[2] Based on billed consumption through June 30, 2023.

Table 8-8 Average Monthly Consumption per Account (Cubic Meters)

Fiscal Year	Customer Class				Equivalent Average
	Residential	Commercial	Industrial	Government	
FY2022[1]	11.4	43,8	1,592.4	222.2	15.1
FY2023[2]	11.3	45.2	1,618.1	243.8	15.2
% Difference	**-1.0%**	**3.1%**	**1.6%**	**9.7%**	**0.7%**

[1] Based on information through June 30, 2022.
[2] Based on information through June 30, 2023.

In FY2022 and FY2023, the average monthly consumption per account was 15.1 m^3 and 15.2 m^3. Consumption seems to have leveled out at lower average monthly consumption levels since the 2015 drought. Historically, PRASA has significant water losses within the distribution system. Reducing NRW is a high-priority initiative, as it will have both revenue enhancement and expense reduction impacts on finances. Therefore, PRASA has invested in different departments within PRASA to implement various initiatives to reduce NRW. Refer to Section 5.6 for additional information on these initiatives.

In addition, according to the U.S. Census Bureau, Puerto Rico's population had a 1.4% annual decline between 2012 and 2020.[10] The Central Government's New Fiscal Plan for Puerto Rico (April 3, 2023) estimates an average 0.4% annual population decline through FY2027, an approximate decline of 1.8% from FY2022 to FY2027. This population decline trend could be one of the reasons for the water consumption reduction pattern experienced in recent years. However, this significant population decline was not reflected in PRASA's number of active accounts.

Table 8-9 contains the projected macroeconomic indicators included in the 2023 PRASA Fiscal Plan. These indicators include annual population change and annual change in Gross National Product through FY2028, both of which are anticipated to decline.

Table 8-9 Macroeconomic Indicators Assumption for Service Revenue Projection

FY	Population Change (Compared to the previous year)	Gross National Product Change (Compared to the previous year)
2024	-0.3%	-0.18%

[10] The U.S. Census Bureau shows Puerto Rico population estimate as of July 2012 was 3,634,488 and 3,285,874 as of April 2020 (2020 Census data).

FY	Population Change (Compared to the previous year)	Gross National Product Change (Compared to the previous year)
2025	-0.5%	-0.02%
2026	--0.5%	0.25%
2027	-0.4%	1.69%
2028	-0.5%	0.85%

Considering the projected reduction in population and the average monthly billed consumption per account of the past five fiscal years, Arcadis finds the forecast period amounts for Service Billings reasonable.

Rate Increases and Rate Structure Adjustment

Refer to Section 8.3 for updates on PRASA's rate structure. Note that for FY2023, the 2023 PRASA Fiscal Plan assumed a 2% annual increase in consumption charges plus an adjustment of 4.95% to the base charge for all customer segments. For FY2024 and beyond, PRASA is projecting 2% annual rate adjustments across all customer segments, resulting in additional revenues of $19.9M, $42.3M, $65.1M, $88.2M, and $111.8M from FY2024 through FY2028, respectively.

According to the 2023 PRASA Fiscal Plan, the rate adjustments are necessary for PRASA to balance its budget and keep up with increasing operational expenses. Additionally, the rate adjustments are expected to provide PRASA with adequate levels of liquidity for funding their CIP. The 2023 PRASA Fiscal Plan assumes that the additional revenues from the annual rate adjustments will provide PRASA with sufficient funding to meet its current obligations.

Arcadis believes that PRASA's assumptions for Service Revenues are reasonable based on historical results and the above assumptions. In addition, the following items should be noted:

- The continued strain on the economy could continue to affect consumption profiles, resulting in further declines in consumption patterns and/or the number of PRASA customers.
- Future rate increases could vary depending on PRASA's revenue and expense results, as well as PRASA's ability to achieve the expected results from the initiatives included in the 2023 PRASA Fiscal Plan. Alternative revenue-enhancing and cost-saving measures may be attempted before PRASA adjusts its rate over the minimum 2% increase.

Adjustment for Billings Not Collected

Adjustments for billings not collected are netted from PRASA's FY2023 preliminary results and forecast period Service Billings as presented in Exhibit 1, Line 1. PRASA has projected a recovery in collections of 96%, which aligns with PRASA's historical collection rate under normal conditions throughout the forecast period.

Arcadis finds PRASA's forecasted amount reasonable. PRASA should closely monitor changes in economic indices and collection results due to the uncertain economic situation in Puerto Rico. Also, the assumed rate of billings not collected could be materially affected if: 1) the proposed rate increases cause customers' payment delinquency rate to increase or 2) there are worsening economic conditions in Puerto Rico.

2. Transfers to/from the Rate Stabilization Account (Exhibit 1, Line 2) – Following the MAT, a Rate Stabilization Account, the balance of which is determined in the annual budget, shall be established by PRASA. This

account is established within the Surplus Fund, which contains any remaining money after all required deposits are made. Equivalent monthly deposits during the fiscal year must be made into the account equal to the balance outlined in the annual budget. In compliance with the MAT, Operating Revenues shall include all transfers from the Rate Stabilization Account minus any deposits made to the Rate Stabilization Account during the same FY. For the FY2023 projections, PRASA has assumed a transfer to the Rate Stabilization Account of $20M. According to the 2023 PRASA Fiscal Plan, this transfer is being made to cover anticipated electricity and payroll costs in FY2025 and FY2026 increases. The 2023 PRASA Fiscal Plan also assumes transfers of $5.0 and $13.0M to the Rate Stabilization Account in FY2027 and FY2028, respectively.

3. Other Income (Exhibit 1, Line 3) – PRASA's Other Income includes Miscellaneous Income, Special Assessments (fees paid by developers), and income from other sources. Miscellaneous Income mainly includes interest income and other miscellaneous revenues. Special Assessments are fees developers pay for construction projects or new development connections. These fees apply to new water and sewer connections to the System. For example, FY2024 fees are $500 each for water and sewer connections ($1,000 total per unit for both). Special Assessments depend on the fees paid by developers of new projects, and it is expected that the current economic situation will continue to impact the local new housing market during the foreseeable future.

   PRASA's Other Income revenues for FY2023 preliminary projections totaled $5.3M, of which approximately $3.8M are from Miscellaneous Income and $1.5M from Special Assessments. PRASA projects an average of approximately $4.5M in additional revenues annually from Other Income during the forecast period, $3.0M from Miscellaneous Income, and $1.5M from Special Assessments. While this is higher than historical averages for this line item, Arcadis finds PRASA's assumptions for Other Income reasonable due to higher-than-normal interest rates expected to boost up interest income in the short term. Revisiting projections for this line item will be important if and when interest rates start to decrease.

4. 2023 PRASA Fiscal Plan Revenue Enhancing Initiatives (Exhibit 1, Line 4) – In addition to the rate structure simplification and adjustments discussed above, PRASA has also included the metering and customer service optimization benefits as a revenue-enhancing initiative in the 2023 PRASA Fiscal Plan. Additional revenues from this initiative are expected to be obtained from FY2025 through FY2028, as summarized in Table 8-10.

Table 8-10 2023 PRASA Fiscal Plan Revenue Enhancing Initiatives ($, Millions)

Initiatives	FY2025	FY2026	FY2027	FY2028
	Projected	Projected	Projected	Projected
Metering Optimization	8.8	26.8	45.5	62.8
Total Additional Revenues[1]	**$8.8**	**$26.8**	**$45.5**	**$62.8**

[1]No additional revenues were included in FY2023 and FY2024 from revenue-enhancing initiatives.

Metering Optimization

The main objectives of this initiative are efficiency and customer service optimization, commercial water loss reductions, and installing and implementing advanced meter infrastructure. According to the 2023 PRASA Fiscal Plan, by increasing the accuracy of water meters, PRASA will be able to transition away from estimated commercial losses and achieve greater precision in its measurements. In addition, by reducing the uncertainty

of the System's apparent losses (commercial losses), PRASA will be able to recover revenues lost to theft and unmetered usage and determine with increased accuracy the volume of real physical water losses. With the implementation of this initiative, PRASA expects to be able to plan its CIP needs and address the renewal and replacement of its linear water mains to reduce physical losses.

Arcadis continues to assist PRASA as this project's technical advisor, including water meters and advanced metering infrastructure (AMI) and the pilot phase as the first step. The results of the pilot will be evaluated and used to inform the selection of the type of water meters and reading technology that will be deployed across the island. Refer to Section 5 for additional details about this program.

8.4.2 Authority Revenues (Other Sources of Revenues)

As defined in the MAT **Authority Revenues** *"shall mean Operating Revenues plus (i) any governmental grants or appropriations available to pay Current Expenses of the Authority, including grants or appropriations received by the Authority and specifically made for the payments of principal of and interest on obligations of the Authority or for reimbursing the Authority for such payments, (ii) any amounts received from the Government of Puerto Rico on account of Commonwealth Guaranteed Indebtedness (which is required to be deposited directly in the Commonwealth Payments Fund) or Commonwealth Supported Obligations (which is required to be deposited in the Commonwealth Payments Fund), (iii) any amounts transferred from the Budgetary Reserve Fund to the Trustee and (iv) any amounts received by the Authority from any source of funding that does not otherwise constitute Authority Revenues as reimbursement for Costs of Improvements paid by the Authority in the current or the immediately preceding three fiscal years from Operating Revenues."*

PRASA is not projecting any additional sources of revenue. Therefore, PRASA's Authority Revenues shall equal Operating Revenues for the forecast period from FY2023 through FY2028.

8.4.3 Operating (Current) Expenses

As defined in the MAT, **Current Expenses** *"shall mean the reasonable and necessary current expenses, incurred by the Authority in the ordinary course of business, calculated on an accrual basis, of maintaining, repairing and operating the properties constituting the Systems or causing said maintenance, repair and operation, which expenses shall exclude depreciation, reserves for allowances for doubtful accounts and other non-cash reserves or expenses. For purposes of the Rate Covenant and the Annual Budget required by Section 7.02 of the MAT, Current Expenses will be calculated on an accrual basis. For all other purposes of the MAT, Current Expenses will be calculated on a cash basis. Notwithstanding any accounting treatment to the contrary, the amount of any termination or similar payment under any interest rate swap or similar hedge agreement shall, if payable by the Authority, not be taken into account in computing Current Expenses to the extent the same is paid by or on behalf of the Authority from the proceeds of any Indebtedness."*

In connection with the issuance of the 2020 Senior Bonds, PRASA and the bondholders executed a Ninth Supplemental Agreement authorizing the amendment of certain provisions in the MAT, subject to and effective upon compliance with Section 9.02 of the MAT. The proposed amendments include a change to the Operating Expenses definition. Note that the amendments will only become effective upon receiving the written consent of the bondholders of all Outstanding Bonds of each lien priority under the MAT and the holders of certain other Outstanding Senior Indebtedness.

PRASA's Operating (Current) Expenses are presented on an accrual basis as required by the MAT. PRASA's preliminary Operational Expenses for FY2023 and operating expense projections for FY2024 to FY2028 net of (i) capitalized expenses, (ii) the 2023 PRASA Fiscal Plan expense reduction initiatives, and (iii) the 2017/2022 Hurricanes impact recoveries are presented in Table 8-11.

Table 8-11 PRASA Operating Expenses ($, Millions)

Fiscal Year	Operating Expenses Without FEMA Reimbursements	Operating Expenses net of FEMA Reimbursements
FY2023 Preliminary	$817.3	$802.3
FY2024 Annual Budget	$850.5	$833.5
FY2025 Projected	$886.9	
FY2026 Projected	$878.1	
FY2027 Projected	$876.9	
FY2028 Projected	$882.9	

PRASA's projections for Operating (Current) Expenses and associated assumptions are discussed below. Note that for certain expense categories, PRASA has assumed that expenses will increase year-over-year at an assumed inflation rate. Also, the 2023 PRASA Fiscal Plan incorporates the FOMB's inflation rates projections, averaging about 1.47% for the forecast period (FY2024 through FY2028), from 1.95% in FY2024 to 1.38% in FY2028. Puerto Rico's inflation rate at the end of June 2023 was about 2.3%, but projections show a projected increase to approximately 2.6% by January 2024[11] .

1. Payroll and Benefits (Exhibit 1, Line 11) – Payroll and Benefits, before capitalization, continue to be PRASA's largest expense category.

   - PRASA's FY2023 Payroll and Benefits preliminary results amount to $338.4M.
   - For FY2024, PRASA is projecting Payroll and Benefits of $335.4M.
   - For the remainder of the forecast period, the 2023 PRASA Fiscal Plan is projecting the Payroll and Benefits expense to increase annually by approximately 1.34% as follows:
     - FY2025 = $347.1M
     - FY2026 = $351.2M
     - FY2027 = $353.5M
     - FY2028 = $361.4M

   The following main assumptions were applied to develop the Payroll and Benefits Costs according to the 2023 PRASA Fiscal Plan:

   - Headcount of 4,700 employees for FY2023, increasing by 50 full-time employees (FTE) each year, reaching 4,950 employees by FY2028.

[11] Source: Trading Economics (https://tradingeconomics.com/puerto-rico/inflation-cpi/forecast)

- Minimum salaries are based on current legislation and as projected to increase per industry standards.
- New salary scales, as implemented on July 1, 2022.
- New incentives for critical operational positions to allow for retention.
- Compliance with the Fiscal Plan Compliance Act (Act 26-2017) as amended, including the following change in benefits:
    - Maximum overtime factor to 1.5 times the normal pay,
    - 24 vacation days, with a maximum of 15 days to be accumulated each year.
- Eighteen days of sick leave per year maximum as set forth by Act 176-2019.
- Healthcare plan costs are based on the current contract for FY2023 and FY2024 and increased by the projected healthcare cost inflation after that.
- Pension costs are projected as a "PayGo" expense based on the information provided by the Employees Retirement System (ERS).

Headcount and Overtime Assumptions

As of June 30, 2023, PRASA had a total headcount of 4,551 employees, including 216 employees qualified under the Voluntary Pre-Retirement Program.

The FY2024 Annual Budget, as presented to the FOMB, assumes a total of 4,750 employees or a net increase of 199 employees, increasing by 50 FTE each year after that, reaching 4,950 employees by FY2028.

Based on FY2023 preliminary results through June 30, 2023, the current overtime level is approximately 8% of total payroll costs. PRASA has assumed a rate of overtime of 9% (as a percentage of net payroll costs) in the FY2024 Annual Budget. With an increased headcount, PRASA expects the need for overtime to decrease. In addition, with the expected salary increases, overtime expenditure will be proportionally smaller as a percentage of net payroll cost than in previous fiscal years. For the remainder of the forecast period, PRASA assumes a rate of overtime of approximately 8% of total payroll costs.

Legislated Acts Assumptions

Act 26-2017 and Act 176-2019 – Act No. 26 was enacted on April 29, 2017 (Act 26-2017) to ensure compliance with the Government's Fiscal Plan approved and certified by the Oversight Board on May 13, 2017, and re-certified post-Hurricanes Irma and María on June 29, 2018. Among other measures, Act 26-2017 requires all marginal benefits to be the same for all Government of Puerto Rico employees, including all public agencies, instrumentalities, and corporations, such as PRASA. The act froze and reduced some payroll benefits or compensation, including vacation and sickness licenses, payout terms of licenses, and bonuses. Subsequently, under Act 176-2019, certain amendments were reverted. Currently, PRASA employees' benefits include the following:

- Vacation licenses accumulate at a rate of 1.25 days per month of service and may be accumulated to up to a maximum of 15 days by the end of each natural year and may accrue up to 60 days. Note that the vacation accumulation rate might change contingent on the final approval of Act 119-2022.
- Sickness licenses accumulate at a rate of 1.5 days per month of service and may be accumulated to up to 18 days by the end of each natural year.
- Licenses in excess will not be paid out, except for vacation days accrued up to 60 days.
- Elimination of all bonuses, except for Christmas bonuses, which shall have a maximum of $600.

- Extra hours will be compensated at a maximum rate of 1.5 times the regular hourly rate.

The impact of Act 26-2017 and Act 176-2019, as amended, were incorporated in PRASA's Payroll and Benefits costs for the forecast period.

2. Voluntary Pre-Retirement Program (Act 211-2015) – As a result of the fiscal crisis, the Puerto Rico Government enacted Act No. 211 on December 8, 2015 (Act 211-2015), which created a "Voluntary Pre-Retirement Program". Act 211-2015 intends to create a program *"whereby eligible employees of the Government of the Commonwealth of Puerto Rico may voluntarily separate from service by receiving incentives until they meet the requirements for retirement; provide for the requirement of credited years of service needed to qualify for this Program; establish the timeframe for employees to exercise their option to avail themselves of the Voluntary Pre-Retirement Program; provide the special incentives that shall be granted to employees who avail themselves of the Program; provide the requirements needed to implement the Program; and for other related purposes".*

   The program incentivized certain eligible employees to voluntarily retire early and receive compensation equal to 60% of their average salary, payout of unused vacation and sick leaves (as per Act 66-2014), and keep their health insurance coverage for two years. These incentives are applicable until they meet the requirements for full retirement. Consequently, the program attempts to reduce the workforce progressively and voluntarily, allowing the economy to transition. Act 211-2015 also stipulates that the resulting vacant positions from the retirement program be eliminated and that agencies take administrative or operational measures to restructure without these positions. The FOMB might authorize maintaining positions if certified to be essential and per the plan submitted by PRASA.

   Some eligible PRASA employees occupied managerial or supervisory positions, which may create organizational challenges. As of June 30, 2023, 216 employees are retired under the Voluntary Pre-Retirement Program.

Collective Bargaining Agreements Assumptions

On April 6, 2021, the Authority received a partial labor agreement proposal from the UIA, its main labor union. UIA requested that the Authority provide financial information to develop a proposed comprehensive revision to the Authority's CBA, with UIA incorporating amendments to clauses with economic impact. After further discussions by the parties, in February 2022, the Authority and UIA signed a Negotiation Agreement. The Negotiation Agreement, by which the parties mediate before the Puerto Rico Department of Labor (DOL), provides for negotiating revised pay scales, subject to PROMESA and the Fiscal Plan compliance.

Under the Negotiation Agreement, either party can notify the other of its intention to negotiate a revised CBA at least 90 days before July 1st, commencing with July 1, 2022. The CBA will be extended for an additional year if such notification is not received at least 90 days before July 1st. As of January 2023, the required 90-day notice had not been received, resulting in the extension of the CBA until July 1, 2023.

The Negotiation Agreement also provides for the parties to promote the payment of wage incentives starting in FY2023 for certain difficult recruitment positions such as plant operators and electro-mechanics, payment of a $600 premium by June 30, 2022, to recognize UIA members' employment commitment, and payment of Christmas bonus balances for FYs 2015 (by July 31, 2022) and 2016 (by July 31, 2023), without interest or penalties to active UIA members.

Regarding the CBA with the HIEPAAA, neither party provided the required notice of its intention to negotiate a new CBA before the CBA would be deemed automatically extended for another year. As a result, and as required by Act 9-2021, the HIEPAAA CBA has been extended for an additional year to July 1, 2023.

On July 1, 2022, based on a comprehensive analysis done by a third party and agreed upon between UIA, HIEPAAA, and the Managers Association, new pay scales were implemented for the PRASA's employees, providing a minimum salary increase. An incentive for licensed plant operators and electro-mechanicals was also implemented.

The incremental costs for the agreed compensation increase were incorporated into the costs for the forecast period.

Pension Costs Assumptions

The Central Government's ERS has been facing significant financial difficulties, as reflected in its net pension liability and historical funding shortfalls, which are expected to continue. Because PRASA's employees and retired employees participate in the ERS, PRASA is responsible for the portion of the net pension liability attributable to its employees.

As provided in a circular letter from the Department of Treasury on June 27, 2017 (Number 1300-46-17), beginning in FY2018, employers that participate in the ERS will have to pay the pension benefit of their retired employees on a Pay-Go basis due to the lack of sufficient liquid assets in the ERS. Therefore, PRASA's FY2023 preliminary projections, FY2024 Annual Budget, and financial projections consider the impact of fully funding the retirement (pension) benefit payments for PRASA's retired employees on a Pay-Go basis. Also, PRASA eliminated from its projections all the employer contributions to the retirement system, including the Cost-of-Living Allowance contribution and the Annual Additional Contribution to the ERS. The amount projected does not include any additional future contributions to the ERS, which PRASA is not expected to comply with. For FY2023, PRASA preliminarily projects $94M to cover employees' retirement benefits on a Pay-Go basis. In its FY2024 Annual Budget, PRASA forecasts $94M in pension Pay-Go costs per the Oversight Board's projection. PRASA projects pension Pay-Go costs to be $90M in FY2025, $90M in FY2026, $88M in FY2027, and $87M in FY2028.

3. Electric Power (Exhibit 1, Line 12) – PRASA's FY2023 preliminary projections for electric power total $177.0M, $34.4M less than the budgeted amount. Hurricane Fiona impacted energy consumption and caused a high number of outages on the island. The FY2024 Annual Budget assumes an electric power expense of $202.5M for FY2024. The FY2024 Annual Budget is based on electric rates, as projected by the Oversight Board, of a standard PREPA/LUMA rate of $0.306 per kilowatt-hour (kWh) and a more consistent projected electric power consumption assuming a reduction in service interruptions. Per the 2023 PRASA Fiscal Plan, electricity consumption is expected to increase in FY2024 and hold relatively steady for the remainder of the forecast period. PRASA's electricity cost is highly sensitive to PREPA/LUMA rates, with an approximate $6.5M per year impact on PRASA's expense per $0.01 variation in the PREPA/LUMA rate. The PREPA/LUMA rate per kWh is projected to increase to $0.351 in FY2025, decrease to $0.327 in FY2026, and then increase in FY2027 and FY2028 to $0.332 and $0.338, respectively; this resulted in electric power expenses of $230.1M in FY2025, $215.1M in FY2026, and $218.5M in FY2027. By FY2028, the PREPA/LUMA rate is projected at $0.338 per kWh, resulting in an electric power expense of $224.7M (a total cost increase of $47.8M from the FY2023 preliminary projections). PRASA's projected results of electric power cost consider the projected and expected reductions in consumption through 1) regional measures (facility consolidations, minor repairs, operational

optimization, and installations improvements) and 2) reductions in cost per kWh from PPAs that have been completed as part of PRASA's Energy Management Program.

Arcadis finds PRASA's forecast period projection for Electric Power reasonable. However, based on external factors, including the restructuring of PREPA's debt, the projected cost for electricity, which PRASA expects during the Certified Fiscal Plan Period to continue to be significantly influenced by oil prices, is subject to a high degree of uncertainty and possibly a significant change. As seen by the large increase in electricity costs included in the FY2024 Annual Budget, PRASA is susceptible to varying prices, and the budget does not include a contingency to manage any unforeseen increases in consumption. Therefore, close monitoring of electric energy usage must continue, and PRASA shall adjust as necessary. Additional discussion on PRASA's Electric Power assumptions is provided below.

Electric Energy Tariff Assumptions

As stated, PRASA's LUMA rate for FY2023 was $0.289 per kWh. LUMA's projected rate applicable to PRASA for FY2024 is $0.306 per kWh. In recent months, PRASA has indicated that the average PREPA (blended) rate cost has been between $0.271-$0.344 per kWh. For FY2025 through FY2028, PRASA is projecting PREPA (blended) rate costs of $0.3505, $0.3265, $0.3321, and $0.3382 per kWh, respectively. The average PREPA (blended) rate cost during the forecast period is $0.319 per kWh.

Purchase Power Agreements

PRASA has included projected cost savings because of its PPAs and other internal measures. Since 2011, PRASA has had ten facilities under a PPA mechanism using photovoltaic energy, producing approximately 11.3M kWh per year at a $0.15 per kWh blended rate, which is less than rates charged by PREPA/LUMA. Annual savings from these PPAs vary based on PREPA rates.

Consumption Growth Rate Assumptions

The electric power consumption from PREPA in FY2023 totaled 610M kWh (compared to the 649M kWh budgeted). For FY2024, PRASA is projecting that its total consumption will be 655M kWh, of which 641M kWh will be power consumption bought from PREPA. This PREPA consumption projection considers regional initiatives expected to be achieved in FY2024. For the forecast period, PRASA is projecting that its total consumption will be at an average of 655M kWh, of which an average of 623M kWh will be power consumption bought from PREPA.

4. Maintenance and Repair (Exhibit 1, Line 13) – The FY2024 Annual Budget for Maintenance and Repair is $61.3M, about $1.2M less than the FY2023 preliminary projections. According to PRASA, the decrease in the maintenance and repair expenses in the FY2024 Annual Budget versus the FY2023 projections is due to PRASA amending the FY2023 maintenance budget to reflect a one-time cost increase because of the impact of Hurricane Fiona. The FY2024 budget amount reflects a return to normal operations. Arcadis finds the maintenance and repair expense budget reasonable. The 2023 PRASA Fiscal Plan projects Maintenance and Repair expenses of $62.1M, $62.9M, $63.9M, and $64.7M for FY2025 through FY2028, respectively.

   Arcadis believes the projected increases during the forecast period are overly modest, averaging only about 1.6% per year. Considering the state and condition of the System, the regional operational challenges, and to avoid any unexpected increases in the future, Arcadis recommends revisiting the inflation assumptions applied to the Maintenance and Repair expenses.

5. Chemicals (Exhibit 1, Line 14) – PRASA's FY2023 preliminary projections for chemical costs amount to $69.9M, $13.3M greater than the budgeted amount. As chemical costs are considered commodities and usually affected by inflation and worldwide demand and supply levels, PRASA's chemical costs have materially increased over the past few years. In addition, PRASA's chemical costs have been on a steady rise during recent years because of cost increases and increased chemical consumption related to ensuring compliance with environmental and health standards. As a result, in FY2024, PRASA is budgeting approximately $73.4M in chemical expenses. For FY2025 through FY2028, PRASA has applied an annual increase based on the assumed inflation rate (1.4% average) on chemical expenses, resulting in expenses of $74.4M in FY2025, $75.4M in FY2026, $76.4M in FY2027, and $77.4M in FY2028.

   Arcadis believes PRASA's forecast period projections for chemical expenses are reasonable. However, chemical expenses could be higher than projected if inflation rates are higher than those assumed in the 2023 PRASA Fiscal Plan, consumption increases due to requirements from regulatory agencies, or inefficient chemical dosing.

6. Insurance (Exhibit 1, Line 15) – Preliminary projections for insurance expenses in FY2023 total $21.6M, equal to what was previously budgeted. PRASA has budgeted $24.9M for insurance expenses in FY2024, which is $3.3M higher than the FY2023 preliminary projection. This amount includes adjustments to PRASA's insurance premiums due to the post-hurricane and earthquake emergency claims. PRASA has applied an annual increase based on the assumed adjusted inflation rate (1.4% average over the forecast period) on insurance expenses throughout the forecast period, resulting in insurance expenses of $25.2M in FY2025, $25.6M in FY2026, $25.9M in FY2027, and $26.2M in FY2028.

   Arcadis believes the projections for insurance expenses are reasonable. Several recommendations in Section 7 have been provided to PRASA for their consideration to expand coverages and transfer additional risks through its insurance program. To the extent PRASA adopts these recommendations, premium costs may increase.

7. Other Expenses (Exhibit 1, Line 16) – Other Expenses consist largely, among others, of costs directly related to operations, including rentals, security services, billings, collections-related costs, water purchases, sludge disposal, and water transport. FY2023 preliminary projections for Other Expenses total $170.3M, $2.7M less than included in the certified FY2023 Annual Budget. PRASA has included $178.6M for Other Expenses in its FY2024 Annual Budget, which represents an increase of approximately 4.9% over FY2023 preliminary projections due to increases in costs attributed to professional services, electric generators rentals, fuels and oils, purchases of water, asphalt materials and services, and contracted technical assistance. PRASA is projecting that Other Expenses will increase year-over-year based on the adjusted assumed inflation rate (1.6% average over the forecast period), resulting in Other Expenses of $180.0M in FY2025, $182.4M in FY2026, $184.8M in FY2027, and $187.4M in FY2028.
   Arcadis has reviewed PRASA's projections for this expense category and finds the budget amount reasonable. However, PRASA should monitor actual costs, particularly for fuels and oils, given the projected increases that could materialize throughout the FY.

8. 2023 PRASA Fiscal Plan Operating and Capital Expense Savings Initiatives (Exhibit 1, Line 17) – The Operating and Capital Expense Savings initiatives included in the 2023 PRASA Fiscal Plan are the reduction of physical water losses, electricity cost reduction, and new financing for CIP.

   Table 8-12 presents the financial projection of these initiatives for the forecast period.

Table 8-12 2023 PRASA Fiscal Plan Operating and Capital Expense Savings Initiatives ($, Millions)

2022 PRASA Fiscal Plan Initiatives	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
	Preliminary	Annual Budget	Projected	Projected	Projected	Projected
Physical Water Losses	$0.0	$1.2	$4.9	$6.7	$10.6	$16.3
Electricity Cost Reduction	$0.0	$1.2	$2.5	$3.4	$11.2	$18.2
New Financing for CIP	$66.9	$217.9	$210.8	$72.9	$35.3	$20.2
Total Expense Savings and New CIP Funding[1]	**$66.9**	**$220.3**	**$218.2**	**$83.0**	**$57.1**	**$54.7**

[1] Numbers may not add up due to rounding.

While PRASA is committed to the physical water losses and electricity cost reduction initiatives, given the status of their development, and considering the coordination, planning, and implementation efforts still required to be completed, it is likely that the timing for achieving the projected benefits will not be as expected by PRASA. The new financing for CIP appears optimistic based on the recent execution rate of capital projects and available funding discussed in Section 2.

Physical Losses Reduction Initiative

Physical losses are the largest component of NRW in PRASA's water balance. Therefore, this initiative includes a series of efforts to reduce physical losses and NRW and generate operational savings by continuing the water leak detection program, water pressure management and optimization, and installing master meters at critical facilities. PRASA projects savings of $1.2M in FY2024, $4.9M in FY2025, $6.7M in FY2026, $10.6M in FY2027, and $16.3M in FY2028. The total projected savings for the forecast period is $39.8M.

Electricity Cost Reduction

As the System's second largest operating expense, PRASA must continue reducing electricity costs and consumption through efficiency measures and distributed generation. Accordingly, PRASA has reported the following measures in the 2023 PRASA Fiscal Plan:

- Perform further operational improvements focused on conservation measures in its WTPs and WWTPs.
- Leverage hydraulic modeling analyses and optimization efforts to reduce energy consumption in the water distribution and wastewater collection system (i.e., pump station facilities).
- Pursue renewable/alternate energy projects.

The actual cost savings from this measure will depend on the cost of electricity produced by PREPA and supplied by LUMA. Based on the current projected electricity rates, the projected cost savings amount to $1.2M in FY2024, $2.5M in FY2025, $3.4M in FY2026, $11.2M in FY2027, and $18.2M in FY2028. Total project savings during the forecast period equate to $36.5M.

New Financing for CIP

After restructuring the Federal Debt, PRASA recovered access to future funding from USEPA SRF Loans and the USDA RD Program. As a result, the FY2023 preliminary projections expect new financing for CIP through these two programs for $66.9M for FY2023 and $217.9M in the FY2024 Annual Budget. For the remainder of the forecast period, the 2023 PRASA Fiscal Plan projects to receive $210.8M in FY2025, $72.9M in FY2026, $35.3M in FY2027, and $20.2M in FY2028 from these programs for their CIP.

9. Capitalized Expenses (Exhibit 1, Line 18) – PRASA contracted Arcadis during FY2022 to review and update the annual operating costs that are eligible to be capitalized to CIP. The recommendations included in the updated report reduce PRASA's capitalization rate from 3.7% (per a study completed in April 2017 by an external consultant hired by PRASA) to 2.7%. FY2023 preliminary projections for capitalized expenses amount to $22.3M. PRASA has included in its FY2024 Annual Budget $23.2M for capitalized expenses based on the capitalization rate of 2.7% of operating expenses. For FY2025 through FY2028, PRASA is projecting capitalized expenses of $24.6M, $24.4M, $24.3M, and $24.5M, respectively.

10. Hurricanes' Impact on Operating Expenses (Exhibit 1, Line 20) – PRASA's total 2017/2020 hurricanes and 2020 earthquakes impact on operating expenses amounted to approximately $238M. The major components included as part of these incremental expense estimates include:
    - Overtime payroll for employees working during the emergency
    - Maintenance, diesel refueling, and logistics for emergency power generators
    - Rentals of generators
    - Water distribution services (i.e., oasis)
    - Security measures and services
    - Contracted chemical and bacteriological analysis

Arcadis reviewed the MAT, as amended, to determine the adequacy of the allocation of insurance proceeds and FEMA reimbursements/grants to be obtained due to the impact of the federally declared disasters. Arcadis requested PRASA's legal opinion on this matter. As provided by PRASA's legal advisor, FEMA funds shall not be treated as Operating or Authority Revenues. FEMA does not provide grants to substitute Operating Revenues. Rather, FEMA funds are directed at disaster-related expenses to be used exclusively to cover costs of the eligible emergencies, permanent works, or resiliency projects approved by FEMA. To the extent FEMA funds are received by PRASA, as mentioned, such funds shall not be subject to the gross pledge set forth under the MAT as these funds cannot be used to pay bondholders. FEMA funds shall, therefore, be deposited to the credit of the Current Expense Fund if they are intended to reimburse PRASA for Current Expenses. The received FEMA grants for repairing, replacing, or reconstructing the damaged or destroyed property should be applied to the Capital Improvement Fund.

In its FY2023 projections, PRASA includes a net deposit of $15M from FEMA funds to the credit of the Current Expense Fund for the reimbursement of PRASA's operating expenses concerning the impacts of Hurricanes Irma and María. In FY2024, PRASA has budgeted a net deposit of $17M for the impacts of 2020 earthquakes and Hurricane Fiona in 2022. No additional deposits are included in the periods from FY2025 through FY2028.

8.5 Debt Service

8.5.1 Master Agreement of Trust

The MAT contains specific DSC requirements that must be met by PRASA, including, but not limited to, a Rate Covenant. As stated in the Rate Covenant defined in the 2012 MAT, as amended, PRASA has covenanted to establish and collect rates, fees, and charges so that it meets the following four independent requirements, which are calculated annually no later than six months after the end of each FY based on Operating Revenues and Authority Revenues outlined in PRASA's most recent audited financial statements:

- Operating Revenues shall be sufficient to be at least equal to 250% of annual debt service concerning Senior Indebtedness for the current FY.
- Operating Revenues shall be sufficient to be at least equal to 200% of annual debt service concerning Senior Indebtedness and Senior Subordinate Indebtedness for the current FY.
- Operating Revenues shall be sufficient to be at least equal to 150% of annual debt service concerning all Bonds and Other System Indebtedness for the current FY.
- Authority Revenues shall be sufficient to be at least equal to:
  - Annual debt service on Indebtedness
  - Current expenses
  - the amounts, if any, necessary to be deposited in any Senior Debt Service Reserve Account, Senior Subordinate Debt Service Reserve Account, or Subordinate Debt Service Reserve Account to restore the amount on deposit therein to the amount of the applicable Debt Service Reserve Requirement provided that each such Accounts will be deemed to be funded at the applicable Debt Service Reserve Requirement for so long as the deposits required by the MAT are being made;
  - the amount, if any, necessary to be deposited in the Operating Reserve Fund to maintain the balance therein at the Operating Reserve Fund Requirement; and
  - the amount, if any, necessary to be deposited in the Capital Improvement Fund and the Rate Stabilization Account of the Surplus Fund following the Annual Budget for the current FY.

Should PRASA decide to issue additional debt while any debt issued under the MAT (as amended) is outstanding, the additional bonds test (ABT) requirements of the MAT would also have to be met. The ABT is a measure of whether DSC will still be met after the proposed additional bonds are issued. The ABT requirements that PRASA must meet include the following:

- Senior Bonds ABT
  - Operating Revenues are at least equal to 2.5x Senior Bonds' maximum annual debt service.
  - Operating Revenues are at least equal to 1.5x maximum annual debt service on all System Indebtedness.
- Senior Subordinated Bonds ABT
  - Operating Revenues are at least equal to 2.0x combined Senior Bonds and Senior Subordinate Bonds maximum annual debt service.
  - Operating Revenues are at least equal to 1.5x maximum annual debt service on all System Indebtedness.
- Subordinated Bonds ABT

- Operating Revenues are at least equal to 1.5x maximum annual debt service on all System Indebtedness.

A summary of PRASA's MAT DSC and ABT requirements is presented in Table 8-13.

Table 8-13 2012 MAT DSC Requirements Summary, as amended

Lien Level	Debt Secured	DSC for ABT (MADS)[1]	DSC for Covenant Test	In Default if DSC not Achieved?
Senior	2008, 2020, 2021, 2022 Bonds and SRF & RD Loans	2.5/1.5	2.5	Yes
Senior Subordinate	Not currently applicable	2.0/1.5	2.0	Yes
Subordinate	Not currently applicable	1.5	1.5	Yes
Below Subordinate	Commonwealth Guaranteed Indebtedness	N/A	1.0	No
Below Subordinate	Commonwealth Supported Obligations (CSO)	N/A	1.0	No

[1] Two tests apply to future debt. The first test is Operating Revenues divided by existing and proposed debt service (at the existing lien level); the second test is Operating Revenues divided by existing and proposed debt service (regardless of lien level) plus specified Reserve Fund deposits.

Following the MAT, the flow of funds shall be as follows:

- Senior, Senior Subordinate and Subordinate debt (and any debt secured on a parity therewith) take priority over current Operating Expenses.
- CGI and CSO would continue to be funded/paid only after funding of current operating expenses and other funds with priority over CGI and CSO.
- PRASA shall deposit all revenues in the Operating Revenue Fund to make the required deposits set forth below. The Trustee transfers the moneys on deposit in the Operating Revenue Fund to the following funds in the following order:
  - Senior Bond Fund – to fund principal and interest payments on Senior Indebtedness;
  - Senior Debt Service Reserve Fund – to fund deficiencies in the reserve fund upon the issuance of additional Senior Bonds or withdrawals or valuation losses;
  - Senior Subordinate Bond Fund – to fund principal and interest payments on Senior Subordinate Indebtedness;
  - Senior Subordinate Debt Service Reserve Fund – to fund deficiencies in the reserve fund upon the issuance of additional Senior Subordinate Bonds or withdrawals or valuation losses;
  - Subordinate Bond Fund – to fund principal and interest payments on Subordinate Indebtedness;
  - Subordinate Debt Service Reserve Fund – to fund deficiencies in the reserve fund upon the issuance of additional Subordinate Bonds or withdrawals or valuation losses;
  - Current Expense Fund (a new fund under the MAT) – to fund current operating expenses of PRASA;
  - Operating Reserve Fund – to fund Operating Reserve requirements and to pay reimbursement obligations on Operating Reserve Facilities;

- Capital Improvement Fund – to fund the Capital Improvement Fund Requirement;
- Commonwealth Payments Fund – to fund principal and interest payments on CGI and CSO; and
- Surplus Fund – to fund the Rate Stabilization Fund and, after that, for any lawful purpose.

In connection with the issuance of the 2020 Senior Bonds, PRASA and the bondholders executed a Ninth Supplemental Agreement authorizing the amendment of certain provisions in the MAT, subject to and effective upon compliance with Section 9.02 of the MAT. The proposed amendments, summarized below, are contained in the form of the Second Amended and Restated Master Agreement of Trust (the "Second Amended and Restated Trust Agreement"). These amendments will only become effective upon receiving the written consent of the bondholders of all Outstanding Bonds of each lien priority under the MAT and the holders of certain other Outstanding Senior Indebtedness.

The proposed amendments, as outlined in the Second Amended and Restated Trust Agreement, among other items, would:

1. *Revise the pledge of the Authority Revenues from a "gross revenue pledge" to a "net revenue pledge" by changing the order of monthly deposits of Revenues with the Trustee, such that the order of monthly deposits in the flow of funds to provide for the payment, both before and after the occurrence of an Event of Default, of Current Expenses prior to the Authority making monthly deposits for debt service on Bonds and Other System Indebtedness.*
2. *Revise the definition of "Annual Debt Service" to clarify that, consistent with the Authority's historical calculation thereof, Annual Debt Service is calculated based on when the Authority is required to make deposits to the respective Bond Funds rather than when the date on which principal and interest is due and payable.*
3. *Change the term "Operating Revenues" to "Revenues" and clarify that such term does not include (a) revitalization charges imposed pursuant to Act 68-2018 or similar mandatory, non-bypassable charges imposed by law to secure securitization bonds and (b) any funds received from the federal government required to be used to pay Current Expenses or Costs of Improvements or required to reimburse the Authority for Current Expenses or for Costs of Improvements.*
4. *Amend the Rate Covenant coverage levels.*
5. *Amend the tests for the issuance of additional Bonds to require that Revenues provide the coverage levels.*
6. *Eliminate the references in the Trust Agreement to Commonwealth Supported Obligations, which obligations are not indebtedness of the Authority, not payable from Revenues, and would not cause the occurrence of an Event of Default if not paid.*
7. *Clarify the timing of delivery of audit reports to the Trustee and the CE.*
8. *Eliminate references to the Term Loan Fund and Budgetary Reserve Fund, which no longer exist; add a force majeure definition and modify the Current Expense Fund and Cost of Improvement definitions.*
9. *Amend the definition of Debt Service Reserve Facility to require that a provider of any such facility be rated in one of the two highest long-term rating categories by at least two nationally recognized statistical rating organizations instead of by two such organizations then rating the Authority's Bonds.*

The proposed amendments would be made under Section 9.02 of the MAT. However, these will not become effective unless and until all bondholders of Outstanding Senior Bonds and the Federal Lenders have consented to that. PRASA cannot assure whether it will continue to seek all such consents when they will be obtained or if they can be obtained at all. Until all the required consents have been obtained, the MAT will remain in effect without the proposed amendments.

8.5.2 Debt Service Coverage

A summary of PRASA's existing debt service obligations and coverages for FY2023 through FY2028 are presented in Exhibit 1 and summarized in Tables 8-14 through 8-17. Estimated debt service amounts include projected payments on the 2008, 2020, 2021, and 2022 Bonds, other existing debt, and payments for maintaining required debt service reserves, as applicable. Other System Indebtedness in parity with Senior bonds includes the SRF and USDA RD Loans, which started in July 2019 after the federal debt modification.

The CGI includes those of PRASA's existing obligations, which the Government of Puerto Rico guarantees. Until June 2019, these obligations included the 2008 Revenue Refunding Commonwealth Guaranteed Bonds, the USDA RD Bonds, and the SRF Loans. On June 30, 2016, PRASA entered into various forbearance agreements with both (i) USDA and (ii) the Puerto Rico Infrastructure Financing Agency (PRIFA), the Department of Natural and Environmental Resources (DNER), and the Department of Health (DOH) (all three for the SRFs), which were later extended in various occasions until July 2019 when agreements were reached between all parties.

Upon execution of the Seventh Supplemental Agreement of Trust dated July 26, 2019, the following amendments were made concerning the CGI:

1. Amendment to Section 1.02 of the MAT, Definition of "Commonwealth Guaranteed Indebtedness" was amended to read as follows: *"Commonwealth Guaranteed Indebtedness" shall mean any obligations of the Authority that are designated as Commonwealth Guaranteed Indebtedness by the Authority and Authority's Puerto Rico Aqueduct and Sewer Authority Revenue Refunding Bonds, Series 2008 but shall not include any loans from the United States Department of Agriculture, Rural Development, Rural Utilities Service or obligations of the Authority to the Puerto Rico Infrastructure Financing Authority evidencing revolving loans pursuant to the Puerto Rico Water Pollution control and Drinking Water Treatment Revolving Funds or any loans granted by the Commonwealth Revolving Funds under the provisions of the Federal Clean Water Act of 1972, as amended and the Federal Safe Drinking Water Act of 1996, as amended*.
2. Amendment to Section 2.20 of the MAT adding a paragraph regarding Trustee notifications to each Fiduciary for and Holder of (as applicable) in Other System Indebtedness.
3. Amendment to Section 8.10 of the MAT regarding Waivers of Events of Default.

Renegotiated terms of PRASA's SRF and RD debt obligations, reclassified as Senior Level Debt per the Seventh Supplemental Agreement of Trust dated July 26, 2019, are summarized in Table 8-24.

Table 8-14 Renegotiated Terms for SRF and RD Debt

Debt Category	SRF	RD
Outstanding Debt Balances, including future loans of $26M for SRF and accrued interests for RD	$595,777,017.21	$402,931,464.55
Term	30 years	40 years
Rate	0% until year 10 and 1.0% after that	2.0%
Payment Terms	Biannual principal-only payment of $5M in Years 1-10; biannual principal and interest payments of $13.7M in Years 11-30	Biannual principal and interest payments of $5M in Years 1-10, increasing to $8.5M in Years 11-40

Debt Category	SRF	RD
Maturity Date	7/1/2049	7/1/2059
Debt Level	Senior	Senior

On December 17, 2020, PRASA issued its 2020 Series A and Series B Revenue Refunding Bonds (the "2020 Senior Bonds") for $1,351.3M and $18.8M, respectively, to refund some of its outstanding senior bonds. The proceeds of the 2020 Senior Bonds were used to:

4. Refinance the then-outstanding 2008 Revenue Bonds Series A and Series B (Senior Lien) issued under the MAT, excluding the non-callable convertible capital appreciation bonds with a balance of $87.2M as of the refunding date.
5. Refinance all of PRASA's currently outstanding Revenue Refunding Bonds, 2008 Series A and 2008 Series B, each guaranteed by the Government of Puerto Rico.
6. Pay costs of issuance of the 2020 Senior Bonds. The par amount of the refunded bonds amounted to $1,427.6M (the 2020 Senior Bonds were issued at a premium to par).

The issuance of the 2020 Senior Bonds to refund a portion of PRASA's senior bonds resulted in a reduction in total debt service payments over the next 27 years of approximately $348.2M and the termination of the Commonwealth Guarantee over the Revenue Refunding Bonds, 2008 Series A, and B. This results in an average annual debt service savings of about $13M.

The 2020 Senior Bonds are classified as Senior Debt and are not guaranteed by the Commonwealth. Therefore, no CGI remains outstanding after the Federal Debt modification in July 2019 and the issuance of the 2020 Senior Bonds.

On August 25, 2021, the Authority issued its 2021 Senior Bonds in a total principal amount of $1,089.8M. In addition, on June 15, 2022, PRASA completed the issuance of its 2022 Senior Bonds in a total principal amount of $565.2M to refinance in the aggregate all of the Authority's 2012 Series A and B senior revenue bonds (2021/2022 Senior Bonds). The issuance of the 2021/2022 Senior Bonds results in a reduction in average annual senior debt service of $22M, total debt service savings to final maturity of approximately $569.7M or approximately $361.5M NPV savings, representing 20% of refunded par amount.

The Puerto Rico Public Finance Corporation (PFC) has an outstanding note, the proceeds of which were used to finance the construction of the North Coast Superaqueduct System (the "PFC Superaqueduct Note"), which is considered a CSO under the MAT, subordinate to the payment of Senior, Senior Subordinate and Subordinate Indebtedness and CGI debt. The PFC Superaqueduct Note is contractually payable "solely" from Commonwealth budgetary appropriations. Until 2006, the Commonwealth (directly or indirectly through budgetary appropriations) had made all debt service payments on the CGI and CSO, including the PFC Superaqueduct Note. In 2006, to help alleviate its budget constraints, the Commonwealth requested that PRASA, as part of its actions to restore its operations to financial self-sufficiency, recommence, in respect of the CGI and begin, in respect of the PFC Superaqueduct Note, to make debt service payments on said obligation during fiscal years where sufficient funds are available. The PFC Superaqueduct Note remains a limited obligation of PRASA, payable solely from appropriations made by the Government. As provided in the MAT, the obligation to make CSO payments is not cumulative and, therefore, does not carry forward to future periods, and failure to make the payments or required deposits related to this debt is not an event of default under the MAT.

On January 20, 2022, AAFAF, on behalf of PFC, entered into a Restructuring Support Agreement (the "PFC RSA") with holders of a majority of those certain Series 2011A, Series 2011B, and Series 2012A Commonwealth Appropriation Bonds (the "PFC Bonds"). The PFC RSA provides for the restructuring and discharging of the PFC Bonds under a Title VI Qualifying Modification (the "PFC Qualifying Modification"). The PFC RSA further provides that the Notes, including by the Authority, for the repayment of the PFC Bonds, will be canceled and extinguished under the PFC Qualifying Modification, and the Authority will be discharged from any liability arising from or related to such promissory notes.

On October 25, 2022, AAFAF, on behalf of the PFC and the Oversight Board, launched a solicitation of the PFC Qualifying Modification. On October 28, 2022, the Oversight Board, as the Title VI Administrative Supervisor, commenced a Title VI proceeding in the U.S. District Court for the District of Puerto Rico.

On December 30, 2022, the Court entered an order approving the PFC Qualifying Modification. On January 12, 2023, the PFC Qualifying Modification became effective. The PFC Bonds and Notes were thus discharged and extinguished. Therefore, PRASA does not hold any outstanding PFC debt or obligations.

A summary of PRASA's debt service obligations and projections for FY2023 and the forecast period are presented in Tables 8-15 and 8-16, respectively. FY2023 debt service obligations totaled $256.8M of Senior lien obligations.

Table 8-15 FY2023 Debt Service Obligations and Preliminary Results ($, Thousands)

Debt Category	FY2023 Obligations[1]	FY2023 Preliminary Results
Senior Debt	$246,834	$246,834
Senior Subordinated Debt	-	-
Subordinated Debt	-	-
Commonwealth Guaranteed Indebtedness (CGI)	-	-
Commonwealth Supported Obligations (CSO)[2]	-	-
Total	**$246,834**	**$246,834**

[1]Considers the full debt service obligations due in FY2023 per the amortization schedule.

[2] Considers no payment of CSO (PFC Superaqueduct-related debt, payable from Commonwealth appropriations). As provided in the MAT, the obligation to make CSO payments is not cumulative. It, therefore, does not carry forward to future periods, and failure to make the payments or required deposits related to this debt is not an event of default under the MAT. The PFC Bonds were canceled and extinguished under the PFC Qualifying Modification effective January 12, 2023. Therefore, PRASA was discharged from any liability arising from or related to such promissory notes.

Table 8-16 FY2024 - FY2028 Debt Service Obligations ($, Thousands)

Debt Category[1]	FY2024 Projection	FY2025 Projection	FY2026 Projection	FY2027 Projection	FY2028 Projection
Senior Debt	$246,834	$260,105	$268,660	$270,263	$272,940
Senior Subordinated Debt	-	-	-	-	-

Debt Category[1]	FY2024 Projection	FY2025 Projection	FY2026 Projection	FY2027 Projection	FY2028 Projection
Subordinated Debt	-	-	-	-	-
Commonwealth Guaranteed Indebtedness (CGI)	-	-	-	-	-
Commonwealth Supported Obligations (CSO)	-	-	-	-	-
Total Debt	**$248,834**	**$260,105**	**$268,660**	**$270,263**	**$272,940**

[1]Considers no payment of CSO (PFC Superaqueduct-related debt, payable from Commonwealth appropriations). As provided in the MAT, the obligation to make CSO payments is not cumulative. It, therefore, does not carry forward to future periods, and failure to make the payments or required deposits related to this debt is not an event of default under the MAT. The PFC Bonds were canceled and extinguished under the PFC Qualifying Modification effective January 12, 2023. Therefore, PRASA was discharged from any liability arising from or related to such promissory notes.

The DSC results presented in Table 8-17 for the forecast period have been calculated using the Rate Covenant requirements per the MAT, as amended, and debt service obligations.

Table 8-17 FY2023 - FY2028 Debt Service Coverage

Debt Service Level	DSC Requirement	FY2023 Preliminary DSC	FY2024 DSC	FY2025 DSC	FY2026 DSC	FY2027 DSC	FY2028 DSC
Senior Debt[1]	**2.50**	4.39	4.43	4.52	4.46	4.54	4.60
Senior Subordinated Debt[1]	**2.00**	4.39	4.43	4.52	4.46	4.54	4.60
Subordinated Debt[1]	**1.50**	4.39	4.43	4.52	4.46	4.54	4.60
All Obligations[2]	**1.00**	1.00	1.00	1.00	1.00	1.00	1.00

[1] DSC calculated for Operating Revenues.
[2] DSC calculated for Authority Revenues.

As shown in Table 8-17, PRASA's Operating Revenues and Authority Revenues are projected to be sufficient to meet Senior Lien debt service payments during the forecast period. Also, PRASA projects to meet the 1.0x DSC on All Obligations every year of the forecast period. The final DSC for FY2023 will be recalculated after the FY2023 Audited Financial Statements issuance to determine if PRASA could meet Rate Covenant Requirements.

8.6 Reserves and Other Deposits Requirements

8.6.1 Debt Service Reserve Funds

Following the MAT, as amended, Reserve Funds for Senior Debt, Senior Subordinate, and Subordinate Debt must be maintained in a reserve account at least equal to:

(i) The amount outlined in the Supplemental Agreement authorizing the issuance of a particular Series of Bonds or

(ii) If not otherwise specified in a Supplemental Agreement authorizing the issuance of a particular Series of Bonds, the lesser of:

- Maximum Annual Debt Service on the Outstanding Bonds secured by such Account, payable in any FY for the related Bonds.
- Ten percent (10%) of the proceeds of the Outstanding Bonds secured by such an Account, calculated following the Code.
- 125% of the average Annual Debt Service for the payment of the principal of and interest on the Outstanding Bonds secured by such Account.

Debt service costs include the required contributions to the debt service reserves created and funded with 2008 bond proceeds. Should future bond issuances include required reserves, PRASA plans to contribute the additional funds in each reserve with a portion of the bond issuance proceeds, as necessary.

8.6.2 Operating Reserve Fund

The Sixth Supplemental Agreement to the MAT was executed on April 19, 2016. Before the Sixth Supplemental Agreement, the MAT required that an Operating Reserve Fund be established for $150M until March 1, 2013, and thereafter:

(i) If there is a line of credit (LOC) on deposit in the reserve fund, the reserve shall mean for the term of the line of credit an amount equal to at least ninety (90) days of current expenses determined on the first day of the FY in which such line of credit is delivered or renewed as set forth in the annual budget for such FY; or

(ii) If the reserve fund is funded from revenues, the reserve shall mean an amount equal to not less than 90 days of current expenses determined annually based on the current expenses relating to the FY of such calculation as set forth in the annual budget for such FY.

The Sixth Supplemental Agreement to the MAT amended Section 5.10 (a) and (c) of the Operating Reserve Fund to read as follows:

(a) In each month, the Trustee shall deposit to the Operating Reserve Fund (i) beginning on the first Business Day of the month and after making the deposits required by Section 5.02 (b) (i) through (vii), an amount of the Authority Revenues equal to 1/60 of the amount, if any, necessary to restore the amount on deposit therein to the Operating Reserve Requirement and to pay interest on any reimbursement obligations due with respect to an Operating Reserve Facility. Earnings on moneys held in the Operating Reserve Fund shall be retained therein.

(b) In lieu of or in addition to cash or investments, at any time, the Authority may cause to be deposited to the credit of the Operating Reserve Fund, an Operating Reserve Facility, in the stated amount equal to all or a portion of the application Operating Reserve Requirement. Any withdrawals from the Operating Reserve Fund made in accordance with the above paragraph (b), shall be made first from any cash or investments on deposit therein and then to the extent no such cash or investments are available, from a draw on any Operating Reserve Facility.

PRASA had a loan agreement (the GDB Loan Agreement) with the Government Development Bank (GDB) under which the GDB provided a revolving line of credit to PRASA for $180M (previously $150M) that satisfied the balance

that PRASA is required to maintain in the Operating Reserve Fund under the MAT. Under the GDB Loan Agreement, this line of credit is payable from moneys on deposit in the Operating Reserve Fund (after making deposits to the Current Expenses Fund) or proceeds from additional indebtedness issued under the MAT. The maturity of such a line of credit was extended to June 30, 2018, contingent upon PRASA completing the 2015 Senior Bond issuance. Since bonds were not issued on or before August 31, 2015, the facility matured on June 30, 2016. Therefore, PRASA was required to fund the Operating Reserve Fund at its requirement from Operating Revenues following the flow of funds (as defined in the MAT) or obtain a new line of credit to satisfy the Operating Reserve Fund Requirement.

Per the Sixth Supplemental Agreement to the MAT, PRASA is cash funding the reserve and deposited $12.1M in the Operating Reserve Fund during FY2023. For FY2024, PRASA is projecting to deposit $5.8M in the Operating Reserve Fund to comply with the MAT requirement of 90 days of current expenses of such year. In future years, PRASA is projecting to deposit the required funds in the Operating Reserve Fund to align the balance with the increases in Operating Expenses, seeking to always maintain three months of current expenses in deposit.

8.6.3 Capital Improvement Fund

Following the MAT, a Capital Improvement Fund must be established and funded for each FY in an amount equal to the greater of:

(i) The amount set forth in the annual budget for such FY, or
(ii) The amount recommended by the Consulting Engineer.

Equal monthly deposits over the FY must be deposited to the Fund to make the balance of the Fund equal to the annual requirement. In addition, the following must be credited to the Fund:

(i) The proceeds of any condemnation awards,
(ii) The proceeds of insurance (other than use and occupancy insurance),
(iii) The proceeds of sales of property constituting a part of the Systems, and
(iv) The proceeds of any termination or similar payment received by PRASA under any interest rate swap or similar hedge agreement.

PRASA deposited $20.5M from Operating Revenues in the Capital Improvement Fund during FY2023 to finance a portion of its projected CIP. This deposit is net from the FEMA/ARPA proceeds and other restricted funds, and the PRASA FY2023 Fiscal Plan New Federal Funds initiative is estimated at $69.2M (excluding the costs related to such funds as they are already included as a part of the debt service) for FY2023.

In its FY2024 Annual Budget, PRASA projects to make deposits to the Capital Improvement Fund of $32.6M from Operating Revenues, net from FEMA/ARPA proceeds and net from the PRASA FY2023 Fiscal Plan New Federal Funds initiative estimated at $225.8M (excluding the costs related to such funds as they are already included as a part of the debt service).

From FY2025 through FY2028, PRASA projects to make deposits in the Capital Improvement Fund in the amounts of $15.3M, $56.0M, $79.7M, and $98.5M from Operating Revenues, net from the New Federal Funds initiative estimated at $227.3M, $95.4M, $60.6M, and $47.4M, respectively (excluding the costs related to such funds as they are already included as a part of the debt service).

8.6.4 Construction Fund

Following the MAT, a Construction Fund must be established and funded with the following deposits:

(i) the amounts required to be deposited under the resolution of the Board authorizing the issuance of particular Series of Bonds or the applicable Supplemental Agreement and,
(ii) any moneys of the Authority that may properly be deposited to the credit of said Fund, or the proceeds of any grants received from any source, to be used for the purpose of paying the Cost of Improvements.

PRASA has not included any deposits into the Construction Fund for the forecast period.

8.6.5 Commonwealth Payments Fund

The Commonwealth Payment Fund includes deposits related to CGI and CSO debt. As previously discussed, there is no outstanding CGI balance after the Federal Debt modification in July 2019 and the issuance of the 2020 Senior Bonds.

There is also no outstanding CSO balance since January 2023, when the PFC Bonds were canceled and extinguished under the PFC Qualifying Modification; therefore, the PRASA was discharged from any liability arising from or related to such promissory notes, and PRASA does not hold any outstanding PFC debt or obligations thereunder.

As no CGI or CSO debt is outstanding, PRASA projects no deposits for the Commonwealth Payment Fund.

8.6.6 Surplus Fund and Rate Stabilization Account

After all the deposits required by the MAT, as amended, have been accordingly made, any remaining moneys shall be deposited to the credit of the Surplus Fund, which includes the Rate Stabilization Account. Accordingly, the FY2023 projections include a $20M transfer to the Rate Stabilization Account, while the FY2024 Annual Budget does not include any transfers from or to the Rate Stabilization Account. The 2023 PRASA Fiscal Plan also includes transfers from the Rate Stabilization Account in the amounts of $20M and $8M in FY2025 and FY2026, respectively. Additionally, transfers to the Rate Stabilization Account of $5M and $13M are planned in FY2027 and FY2028, respectively.

8.7 Conclusions

PRASA's forecast (Exhibit 1) reflects the financial projections in the 2023 PRASA Fiscal Plan certified by the Oversight Board on May 26, 2023. With PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the forecast reflects a total surplus of $8.3M.

Operating Revenues are projected to be sufficient to meet Senior Lien debt service payments and meet Rate Covenant DSC requirements for Senior Lien Debt. Authority Revenues are projected to be sufficient every year of the forecast period to meet All Obligations per the MAT. Therefore, PRASA is projecting to meet its Rate Covenant requirement of 1.0x coverage of its current obligations throughout the forecast period. In meeting these requirements, PRASA must consider its rates' overall sustainability and affordability, given the overall economic situation affecting Puerto Rico and recent trends affecting customer consumption profiles.

The following events could have material negative effects on PRASA's forecast, which may negatively impact PRASA's financial situation in the future:

- Lower revenues or savings achieved, or timeliness of the 2023 PRASA Fiscal Plan initiatives.
- Lower funding than expected from FEMA proceeds and other projected federal funds.
- Higher energy costs because of higher consumption and/or higher PREPA/LUMA electric costs (per kWh).
- Higher than expected annual inflation rates.
- Higher than budgeted personnel costs related to salaries, benefits, and incentives to improve employee retention at PRASA.
- Higher construction costs due to the supply-demand situation of materials and equipment.
- Future natural disasters.
- Effects on the decrease in population projections.

The probability of PRASA meeting its forecast is conditioned on the following:

1. **PRASA's continuing ability to maintain its Service Revenues, billings, and collections in a challenging economic environment** – Further decline in non-residential consumption, uncertainty on the island's economic recovery, and continuing population shifts could cause further strain on PRASA's billings and collections.
2. **PRASA's ability to successfully implement its Fiscal Plan initiatives** – PRASA's 2023 Fiscal Plan includes certain revenue-enhancing and cost-reduction initiatives. Any changes to the funding, framework, and execution of these initiatives would significantly alter PRASA's projected financial results. Therefore, although PRASA has committed to implement some of the initiatives described in this Report, there is a possibility that the projected results and, more specifically, the timing of those results may not be achieved.

PRASA's ability to address operational needs while meeting its budgetary assumptions and goals – PRASA's System requires increased maintenance and repairs, additional operations staff, and other operational investments for general System upkeep. As a result, if the System needs exceed the levels assumed by PRASA in its forecast, expenses could be materially affected.

9 Conclusions

Based on our review, we offer the following statements and conclusions concerning PRASA’s financial and operational conditions.

9.1 PRASA’s Fiscal Situation

Puerto Rico's Government has grappled with notable economic and demographic hurdles in recent years, significantly affecting PRASA. Alongside the economic downturn in the region, PRASA, similar to other municipal water and wastewater utilities, confronts various pressing issues. These include challenges related to affordable service delivery, aging infrastructure, substantial non-revenue water NRW, compliance with regulatory mandates, susceptibility to climate change and natural disasters, declining population and water usage, workforce-related difficulties, and escalating requirements for capital investment and R&R.

Puerto Rico has endured adverse economic, infrastructural, and operational repercussions due to Hurricanes Irma and María in 2017, a sequence of earthquakes in 2019 and 2020, the COVID-19 pandemic, and Hurricane Fiona in 2022. PRASA's financial situation has shown signs of improvement, attributed to adopting diverse strategies. These encompass debt restructuring, measures to augment revenue, federal disaster recovery aid, and acquiring loans and grants from the SRF.

PRASA remains steadfast in its commitment to build upon prior achievements, especially in the system's condition, enhancing operational efficiencies and ensuring the timely and cost-effective execution of its CIP. These specific areas are anticipated to receive attention, utilizing anticipated federal funding inflows (combined with appropriate contributions from PRASA's internal resources). This funding is intended to cover the CIP necessities, fostering PRASA's objective to fortify its infrastructure and build more effective and resilient water and wastewater systems.

9.2 Staffing Optimization

In January 2022, PRASA evaluated labor capacity and productivity to determine the most efficient staffing levels. The assessment highlighted a requirement for 5,030 employees for optimal performance within PRASA. Considering the total headcount of 4,551 employees in FY2023, PRASA ideally needs to recruit an additional 479 employees. Below is a summary of PRASA's strategy to bridge this employee gap:

- Gradually recruit to cover positions vacated by employees reaching retirement age.
- Prioritize recruiting essential technical and operational roles, such as plant operators, electromechanics, and other critical operational personnel.
- Address staffing needs in Infrastructure, Customer Service, and Compliance, among others.
- Evaluate current pay scales across different employee groups to align with market rates and aim to reduce the high turnover experienced in recent years.

It is important to note that PRASA still struggles to fill vital operational positions in its Operations Department, including roles like plant operators, electromechanical staff, system maintenance staff, and meter readers. This scarcity results in overtime work, delayed repairs, or inadequately staffed services, impacting operational efficiency.

9.3 System Asset Condition

Arcadis conducted asset condition assessments for various WTP and WWTP facilities, aligned with FY2023, and examined a sample of associated auxiliary facilities. Between January and April 2023, Arcadis undertook assessments across PRASA's five Operational Regions, visiting 180 facilities. Among these, 80 were WTP and WWTP facilities. The evaluation involved a thorough visual inspection encompassing equipment, facility conditions, process controls, and an appraisal of regulatory compliance performance, operational and maintenance (O&M) practices, staffing, and training.

The gathered data reveals that 18% of the facilities inspected in FY2023 were classified as in Good condition, while 68% were deemed Adequate. Within the facilities rated Adequate, 26% (31 out of 119) scored below 2.0. Left unaddressed, these facilities have the potential to experience continued deterioration, possibly leading to a downgrade to Poor or Unacceptable ratings in the future.

Fourteen percent of the facilities are in the Unacceptable to Poor range. The major concern is the facilities' physical condition. However, PRASA expects to properly address several deficiencies highlighted by the projected inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) the System needs. In addition to the physical condition, the Staffing and Training criterion impacts the overall condition of the facilities. This criterion was mostly affected by the ongoing personnel turnover and the need for certified operators and other support staff for the treatment facilities.

Comparing the assessment results by asset category with those of the FY2023 condition assessment for treatment plants (WTPs and WWTPs), negative changes were observed for WTPs and WWTPs. Also, the overall rating for ancillary facilities increased to different degrees for Wells, WPS, WST, and WWPS.

Overall, the WTPs inspected are mostly in Adequate condition. To the extent that the physical structures and operational and process controls are maintained or improved, they are expected to continue to serve their intended purpose of providing potable water supply in compliance with applicable regulations. Compared to the FY2022 inspection results, all criteria scores decreased. The Equipment and Maintenance criteria rating scores have remained fairly constant for the past years; this can be attributed to the same equipment being out of service or deteriorating, as previously reported.

The WWTPs generally range from Poor to Adequate conditions in the overall rating. Out of the 23 facilities inspected, 10 (43%) received a Poor overall rating, and 13 (57%) received an Adequate rating. Five of those ten facilities had a Poor rating in terms of Equipment and Maintenance. Compared to the FY2022 inspection results, Regulatory Compliance scores decreased despite interim limits or monitoring only on certain parameters. The Operations and Process Control and Equipment and Maintenance scores decreased while the Staffing and Training criteria decreased. The facilities' physical condition is the main concern. Process Control is also challenging in some facilities, even though plant operators indicated that standard operating procedures SOPs and control strategies are followed. Also, PRASA must plan and make the necessary improvements to WWTPs and WTPs so that when the interim limits are lifted, the facilities can meet the permanent limits.

Regarding ancillary facilities, the facility criteria rating of wells, WPS, and WST increased significantly but remained at the Adequate. To the extent that the physical structures and operational and process controls are maintained or improved by CIP initiatives, the facilities are expected to continue to serve their intended purpose.

9.4 O&M Practices

Several WTP and WWTP facilities reported exceedances in compliance treatment parameters during the evaluation period and/or lacked the appropriate tools for the execution of appropriate O&M practices, including lack or outdated versions of O&M manuals, equipment manuals, Emergency Response Plans (ERPs), missing laboratory equipment and jar tests not being performed consistently, lack of working emergency generator units and deficient house/grounds keeping. Despite some operations and process control issues, the WTPs deliver potable water adequately. Various WWTPs face challenges due to process control or equipment issues.

In FY2023, chemicals-related expenses were one of the largest operating expenditures at nearly $70M. PRASA's efforts to reduce overall chemical costs include non-capital initiatives such as procurement strategies and better handling of chemical usage. However, rising costs associated with chemical production and the compliance requirements for water quality have effectively offset efforts to generate savings. The chemical cost increase is out of PRASA's control since supply and demand market factors drive it.

PRASA has a long road ahead to address challenges that have hindered and continue to affect O&M performance but hopes that important operational initiatives, including reducing NRW, improving meter and billing accuracy with the procurement of advanced metering solutions, and the influx of federal funds for the CIP implementation will allow for the much-needed improvements to the System.

PRASA should consider operational procedure improvements like standardization of processes and providing more tools and training to operators on process controls and actions to facilitate and improve plant operations and performance and optimize O&M expenses. Also, including new process control equipment and system automation would benefit PRASA, given that operators continue to depend on manual operation for several processes. There is also room for improvement concerning prioritization, scheduling, and execution of corrective and preventive maintenance activities for optimizing and strengthening the System.

9.5 Non-Revenue Water Reduction Program

Reducing NRW is a high-priority initiative for PRASA, as it will have both revenue enhancement and expense reduction impacts on finances. Therefore, PRASA has invested in different departments within PRASA to implement this initiative. The two main programs are Metering Optimization and the WRO.

To reduce commercial water losses and improve customer experience, PRASA has outlined three initiatives under the Customer Service Department. The initiatives include Efficiency and Customer Service Optimization, Commercial Water Loss Reduction, and AMI.

The WRO focuses on recovering physical losses throughout the water distribution system. In pursuing the vision of achieving long-term sustainability, PRASA included the reduction of NRW as one of the focus areas of the 2023 PRASA Fiscal Plan and has established three main programs for reducing physical losses to achieve a reduction of 64.1 MGD by FY2028. These programs are:

- Master Meters – Accurately measure water production by installing water meters at critical facilities.
- Pressure Management – Incorporating pressure management best practices across the transmission and distribution network.
- Leak Detection and Reduction – Improving identification, prioritization, and resolution of major leaks across PRASA assets.

PRASA will continue with the NRW Reduction Program and is in the process of selecting the proponents who will participate in the pilot phase of the AMI project. Concurrently with the pilot phase, PRASA plans to have a separate bid for the installation of both the water meters and AMI infrastructure island-wide.

9.6 Capital Improvement Program and Regulatory Compliance

PRASA has engaged the services of four PMCs to support its Infrastructure Department in the planning, design, permitting, procurement, construction, and management of the CIP projects in each of the five Regions. As of March 31, 2023, PRASA had 224 active projects in the CIP at different stages for a total investment of $4,414M.

PRASA's six-year CIP for FY2023 through FY2028, as included in the 2023 PRASA Fiscal Plan, amounts to $6.55 billion. Reconstruction & Recovery, totaling 62% of the total CIP, increased by 87.6% compared to FY2022 to $2,157.8M and is the largest category in terms of dollars throughout this CIP period. Mandatory Compliance-driven projects are the second largest expense, with an annual average expenditure of $933.2M and a total of $559.5M. The Mitigation and Resiliency category is now the third largest expense, with an annual average expenditure of $79.5M and $476.8M (7.3% of the total CIP) over six years.

Compared to the 2022 PRASA Fiscal Plan six-year CIP ($3,454.9M), the 2023 PRASA Fiscal Plan CIP was increased by a total expenditure of $3,090.4M, an 89.5% increase. The difference is mainly attributed to the increase in Recovery and Reconstruction projects. Other categories increased as well. However, the FY2023 PRASA Fiscal Plan CIP did have some reductions in projects and expenditures for the Quality and Fleet and IT categories with annual average expenditures of $15M (1.4% of the total CIP and $10.1M (0.9% of the total CIP), respectively.

PRASA continues to work on the requirements of the Consent Decree with USEPA and the Settlement Agreement with PRDOH. In addition, it continues to consider the proposed modifications to said Consent Decree and Settlement Agreement between PRASA and regulatory agencies in its CIP.

While PRASA has begun to identify the potential impact of new regulations, the full impact of future regulations and other regulatory requirements on PRASA’s System is unknown. In some cases, future regulations and additional regulatory requirements are expected to require minor process changes and, in other cases, major capital improvements, such as the construction of new treatment processes and intensive repair programs. PRASA is vigilant of potential future regulations, such as the Lead and Copper Compliance Rule and the PFAS groups, that may impact the System and compliance requirements. Also, PRASA has experienced additional compliance challenges regarding NPDES permit limit requirements for WWTPs and STS discharges at the WTPs. Over the past years, the NPDES permit limits became more stringent for certain parameters such as total nitrogen, total phosphorous, and residual chlorine, among others. PRASA is currently performing investigations and analysis to explore feasible alternatives while continuing communication with regulatory agencies to achieve compliance in the future.

PRASA expects to address the deficiencies with the projected inflow of federal funds to cover (with appropriate contributions from PRASA’s internal funds) its System needs in addition to the funds available due to the debt restructuring initiative.

9.7 Insurance Program

PRASA's insurance program, including risk management, policies, and the OCIP, was reviewed to determine if it is appropriate for the System. Several key recommendations for PRASA's insurance program are provided below and recommended they be implemented promptly.

1. The insurable values stated in the policy program are the same as in 2013 based on the cost appraisal performed by Malcolm Pirnie in 2006. Therefore, factors like PRASA's CIP, inflation, acquisitions, etc., have not been considered for at least 16 years. It is strongly recommended that PRASA undertake a new valorization of its assets.
2. Current PML estimates for PRASA for quantifying catastrophic risk exposures were performed in 2010 by AIR Worldwide Corporation based on a valorization study from 2006. Since then, modules, maps, and projections have changed, and new modules might prove economically beneficial to PRASA. This study will provide PRASA and its stakeholders with a scientific report representing the maximum foreseeable loss from catastrophic events, considering various scenarios in terms of intensity and return periods, corroborating if the current limits of insurance carried are adequate or if adjustments shall be made. This analysis may assist PRASA in complying with FEMA's insurance requirements. It is strongly recommended that PRASA undertake a new PML study, which should be performed after a new valorization of PRASA's assets is conducted since any changes in the values of all insurable assets will affect the outcome of this study.
3. Once the new valorization of PRASA assets and PML study are completed, PRASA will be better positioned to determine if its current insurance limits and deductibles are adequate.
4. It is recommended that a loss control assessment plan be set in place to inspect the WTPs and WWTPs periodically.

PRASA should implement these recommendations to expand coverage and transfer additional risks through its insurance program. To the extent that PRASA adopts these recommendations, premium costs may increase, and these additional costs should be considered in future financial forecasts.

9.8 Financial Analysis

PRASA's forecast reflects the financial projections included in the 2023 PRASA Fiscal Plan certified by the Oversight Board on May 26, 2023. With PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the forecast reflects a total surplus of $8.3M.

Operating Revenues are projected to be sufficient to meet Senior Lien debt service payments and meet Rate Covenant DSC requirements for Senior Lien Debt. Authority Revenues are projected to be sufficient in every year of the forecast period to meet All Obligations per the MAT, which include the payment of the CGI and CSO debt service obligations in full. Therefore, PRASA is projecting to meet its Rate Covenant requirement of 1.0x coverage of its current obligations throughout the forecast period.

The probability of PRASA meeting its forecast is conditioned on the following:

- PRASA's sustained capacity to uphold its Service Revenues, billing, and collection processes faces challenges in the current economic climate. Persistent decreases in non-residential consumption, uncertainty surrounding the island's economic recovery, and ongoing population shifts could amplify pressure on PRASA's billing and collection operations.

- PRASA's successful execution of its Fiscal Plan initiatives is contingent upon certain revenue-boosting and cost-cutting measures outlined in its 2023 plan. Any alterations to these initiatives' funding, structure, or implementation would markedly impact PRASA's anticipated financial outcomes. While PRASA has pledged to implement several initiatives detailed in this report, there remains a possibility that the projected outcomes, particularly their timing, might not be attained.
- PRASA's capability to fulfill operational requirements within its budgetary assumptions and objectives is crucial. The system demands heightened maintenance, repairs, an expanded operations workforce, and other investments for its overall maintenance. Consequently, should the system's necessities surpass the levels anticipated by PRASA in its projections, expenses could be substantially impacted.

Arcadis has relied on certain assumptions and information provided by PRASA regarding the conditions that may exist or future events to develop the conclusions included in this section. Arcadis believes the information and assumptions are reasonable but has not independently verified information provided by PRASA and others. Therefore, to the extent that actual future conditions differ from those assumed in this report or provided by others, the actual results will vary from those forecasts.

Arcadis has not determined the validity and enforceability of any contracts, agreements, existing laws, rules, or regulations applicable to PRASA and its operations. For this report, Arcadis has assumed that all such contracts, agreements, laws, rules, and regulations will be fully enforceable following their terms.

Exhibit 1

Financial Forecast FY 2023-2028

EXHIBIT 1

	PRASA FINANCIAL FORECAST PRO FORMA[a] ($, Thousands)	FY2023 PRELIMINARY [b]	FY2024 ANNUAL BUDGET	FY2025 PROJECTION	FY2026 PROJECTION	FY2027 PROJECTION	FY2028 PROJECTION
	OPERATING REVENUES						
1.	Service Revenues (Base Fee and Service Charges, Net of Subsidies) [c]	$1,098,183	$1,102,826	$1,099,060	$1,095,112	$1,092,570	$1,089,195
2.	Transfer from / (to) Rate Stabilization Account	(20,000)	-	20,000	8,000	(5,000)	(13,000)
3.	Other Income (Miscelaneous/Special Assessments)	5,300	4,500	4,500	4,500	4,500	4,500
4.	Fiscal Plan - Revenue Enhancing Initiatives [d]	-	19,932	51,074	91,864	133,772	174,629
5.	**Total Operating Revenues [Sum Lines 1-4]**	**$1,083,483**	**$1,127,258**	**$1,174,634**	**$1,199,476**	**$1,225,842**	**$1,255,324**
	ADDITIONAL REVENUES						
6.	Transfer from Budgetary Reserve Fund	0	0	0	0	0	0
7.	General Fund Grants/Appropriations/Contributions	0	0	0	0	0	0
8.	Reimbursements to the Authority Revenues	0	0	0	0	0	0
9.	**Total Other Sources of Revenue [Sum Lines 7-9]**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
10.	**Total Authority Revenues [Line 5 + Line 9]**	**$1,083,483**	**$1,127,258**	**$1,174,634**	**$1,199,476**	**$1,225,842**	**$1,255,324**
	OPERATING EXPENSES						
11.	Payroll and Benefits	$338,385	$335,386	$347,051	$351,166	$353,517	$361,405
12.	Electric Power	$176,970	$202,504	230,069	215,125	218,546	224,745
13.	Maintenance and Repair	$62,543	$61,318	62,157	62,982	63,817	64,700
14.	Chemicals	$69,851	$73,406	74,410	75,398	76,398	77,454
15.	Insurance	$21,576	$24,879	25,219	25,554	25,892	26,250
16.	Other Expenses	$170,263	$178,568	179,996	182,384	184,805	187,360
17.	Fiscal Plan - Cost Saving Initiatives [e]	-	(2,441)	(7,403)	(10,095)	(21,745)	(34,565)
18.	Capitalized Operating Expenses	(22,263)	(23,129)	(24,610)	(24,368)	(24,333)	(24,498)
19.	**Total Operating Expenses [Sum Lines 11-18]**	**$817,325**	**$850,491**	**$886,888**	**$878,145**	**$876,896**	**$882,850**
	ADDITIONAL EXPENSES						
20.	Expected FEMA Reimbursements[f]	(15,034)	(17,000)	0	0	0	0
21.	**Total Additional Expenses [Line 20]**	**-$15,034**	**($17,000)**	**$0**	**$0**	**$0**	**$0**
22.	**Total Operating Expenses [Line 19 + Line 21]**	**$802,291**	**$833,491**	**$886,888**	**$878,145**	**$876,896**	**$882,850**
	DEPOSITS						
23.	Deposit to the Senior Bond Fund	$246,834	$254,336	$260,105	$268,660	$270,263	$272,940
24.	Deposit to the Senior Debt Service Reserve Fund	0	0	0	0	0	0
25.	Deposit to the Senior Subordinate Bond Fund	0	0	0	0	0	0
26.	Deposit to the Senior Subordinate Debt Service Reserve Fund	0	0	0	0	0	0
27.	Deposit to the Subordinate Bond Fund	0	0	0	0	0	0
28.	Deposit to the Subordinate Debt Service Reserve Fund	0	0	0	0	0	0
29.	Deposit to the Current Expense Fund	0	0	0	0	0	0
30.	Deposit to the Operating Reserve Fund[g]	12,069	5,794	11,266	(4,403)	(2,508)	(704)
31.	Deposit to the Capital Improvement Fund (Net of Projected New Federal Funds and FEMA Reimbursement)	20,476	32,567	15,292	55,954	79,726	98,523
32.	Deposit to the Construction Fund	0	0	0	0	0	0
33.	Deposit to the Commonwealth Payments Fund	0	0	0	0	0	0
34.	Deposit to the Surplus Fund	0	0	0	0	0	0
	Deposit to the Rate Stabilization Account	0	0	0	0	0	0
35.	**Total Deposits, excluding existing deposits available in the Current Expense Fund [Sum Lines 23-28 and 30-34]**	**$279,379**	**$292,697**	**$286,662**	**$320,212**	**$347,482**	**$370,759**
36.	**Net Authority Revenues After Obligations and Deposits [Line10-Line 22-Line 35-Line 30]**	**$1,812**	**$1,070**	**$1,082**	**$1,119**	**$1,463**	**$1,714**
	DEBT SERVICE PAYMENTS DUE						
37.	Senior (S)[h]	$246,834	$254,336	$260,105	$268,660	$270,263	$272,940
38.	***DS Coverage Required = 2.50***	***4.39***	***4.43***	***4.52***	***4.46***	***4.54***	***4.60***
39.	Senior Subordinated (SSUB)	0	0	0	0	0	0
40.	***DS Coverage Required = 2.00***	***4.39***	***4.43***	***4.52***	***4.46***	***4.54***	***4.60***
41.	Subordinated (SUB)	0	0	0	0	0	0
42.	***DS Coverage Required = 1.50***	***4.39***	***4.43***	***4.52***	***4.46***	***4.54***	***4.60***
43.	Commonwealth Guranteed Indebtedness (CGI)	0	0	0	0	0	0
44.	Commonwealth Supported Obligations (CSO)	0	0	0	0	0	0
45.	Debt Not Covered Under the MAT	0	0	0	0	0	0
46.	**Total Debt Service Including Debt Not Covered Under the MAT, Net of Existing Deposits**	**$246,834**	**$254,336**	**$260,105**	**$268,660**	**$270,263**	**$272,940**
47.	***DS Coverage on All Obligations (Coverage Required = 1.00)***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***	***1.00***

[a] Numbers may not add up due to rounding.

[b] Based on projected results as presented in PRASA's May 26th, 2023 Fiscal Plan.

[c] Includes additional revenues from implemented rate increases FY 2018-2023.

[d] Projected additional revenues from initiatives included in 2023 PRASA Fiscal Plan.

[e] Projected operating and capital expense reductions from initiatives included in Fiscal Plan: reduction of physical water loss, and electricity cost reduction. Excludes New Financing for CIP initiative (included in line 31).

[f] FEMA funding reimbursement of operating expenses. FEMA funds shall be deposited to the credit of the Current Expense Fund as they are used to reimburse PRASA for Current Expenses.

[g] Including the impact on overhead from operating expense reduction initiatives.

[h] Includes expected future debt service for SRF and RD loans.

Appendix A

Ongoing and Future Initiatives and Projects by Operational Region

Appendix. A

Ongoing and Future Initiatives and Projects by Operational Region

Region	Initiatives and Projects	Description
West	Optimization Initiatives	• Collection system rehabilitation. • Measure the volume of leaks and repairs in the Aguadilla Operational Area. • Replacement of larger pumps with smaller ones. • Optimization of WTPs was performed through the evaluation and measurement of water production. • Elimination of WPSs at strategic locations to alleviate high pressures in the distribution system. • Project for chemicals optimization and reduction, especially for chlorine and bisulfite application.
	Water Compliance Actions to Meet DBPs Limits	• Betances Water System DBPs exceedances were normalized and continuously monitored to ensure maintained compliance. • Improvements to WTPs and distribution systems to minimize DBPs.
	Non-Revenue Water	• Projects related to pipeline replacement, identification, and repairs of water main leaks. • 98% installation of flow meters in the distribution at the WTPs. • Very limited staff to perform pressure tests throughout the distribution system.
	Acquisition of Vehicle Fleet	• Continue efforts for fleet acquisition to increase fleet availability.
	Projects	• Mayagüez Submarine Outfall - Repair of pipeline break to address violations to the discharge permit. • Rehabilitation of Aguadilla (Montaña) WTP and dredging of two water sources (lakes) are in the construction phase. • Rehabilitation and expansion of Culebrinas WTP is in the pre-construction phase. • Projects in the pre-construction phase include: - Improvements to the intake and pumping of the Río Añasco River; - Improvements at the Aguada WWTP; - Improvements at the Mayagüez WWTP; - Rehabilitation of the Lajas WWTPs (CIP 5-31-5031), including corrosion control; - Rehabilitation of the Monte del Estado WTP and the raw water intake; - Rehabilitation of the Las Marías WWTP; - Rehabilitation of the Maricao WTPs; - Rehabilitation of the Ponce de León WTPs; and - Rehabilitation of the Miradero WTPs. • Projects in the construction phase include: - Installation of the 3.5 MGD floating raw water intake for Guajataca WTP.

Region	Initiatives and Projects	Description
Metro	Optimization Initiatives	• Completed a replacement of eight valves in the Santurce area. • Inspections of all WSTs (119 actives) and WPS to identify and calculate water losses to establish a work plan for repair as applicable are ongoing. • Data collection of all WPS packing to develop a prioritization work plan for repairs.
	Water Compliance Actions to Meet DBPs Limits	• Continues the system's flushing program and tank clean-up initiative. • Tanks oscillation and potential tank elimination to reduce retention time. • Application of chemicals in raw water sources to reduce organics. • An aerator was installed in the Talanco 1 WST in Trujillo Alto. It is pending the completion of the electrical capacity increase project to put in service.
	Non-Revenue Water	• Implementation of surface scan technology to identify areas with potential leaks to allocate resources efficiently. • Continues measuring the flow of distribution system flushing procedures. • Valves identification and marking as part of the pressure management initiative. • Reduce water losses in water transfers to other regions by installing flow meters at these locations. • Continues the verification of WSTs with the potential of overflowing.
	Acquisition of Vehicle Fleet	• Acquisition of new flushing trucks is expected by December 2023. • Continue efforts to acquire additional vehicles for field crews.
	SSOMP – Sewer System Operation & Maintenance Program	• Ongoing activities for sewer reconnaissance and pipeline cleaning, identification of defects, and identification of illegal connections. • Ongoing repair of pipelines to control and prevent future overflows. • Continue with SSOMP program activities as required by the Consent Decree.
	Energy Consumption Reduction Program	• Continues performing pump adjustments, reducing time in operation, and using smart systems in several areas, which reduces consumption. • Completed a repair of an 8" drain valve in the sedimentation tank at Sergio Cuevas WTP, resulting in energy conservation for the region. • Completed the replacement of gas chlorine for liquid disinfection system for all systems as planned. • Continues to evaluate the elimination of WTPs, WWTPs, and WPSs and replacing vertical pumps with variable frequency drives to reduce energy consumption.

Region	Initiatives and Projects	Description
	Projects	• Rehabilitation of the Enrique Ortega WTP and STS project was awarded for construction. • Projects in the pre-construction phase include: - Rehabilitation of the Sergio Cuevas WTP; - Rehabilitation of the Guaynabo WTP and improvements to the Santa Rosa Intake; - Rehabilitation of the Carolina WWTP; - Improvements to the Puerto Nuevo WWTP; and - Degritters for the Puerto Nuevo WWTP. • A significant number of emergency projects are dedicated to the replacement of sewer lines.
North	Optimization Initiatives	• Continues installing telemetry systems to integrate more facilities into the remote visualization system. • Continues with the segmentation of pressure control areas. • The goal was to measure the flow of 167 flushing points in 18 municipalities.
	Water Compliance Actions to Meet DBPs Limits	• Continues with tanks' oscillation to reduce water age. • Increase flushing frequency at Manatí and Corozal distribution tanks. • Eliminating several WSTs, pressure management plan, and elimination/reduction of pre-chlorine injection. • Reroute water lines to improve water quality and reduce DBPs. • Continues plan for optimization and compliance improvements.
	Optimization/Energy Consumption Reduction Initiatives	• Installation of the timer at the Nevarez well. • Installation of timers on blowers at WTPs equipment. • Evaluation of a new WPS for water transfer from Enrique Ortega WTP to Toa Alta, Naranjito, and Corozal areas, eliminating the path through Bayamón. • Evaluation of a new WPS in the Palacios WST that could eliminate the Winche WST and Contorno WPS. • Construction of a new WTP located at Barrio Nuevo PR-167 near "Sector Mulita" that could eliminate Achiote I WPS, Achiote II WPS, Caserío WPS, El Cerro WPS, and the service area of Lomas del Viento WPS. • Future elimination of the Río Arriba WTP.
	Pipe Repairs and Water Loss Mitigation	• Continues aggressive plans to replace or repair pipelines. • Initiatives for pressure management include reducing the use of wells by switching several wells to standby mode and installing pressure regulators in the Manatí Operational Area. • Zones created based on pressure, capacity, and water demand significantly reduced main breaks. • Continues the installation of water meters.
	Sanitary Overflow Prevention Initiative	• Future project to address the infiltration of saline water into Islote trunk sewer, CSWOs, and collapsed pipe segments in Manatí trunk sewer.

Region	Initiatives and Projects	Description
	Projects	• Rehabilitation of the Quebrada WTP (LT2 compliance) was completed in FY2023. • Projects in the pre-construction phase include: - Morovis distribution system improvements; - Rehabilitation of the Quebradillas WTP and raw water intake improvements; - Rehabilitation of the Cubuy WTP; - Rehabilitation of the Jayuya Urbano WTP; - Rehabilitation of the Lares Nueva Espino WTP; - Rehabilitation of the Morovis Urbano WTP; - Rehabilitation of the Naranjito WTP; - Rehabilitation of the Mameyes Utuado WTP; - Rehabilitation of the Santa Isabel WTP and raw water intake; and - Rehabilitation of the Barceloneta WWTP. • Projects in the construction phase include: - Corozal Urbana CT/distribution termination tank; - Rehabilitation of the Morovis Sur WTP and the raw water intake improvements; - Rehabilitation of the Hatillo-Camuy intake, pipeline, and WTP; and - New Dorado trunk sewer and pretreatment improvements. • The rehabilitation of the Boquilla and Cruz Rosa wells is in the planning phase. • Construction of two water wells for Sabana Grande (Utuado), two for the Santa Isabel Water System, and two for the Pozas Water System (a total of six wells). • Evaluating the feasibility of a new 20 MGD WTP at Arecibo, the “Super Planta”. • Evaluation of a new well to support Indiera Alta customers. • Installation of new pipelines for Bayaney and Quebrada areas. • Rehabilitation of existing infrastructure in the Quebrada area and construction of new water infrastructure near PR-129 street. • Installation of new pipelines of large diameter at the Tierras Nuevas System in Manatí. • Quebrada Arenas in Toa Alta and WPS improvements. • Improvements to Vega Baja water Wells (Monserrate, Pugnado 1 & 2) are in the bidding process. • The elimination of the Toa Alta, Vega Alta, Vega Baja, and Dorado WWTPs is in the planning phase.

Region	Initiatives and Projects	Description
South	Optimization of Operations	• The Salinas Aquifer Restoration is no longer an emergency. After Hurricane Fiona and significant rainfall, aquifer levels increased dramatically. • Baramaya WPS is operating for approximately 9 hours, which is a decrease in running time. • Evaluation and relocation of some STSs NPDES discharges flow into the Peñuelas Wastewater System. • Evaluation of the elimination of Ponce Nueva WTP discharge through a connection with the Ponce Wastewater System. • Continue transitioning to chlorine solution in several systems. • Evaluation of different polymers to adjust dosing to reduce chemical consumption. • Continues installation of pressure control. • Continues installation of telemetry at wells.
	Water Compliance Actions to Meet DBPs Limits	• Elimination of pre- and post-chlorine injection points. • Increased tank sedimentation cleaning frequency from semi-annual to three times per year. • Monitoring sampling points at water distribution systems with higher DBP indicators to reduce non-compliance. • Continues with tanks' oscillation to reduce water age. • Ongoing WTPs optimization program. • Weekly staff training and refreshers in compliance topics and equipment.
	Non-Revenue Water Recovery	• Flush water metering at fire hydrants was implemented in Yauco and Ponce Operational Areas. The rest of the areas will begin this initiative in the future. • Identification and repairs of hidden leaks. • Installation of water meters at PRASA's facilities. • Continue to perform operational adjustments and install pressure gauges on strategic locations throughout the distribution system. • Installation of regulators and sustaining valves for operational adjustments. • Visualization and monitoring of tank overflows utilizing the SCADA system. • Patillas Urbano is currently under a pressure management area evaluation. This improvement could result in approximate water savings of 172,000 gpd.
	Acquisition of Vehicle Fleet	• Continue efforts for vehicle acquisition/rental, especially heavy equipment. Only a few vehicles were received during FY2023, including pickup trucks, pipe layers (*tuberas*), boom trucks, and semi-trucks. • The Operational Areas of Ponce and Coamo have rented dump trucks. • Active contracts for all operational areas for lightweight mechanics.
	Pipeline Ruptures and SSOs Control	• Validation of leak/overflow claims is ongoing. • Relocation of the Guayama WTP raw water pipeline and raw water transfer of 600 gpm to Carite to reduce pressure and energy consumption in the system. • Installation of pressure control, pressure regulator valves, and replacement of float valves. • Replacing digital pressure gauges in Yauco and Ponce operational areas, areas most prone to line breaks.

Region	Initiatives and Projects	Description
	Energy Consumption Reduction Initiatives	• Hydraulic modeling study intended to eliminate pump stations in the Ponce Operational Area. • Facilities lighting replacement to LED. • Installation of timer on blowers at package WWTPs to reduce operations at night. • Elimination of a WPS in Monte Pelao in Guánica. The regulators' valves were installed. • Continues identification and installation of timers (783KW energetic savings). The first target is the Baramaya pumps, which are 700 hp each.
	Projects	• Projects in the construction phase include: - Rehabilitation of the sanitary trunk sewer from Salinas to Guayama; - Improvements at the Guayama WWTP; - The Yauco WWTP improvements, including the aeration system and repairs to the clarification process; and - Improvements at the Jaguas Ceiba Building (Earthquakes). • Projects in the pre-construction phase include: - The elimination of the Ponce Vieja WTP; - Improvements at the Coto Laurel WTP; - The rehabilitation of the Santa Isabel WWTP; - The rehabilitation of the Ponce WWTP; - The rehabilitation of the Guilarte WTP; - The rehabilitation of the Jaguas Pasto WTP; - The elimination of the Maunabo WWTP and the new Maunabo-Patillas trunk sewer; - Improvements at the Peñuelas WWTP; - Rehabilitation of the Malpaso WTP LT2; - Rehabilitation of the Ponce WWTP; - Elimination of the Apeadero WTP and improvements to the distribution of Aceitunas WTP; - Rehabilitation of the Jagueyes (Villalba) WTP; - Rehabilitation of the Río Prieto WTP; and - Rehabilitation of the Toa Vaca Dam. • Improvements at the Ponce Nueva WTP started in July 2023. • Improvements at the Vertedero Well. • Increase the capacity of Guaraguao, Río Prieto, and Matrullas WTPs. • Replacement of the degritter at Guánica WWTP. • Construction of the Bauta Tunnel. • The Guayama penstock is in the design phase. • Design of the new WTP for Salinas is expected to begin in 2024.

Region	Initiatives and Projects	Description
East*	Projects	The following projects are in the construction phase: • The Central Laboratory reached substantial completion. • Emergency Generators - Phase 2. • Dredging of Lago Loíza (Carraizo). • Tank Rehabilitation Phase 1. • Ceiba Norte and Gurabo Abajo Juncos Sanitary Sewer System Improvements. • Rehabilitation of the Caguas Trunk Sewer. • Cerro Gordo WTP STS Improvements. • Improvements to Las Piedras collection system at PR-9922. The following includes a summary of projects in the Planning, Design, and Bidding phases: • Relocation of the 12” water distribution water main is the bidding process. • Rehabilitation of the Cubuy WTP and intake are in the planning phase. • Rehabilitation of the Río Blanco WTP and Caguas Norte are in the design phase. • Rehabilitation of the Comerío and Caguas WWTPs and Humacao WTP are in the planning phase.

*****Despite efforts to coordinate the meeting with the East Region, it did not take place; therefore, the updates for this region are limited. The updates included in this table summarize projects included in the CIP region.

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