ARCADIS

PUERTO RICO
AQUEDUCT AND
SEWER AUTHORITY


# Fiscal Year 2022 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority

## Final Report

September 2022

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.

# Fiscal Year 2022 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority

**Final Report**

September 2022

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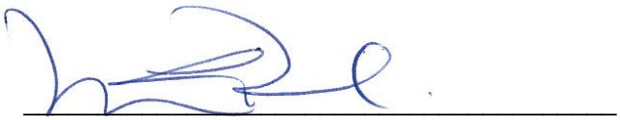

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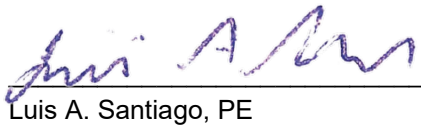

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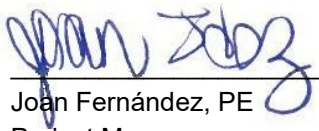

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# Exhibits

**Exhibit 1. Financial Forecast FY 2022-2027**

# Acronyms and Abbreviations

| | |
|---|---|
| ABT | Additional Bonds Test |
| AAFAF | Puerto Rico Fiscal Agency and Financial Advisory Authority (Spanish Acronym) |
| ACA | Asset Condition Assessment |
| ADSEF | Office of Administration for the Families Socioeconomic Development (Spanish Acronym) |
| AMI | Automatic Meter Reading and/or Advanced Metering Infrastructure |
| ARPA | American Rescue Plan Act |
| ASSMCA | *Administración de Servicios de Salud y Contra la Adicción* |
| AOP | All Other Perils |
| ASG | General Services Administration of Puerto Rico (Spanish Acronym) |
| AWWA | American Water Works Association |
| BNR | Biological Nutrients Removal |
| BOD | Biological Oxygen Demand |
| BPR | Biannual Progress Report |
| CAGR | Compound Annual Growth Rate |
| CARES Act | Coronavirus Aid, Relief, and Economic Security Act |
| CIAPR | College of Engineers and Land Surveyors of Puerto Rico (Spanish Acronym) |
| CBA | Collective Bargaining Agreement |
| CCL | Contaminant Candidate List |
| CCT | Chlorine Contact Time |
| CCP | Corrosion Control Program |
| CDBG-DR | Community Development Block Grant – Disaster Recovery |
| CER | Consulting Engineer’s Report |
| CGI | Commonwealth Guaranteed Indebtedness |
| 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 |
| DSC | Debt Service Coverage |
| DWO | Dry Weather Overflow |
| DWSRF | Drinking Water State Revolving Fund |
| EAP | Emergency Action Plan |
| E&O | Errors and Omissions |
| ECRC | Environmental Compliance and Regulatory Charge |
| EGU | Emergency Generator Unit |
| EMT | Executive Management Team |
| EPL | Excess Employment Practices Liability |
| EQ | Earthquake |
| EQB | Environmental Quality Board |
| 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 |
| FTE | Full-Time Employee |
| FOG | Fats, Oil and Grease |
| FOMB | Fiscal, Oversight, and Management Board |
| 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 |
| LIHWAP | Low-Income Household Drinking Water and Wastewater Assistance Program |
| LCR | Lead and Copper Rule |
| 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 |
| NFMP | Non-Federal Match Program |
| NPDES | National Pollutant Discharge Elimination System |
| NPW | Non-Potable Water |
| NPV | Net Present Value |
| NRW | Non-Revenue Water |
| OCIP | Owner Controlled Insurance Program |
| OMB | Puerto Rico Office of Management and Budget |
| OSHA | Occupational Safety and Health Administration |
| P3 | Public-Private Partnership |

| | |
|---|---|
| PAE | *Programa de Ayuda al Empleado* |
| PCS | Process Control System |
| PE | Professional Engineer |
| PFAS | Per-and Polyfluoroalkyl Substances |
| PFA RSA | Restructuring Support Agreement |
| 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 |
| PPP | Public and Private Projects |
| 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 |
| RD | Rural Development |
| RFP | Request for Proposal |
| R&R | Renewal and Replacement |
| RWI | Raw Water Intakes |
| RWPS | Raw Water Pump Station |
| RWWTP | Regional Wastewater Treatment Plant |
| SAIH | Automated Hydrant Inspection System (Spanish Acronym) |
| 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 Funds |
| 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 |
| UCMR5 | Fifth Unregulated Contaminant Monitoring Rule |
| UIA-AAA | *Unión Independiente Auténtica de la Autoridad de Acueductos y Alcantarillados* |
| U.S. | United States |
| USDA | U.S. Department of Agriculture |
| 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) 2022 Certified Fiscal Plan dated May 20, 2022 (2022 PRASA Fiscal Plan), PRASA's FY2023 Annual Budget approved by the Oversight Board on June 30, 2022.*

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# Executive Summary

## E.1. Introduction

The Puerto Rico Aqueduct and Sewer Authority (PRASA) is a public utility responsible for the production and distribution of potable water and the collection, treatment, and disposal of a large portion of domestic and industrial pretreated wastewater in Puerto Rico. PRASA serves approximately 3.2 million residents and millions of visitors annually. PRASA owns many assets, including land, buildings, dams, wells, water, 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 FY2022 (2022 CER or the "Report") in compliance with the MAT. PRASA's fiscal year begins on July 1st and ends on June 30th. Therefore, FY2021 is the fiscal year from July 1, 2021, through June 30, 2022.

## E.2. PRASA's Fiscal Situation

Over the past several years, the Government of Puerto Rico has faced significant economic, demographic, and severe weather 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 is facing several significant challenges, including service affordability, aging infrastructure, high volume of non-revenue water (NRW), regulatory mandates, and increasing renewal and replacement (R&R) needs. Puerto Rico was also impacted by Hurricanes Irma and María in 2017, a series of earthquakes in 2020, and the COVID-19 pandemic.

On May 25, 2016, the United States (U.S.) Congress enacted the Puerto Rico Oversight, Management, and Economic Stability Act, also known as PROMESA. PROMESA addresses Puerto Rico's debt by establishing an oversight board, a process for restructuring debt, and expedited procedures for approving critical infrastructure projects. The Oversight Board established under this Act oversees the development of budgets and fiscal plans for Puerto Rico's Central Government and its instrumentalities, 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 20, 2022, the FOMB certified PRASA's Fiscal Plan, according to Section 201(d)(2) of PROMESA (2022 PRASA Fiscal Plan). The 2022 PRASA Fiscal Plan has been developed to promote 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 operational sustainability objectives are achieved, PRASA will be well-positioned 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 2022 PRASA Fiscal Plan provides for its Capital Improvement Program (CIP) to cover six years from FY2022 to FY2027 (the six-year CIP) and further provides RASA's six-year forecast covering preliminary results for FY2022 and projections for FY2023 through FY2027 (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) program 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 $214 million between FY2018 and FY2022.
    b. Termination of existing Commonwealth guarantees for 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 $26 million granted under the Agreements of 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 $13 million, and total debt service savings to final maturity of approximately $348.2 million. In August 2021, PRASA issued its 2021 Senior Bonds in a total principal amount of $1,089.8 million, and in June 2022, completed the issuance of its 2022 Senior Bonds in a total principal amount of $565.2 million 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 $22 million, and total debt service savings to final maturity of approximately $569.7 million. After the Federal Debt modification in July 2019 and the issuance of the 2020 Senior Bonds, no Commonwealth Guaranteed Indebtedness remains outstanding.
3. Rate Adjustments: On July 1, 2022, PRASA implemented a new rate structure and charges, simplifying its rate to only two charges – base charge and a consumption charge. The new rate is expected to increase by 4.95% in base charge revenues and 2% in consumption charge revenues. The updated rates also incorporate an annual increase for subsequent years of at least 2% but not more than 5% annually, up to a limit of 30% cumulative.
4. Energy Management: PRASA plans to access federal or other sources of funding to implement additional projects that could provide renewable energy and realize cost savings. In addition, PRASA plans to implement non-capital investment measures to improve water conservation and also evaluate additional alternative energy processes such as waste to energy, liquefied natural gas, liquefied propane gas, and biogas.
5. Recovery from 2017 Hurricanes and 2020 Earthquakes: As a result of the 2017 Hurricanes, PRASA made the execution of the CIP projects a priority and was able to secure federal funding under the Federal Emergency Management Agency (FEMA) Accelerated Award Strategy (FAASt) for the reconstruction and recovery of PRASA's System. Similar to the 2017 Hurricanes aftermath approach, PRASA made the execution of the CIP projects of the 2020 Earthquakes a priority and received federal funding to address the infrastructure damages.

6. COVID-19 Pandemic and American Rescue Plan Act: In March 2022, PRASA recommenced the implementation of the disconnection process for overdue accounts that do not have a payment plan. On March 2021, the United States President approved the American Rescue Plan Act (ARPA) to provide additional relief in response to the COVID-19 pandemic impacts. A total of $195 million in ARPA funds were assigned to PRASA to address infrastructure projects. On September 2021, PRASA received $7.5 million to pay essential employees and comply with applicable guidelines. This program is known as Premium Pay. In addition, on December 2021, PRASA received $65 million for infrastructure projects; and in February 2022, an additional $130 million was allocated for the Caño Martín Peña Program.

Table ES-1 includes a summary of the identified, obligated, and received funds as of April 2022.

*Table ES-1 Federal Funding Summary for Disaster Recovery and Resilience (As of April 2022, $ in millions)*[1]

| Fund Name | Program | Funding Source | Identified Amount | Obligated/Approved | Received |
|---|---|---|---|---|---|
| Reconstruction & Recovery | Emergency Work (Category A&B) | FEMA (PA) | $207.1 | $207.1 | $185.7 |
| | Permanent Work (FAAst, Section 428) | FEMA (PA) | $3,662.7 | $3,662.7 | $16.1 |
| | Disaster Related Hazard Mitigation | FEMA (406) | $319.6 | - | - |
| | Non-Disaster Related Hazard Mitigation (HMGP) | FEMA (404) | $1,163.7 | $3.4 | - |
| | CDBG-DR (Non-Federal Match Program) | HUD | $406.9 | $200.0 | $1.2 |
| | RD – Harvey, Irma, and María Grant | RD | $24.7 | $24.7 | $19.4 |
| | **Hurricane Recovery Funds** | | **$5,784.6** | **$4,097.9** | **$222.4** |
| COVID-19 Relief Funds | Cares Act | OMB | $2.1 | $2.1 | $1.4 |
| | Infrastructure Projects (Naranjito, Santa Rita, etc.) | ARPA | $79.9 | $65.4 | - |
| | Caño Martín Peña | ARPA | $130.0 | $130.0 | - |
| | Premium Pay | ARPA | $7.5 | $7.5 | $7.50 |
| | LIHWAP | ARPA/CAA | $5.0 | - | - |
| | ERAP – Emergency Rental Assistance | HUD | TBD | $12.2 | $12.2 |
| | Mortgage Assistance Program | HFA | TBD | - | - |
| | **Total Coronavirus Relief Funds** | | **$224.6** | **$217.3** | **$21.1** |
| Infrastructure Funds | CWSRF | USEPA | $195.0 | $195.0 | $40.5 |
| | DWSRF | USEPA | $46.0 | $46.0 | $18.4 |
| | RD – Rural Utility Services (ULOs) | RD | $22.0 | - | - |
| | CDBG-DR Electrical Power Systems | HUD | $63.3 | - | - |
| | **Total Funds for Infrastructure Projects** | | $326.3 | $241.1 | $58.9 |
| | | | | | |

[1] Source: 2022 PRASA Fiscal Plan

# 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 and labor relations, customer service, purchasing and logistics, and information technology. Figure ES-1 shows PRASA's current organization.

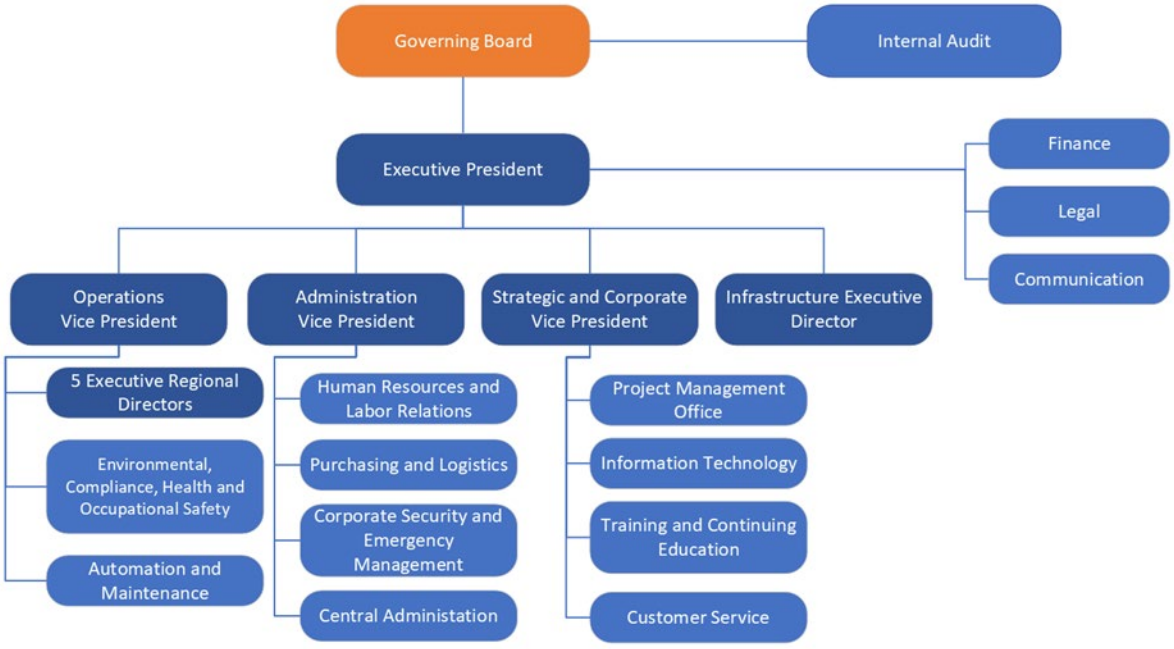



*Figure ES-1 PRASA's current Legislated and Executive Management Structure*

Key PRASA leadership includes its Executive President, Strategic and Corporate Planning Vice-President, Operations Vice-President, Administration Vice-President, Infrastructure Executive Director, and the five Regional Executive Directors and Department Directors. PRASA's key EMT staff and current roles during FY2022 are Eng. Doriel Pagan (Executive President), Eng. Damaris Santini Martinez (Operations Vice-President), Eng. Arnaldo Jimenez (Strategic and Corporate Planning Vice-President), Keralia Moreda, Esq. (Administration Vice-President), Omar Rivera Colon (Executive Director of Finance), Eng. Joel Lugo Rosa (Interim Executive Director for Infrastructure), Eng. Roberto Martinez (Executive Director Metro Region), Eng. Jose Rivera (Interim Executive Director North Region), Eng. Bruce Leon Ng (Interim Executive Director South Region), Eng. Enrique Rosario (Interim Executive Director East Region), and Eng. Erick Rosa Lugo (Interim Executive Director West Region).

At the end of FY2022, PRASA had a total headcount of 4,604 employees, including 254 employees under the Voluntary Pre-Retirement Program. Staff decreased by 1.4% from FY2021 to FY2022, including a reduction of four HIEPAAA employees and 44 management employees. Based on the total number of active FTE employees for FY2022 (4,350), the ratio of service accounts (counting the water service and sanitary sewer service for the same client as two separate accounts) to employees was 470, representing an increase of 1.8% compared to FY2021, which was 462. 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 FY2022; the Authority's total headcount was 4604. PRASA continues to struggle to fill key

staffing needs in the Operations Department (i.e. operators for treatment facilities, system maintenance, and 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 FY2022 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, 2021, through December 31, 2021. The inspections for the dams were performed in February 2022. The facility inspections for WTPs, WWTPs, and ancillary facilities were performed between March 2022 and July 2022. Additional information can be found in the FY2022 Asset Condition Assessment (ACA) Report. The facilities were rated as Good, Adequate, Poor or Unacceptable.

A total of 184 facility inspections were performed out of the 3,940 facilities that comprise the System, excluding 137 active RWIs and 75 RWPSs. Inspected facilities include eight dams, 48 WTPs, 24 WWTPs, 20 Wells, 33 WPSs, 31 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 | 8 | 100 |
| Water Treatment Plants | 112 | 48 | 43 |
| Wastewater Treatment Plants | 51 | 24 | 47 |
| Wells | 238 | 20 | 8 |
| Water Pump Stations | 1,136 | 33 | 3 |
| Water Storage Tanks | 1,564 | 31 | 2 |
| Wastewater Pump Stations | 831 | 20 | 2 |
| **Total** | **3,940** | **184** | **5** |

[1] Data obtained from PRASA Geographical Information System (GIS) updated in June 2022. The total excludes 137 active RWIs and 75 RWPSs.

As was the case in 2020, four dams (Río de La Plata, Cidra, Isabela, and Las Curías) received an overall rating of Poor, and four dams received an overall rating of Adequate. No dam received a combined rating of Good. inspections. Overall, there was a decrease in ratings on indicators on all dams due to the lack of improvements to address deficiencies noted in the previous inspections.

Three of the inspected WTPs, Lares Nueva (Espino) WTP, Aceitunas WTP, and Toa Vaca WTP, were rated as Good, and the rest were rated Adequate with an overall average rating score of 2.3. However, even though 94% of the WTPs were classified as Adequate, one of the 48 WTPs, Ceiba Sur WTP, received a low-end rating of Adequate that could deteriorate to a Poor rating if not attended.

A total of 24 WWTPs (47% 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 1.6. Eight (33% of the visited

facilities) WWTPs were rated as Poor, and 16 (67%) WWTPs were rated as Adequate in the overall rating. However, seven of the 16 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), Vega Alta (North Region), Morovis (North Region), Culebra (East Region), Guayanilla (South Region), Comerío (East Region), Yauco (South Region), Unibón (North Region), Santa Isabel (South Region), Naranjito (North Region), Adjuntas (South Region), Aguadilla (West Region), Vieques (East Region), Vega Baja (North Region), Mayagüez (West Region), Maricao (West Region), Cayey (East Region), and Patillas (East Region).

A total of 20 wells (equivalent to 8% of total wells) from the Operational Areas of Arecibo, Manatí, Toa Alta, Manatí, Cayey, Humacao, Coamo, Guayama, Aguadilla, and San Germán were inspected in FY2022. Out of the 20 wells inspected, four received a rating of Poor, two were rated Good, and the remainder were rated Adequate under the overall rating criteria.

A total of 33 above-ground WPSs (3% of total WPSs) were inspected. Six (18% of inspected WPSs) facilities were rated as Unacceptable under this category which includes: Mariana III, from the Humacao Operational Area; Cerro Gordo 1 and Peña 2, both from the Bayamón Operational Area; La 22 and La 15, both from the San Germán Operational, and Arrayanes 2, from the Carolina Operational Area; Area. In addition, six (18% of inspected WPSs) facilities were rated as Poor under this category which includes: Mariana II and Mariana IV, both from Humacao Operational Area; Bermejales 1, from Coamo Operational Area; Piedras Blancas (Amigos Unidos), from Aguadilla Operational Area; La Torre, from Cayey Operational Area; and Carruzos 4, from Carolina Operational Area.

A total of 20 WWPSs were inspected in FY2022. Out of the 20 WWPSs inspected, 13 (65%) received an Adequate overall rating, seven (35%) 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.

A total of 31 WSTs were inspected in FY2022. Emphasizing the facility-specific criterion, the WSTs rating distribution for this evaluation is as follows: two (7% of inspected WSTs) WSTs were rated as Unacceptable, 15 (48% of inspected WSTs) were rated as Adequate, and 14 (45% of inspected WSTs) were rated as Good.

In FY2022, of the total 519 MGD produced, approximately 339 MGD was Non-Revenue Water (NRW), a decrease in NRW over FY2021 results (368 MGD). Of this amount of NRW, 328 MGD was due to water losses (both apparent and real), and 11.15 MGD was due to unbilled authorized consumption. Of the total water losses in FY2022, approximately 49.60 MGD was due to apparent (commercial) losses, while approximately 278.72 MGD was due to real (physical) losses. According to the FY2022 PRASA Fiscal Plan, PRASA’s goal is to reduce water losses by 54 MGD by FY2027 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 losses 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 2022 PRASA Fiscal Plan.

Because of the size, complexity, and current condition 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.

# 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 FY2022 asset condition assessment effort previously described. 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.

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 FY2022 O&M expenses preliminary projection for the water and wastewater system (combined) is approximately $741 million, of which $683 million are directly related to the O&M of the System. The remainder of $58 million is related to commercial activities and provision of customer services, including but not limited to staffing and operation of customer service offices islandwide; meter reading; connection and disconnection services; invoice preparation, printing, and distribution; and customer service call centers, among others. PRASA estimates that during FY2022, approximately 73% of its System's O&M budget ($498 million) was allocated to the water system and the remaining 27% ($185 million) to the wastewater system.

In FY2022, chemical-related expenses were one of the largest operating expenditures at nearly $60 million. 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.

Below is a brief description and status of additional programs and initiatives that PRASA continued to work on in FY2022 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. They have

implemented various strategies, but to implement a full asset management program, they need to contract a consultant to assist them in developing the framework and its implementation.

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 Waster 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. In FY2022, PRASA contracted a consultant to prepare the next Master Plan update to create the roadmap for the future 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 and the 2020 Earthquakes as part of the CIP objectives.

PRASA has engaged the services of four Program Management Consultants (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 the end of the third quarter of FY2022, PRASA had over 266 active projects in the CIP at different stages for a total investment of $2,951 million, as shown in Table ES-3.

*Table ES-3 Active CIP Projects by Stage*

| Stage | No. of Projects | Estimated Investment ($, million) | Percentage (%) |
|---|---|---|---|
| Planning/To be Assigned | 134 | $1,792 | 61 |
| Design | 29 | $507 | 17 |
| Building/Contracting | 37 | $441 | 15 |
| Construction | 26 | $211 | 7 |
| **Total** | **226** | **$2,951** | **100** |

As of April 2022, the major projects under construction include the Caguas Laboratory, the Dorado and Salinas/Guayama trunk sewers, and the Ponce WTP improvements. In addition, the main projects under design or bidding phases include meter replacement, Carraízo dredging, Enrique Ortega WTP rehabilitation, Guayama WWTP rehabilitation, Culebrinas WTP rehabilitation, Los Angeles liner project, and the completion of the Valenciano WTP.

Compared to the 2021 PRASA Fiscal Plan six-year CIP ($2,866.1 million), the 2022 PRASA Fiscal Plan CIP was increased by a total expenditure of $588.8 million, a 20.5% increase. The difference is mainly attributed to the

increase in Recovery and Reconstruction and Mandatory/Non-Mandatory Compliance projects. Other categories increased as well. However, the FY2022 PRASA Fiscal Plan CIP did have some reductions in projects and expenditures for the Quality and Emergencies and Contingencies categories at $19 million (26%) and $38.5 million (88%), respectively. Table ES-4 shows the CIP money distribution for FY2022 through FY2027.

*Table ES-4 CIP FY2022-FY2027 by Category ($, Millions)*

| Project Category | Fiscal Year Ending June 30[1] | | | | | | 2022-2027 Total[1] |
|---|---|---|---|---|---|---|---|
| | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | |
| Reconstruction & Recovery | $61 | $274.2 | $633.5 | $661.4 | $369.0 | $158.7 | $2,157.8 |
| R&R | $58.9 | $55.2 | $54.3 | $55.2 | $54.8 | $51.5 | $329.8 |
| Compliance (Mandatory/Non-mandatory) | $66.3 | $146.0 | $164.4 | $112.9 | $65.6 | $34.3 | $589.6 |
| Quality | $19.4 | $38.7 | $27.8 | $3.2 | $1.7 | $1.5 | $92.3 |
| Meters and Electrical Generators | $18.3 | $26.6 | $2.0 | - | - | $5.5 | $52.3 |
| Fleet and IT | $9.8 | $23.4 | $10.0 | $7.0 | $7.0 | $8.0 | $65.3 |
| Emergencies and Contingencies | $- | $1.0 | $1.0 | $1.0 | $1.0 | $1.0 | $5.0 |
| Safety and Growth | $8.3 | $12.5 | $24.2 | $9.2 | $1.7 | $0.4 | $56.3 |
| Others | $10.8 | $28.4 | $24.2 | $19.7 | $16.2 | $7.4 | $106.6 |
| **Total** | **$252.6** | **$606.2** | **$941.3** | **$869.3** | **$517.0** | **$268.3** | **$3,454.9** |

[1] Numbers may not add due to rounding.

One of the main six-year CIP objectives is regulatory compliance with the existing 2015 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 the System 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) are currently working towards presenting in court a partial modification of the 2015 USEPA Consent Decree in court to address the effects of 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 PRASAs 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 more defined and NPDES permit limits tend to be more stringent, CIP modifications may be required to accommodate the resulting needs adequately. As a result, the CIP needs will require to be reprioritized, and implementation schedules will depend on PRASA's financial capacity.

# E.7. Insurance Program

Arcadis contracted Marsh Saldaña, Inc. (Marsh) to review PRASA's current insurance coverage and determine its adequacy considering the type and value of PRASA's fixed assets. The evaluation has been based solely on PRASA's copies of policies for the 2021-2022 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 undertakes a new valorization of its assets.
2. Marsh's 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, therefore, corroborating if the current limits of insurance carried are adequate or 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 in a better position 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.

# E.8. System Assets and Financial Analysis

Arcadis evaluated PRASA's financial forecast as included in the 2022 PRASA Fiscal Plan as certified by the Oversight Board on May 20, 2022, and assessed the appropriateness of rates and charges. Arcadis also reviewed the FY2023 Annual Budget certified and approved on June 9, 2022, by the FOMB to asses PRASA's financial condition, particularly as it relates to assessing PRASA's financial preliminary results for FY2022 and the reasonableness of PRASA's assumptions in the preparation of the five-year financial projections from FY2023-FY2027 (the forecast period) to assess the sufficiency of the revenues necessary to support the projected operations and capital costs.

During FY2022 a new rate structure was approved and included in the 2022 PRASA Fiscal Plan projections. Implementing the rate adjustments will enable PRASA to generate nearly $370 million in incremental revenues

between FY2023 to FY2027 and help meet its objectives of providing clean and reliable water and wastewater services.

On June 15, 2022, PRASA completed the issuance of its 2022 Senior Bonds in a total principal amount of $565.2 million to refinance in the aggregate of the 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 $22 million, total debt service savings to final maturity of approximately $569.7 million or approximately $361.5 million net present value (NPV) savings, representing 20% of the refunded par amount.

## Operating Revenues and Expenses

PRASA's annual Operating Revenue projections for FY2022 through FY2027, including the 2022 PRASA Fiscal Plan revenue-enhancing initiatives, presented on a cash basis in accordance with the MAT are summarized in Table ES-5.

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

| Fiscal Year | Operating Revenues |
|---|---|
| FY2022 Projection based on Preliminary Results | $1,056.4 |
| FY2023 Annual Budget[1] | $1,101.2 |
| FY2024 Projected | $1,106.5 |
| FY2025 Projected | $1,128.5 |
| FY2026 Projected | $1,158.0 |
| FY2027 Projected | $1,193.3 |

[1] As certified by the FOMB on June 9, 2022.

PRASA is not projecting any additional sources of revenue. Therefore, PRASA's Authority Revenues shall equal Operating Revenues for the forecast period from FY2022 through FY2027.

PRASA's Operating (Current) Expenses are presented on an accrual basis as required by the MAT. PRASA's preliminary Operational Expenses for FY2022 and operating expense projections for FY2023 to FY2027 net of (i) capitalized expenses, (ii) the 2022 PRASA Fiscal Plan expense reduction initiatives, and (iii) the September 2017 Hurricanes impact recoveries are presented in Table ES-6. In its FY2022 projections, PRASA includes a net deposit of $20 million from FEMA funds to the credit of the Current Expense Fund for the reimbursement of PRASA's operating expenses. No additional deposits are included in the periods from FY2023 through FY2027.

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

| Fiscal Year | Operating Expenses Without FEMA Reimbursements | Operating Expenses net of FEMA Reimbursements |
|---|---|---|
| FY2022 Preliminary | $758.9 | $738.9 |
| FY2023 Annual Budget | $818.9 | |
| FY2024 Projected | $822.3 | |

| Fiscal Year | Operating Expenses Without FEMA Reimbursements | Operating Expenses net of FEMA Reimbursements |
|---|---|---|
| FY2025 Projected | $833.3 | |
| FY2026 Projected | $838.1 | |
| FY2027 Projected | $853.4 | |

## Debt Service

Estimated debt service amounts include projected payments on the 2008, 2012, 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<br>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% thereafter | 2.0% |
| Payment Terms | Biannual principal only payment of $5 million in Years 1-10; biannual principal and interest payments of $13.7 million in Years 11-30 | Biannual principal and interest payments of $5 million in Years 1-10; increasing to $8.5 million 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 FY2022 and the forecast period are presented in Tables ES-8 and ES-9, respectively. FY2022 debt service obligations, including CSO debt, totaled $272.9 million of which $256.8 million were Senior lien obligations. As shown, PRASA did not make payments for CSO debt.

*Table ES-8 FY2022 Debt Service Obligations and Preliminary Results ($, Thousands)*

| Debt Category | FY2022 Obligations[1] | FY2022 Preliminary Results[2] |
|---|---|---|
| Senior Debt | $248,536 | $248,536 |

| Debt Category | FY2022 Obligations[1] | FY2022 Preliminary Results[2] |
|---|---|---|
| Senior Subordinated Debt | - | - |
| Subordinated Debt | - | - |
| Commonwealth Guaranteed Indebtedness (CGI) | - | - |
| Commonwealth Supported Obligations (CSO) | 8,999 | - |
| **Total** | **$257,535** | **$248,536** |

[1] Considers the full debt service obligations due in FY2022 per the amortization schedule.
[2] Considers no payment of CSO. 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 RSA further contemplates that those promissory notes that were issued to the order of the Puerto Rico Public Finance Corporation (PFC) by certain Commonwealth instrumentalities, including PRASA, for the repayment of the PFC Bonds will be canceled and extinguished under the PFC Qualifying Modification, and PRASA will be discharged from any liability arising from or related to such promissory notes. The PFC Qualifying Modification remains subject to various conditions including obtaining Court approval of the PFC Qualifying Modification, which is still pending.

*Table ES-9 FY2023-FY2027 Debt Service Obligations ($, Thousands)*

| Debt Category[1] | FY2023 Projection | FY2024 Projection | FY2025 Projection | FY2026 Projection | FY2027 Projection |
|---|---|---|---|---|---|
| Senior Debt | $254,376 | $263,200 | $264,700 | $268,200 | $267,700 |
| Senior Subordinated Debt | - | - | - | - | - |
| Subordinated Debt | - | - | - | - | - |
| Commonwealth Guaranteed Indebtedness (CGI) | - | - | - | - | - |
| Commonwealth Supported Obligations (CSO) | - | - | - | - | - |
| Total Debt | **$254,376** | **$263,200** | **$264,700** | **$268,200** | **$267,700** |

[1]Considers no payment of CSO or 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 RSA further contemplates that those promissory notes that were issued to the order of PFC by certain Commonwealth instrumentalities, including PRASA, for the repayment of the PFC Bonds will be canceled and extinguished under the PFC Qualifying Modification, and PRASA will be discharged from any liability arising from or related to such promissory notes. The PFC Qualifying Modification remains subject to various conditions, including obtaining Court approval of the PFC Qualifying Modification, which is still pending.

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. The FY2022 preliminary DSC results consider that PRASA will not pay the CSO debt which is not an event of default under the MAT.

*Table ES-10 FY2022 - FY2027 Debt Service Coverage*

| Debt Service Level | DSC Requirement | FY2022 Preliminary DSC | FY2023 DSC | FY2024 DSC | FY2025 DSC | FY2026 DSC | FY2027 DSC |
|---|---|---|---|---|---|---|---|
| Senior Debt[1] | **2.50** | 4.25 | 4.33 | 4.21 | 4.26 | 4.32 | 4.46 |
| Senior Subordinated Debt[1] | **2.00** | 4.25 | 4.33 | 4.21 | 4.26 | 4.32 | 4.46 |
| Subordinated Debt[1] | **1.50** | 4.25 | 4.33 | 4.21 | 4.26 | 4.32 | 4.46 |
| All Obligations[2] | **1.00** | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

[1] DSC calculated with respect to Operating Revenues.
[2] DSC calculated with respect to Authority Revenues.

## Reserves and Other Deposits Requirements

Per the Sixth Supplemental Agreement to the MAT, PRASA is cash funding the reserve and deposited $14.6 million in the Operating Reserve Fund during FY2022. For FY2023, PRASA is projecting to deposit $14.8 million 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.

PRASA deposited $54.2 million from Operating Revenues in the Capital Improvement Fund during FY2022 to finance a portion of its projected CIP. This deposit is net from the FEMA/ARPA proceeds and other restricted funds, and the PRASA FY2022 Fiscal Plan New Federal Funds initiative estimated at $69.2 million (excluding the costs related to such funds as they are already included as a part of the debt service) for FY2022. In its FY2023 Annual Budget, PRASA projects to make a deposit to the Capital Improvement Fund of $13 million from Operating Revenues, net from FEMA/ARPA proceeds and net from the PRASA FY2022 Fiscal Plan New Federal Funds initiative estimated at $182.7 million (excluding the costs related to such funds as they are already included as a part of the debt service). From FY2024 through FY2027, PRASA projects to make deposits in the Capital Improvement Fund in the amounts of $18.1 million, $26.1 million, $48.4 million, and $67.5 million from Operating Revenues, net from the PRASA FY2022 Fiscal Plan New Federal Funds initiative estimated at $178.1 million, $62.1 million, $16.0 million, and $29.8 million, respectively (excluding the costs related to such funds as they are already included as a part of the debt service).

# E.9. Conclusions

Over the past several years, the Government of Puerto Rico has faced significant economic, demographic, severe weather (Hurricanes in 2017 and earthquakes in 2020), and pandemic related-challenges that have adversely impacted PRASA. In addition to the economic downturn that has been experienced in Puerto Rico, PRASA is also facing several System challenges, including service affordability, aging infrastructure, high volume of NRW, regulatory mandates, and increasing 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 FY2022 total headcount of 4,604 employees, PRASA will ideally need to hire 426 additional employees. Note that PRASA continues to face challenges in filling critical operational staff needs in its Operations Department (i.e., plant operators, electromechanical staff, System maintenance staff, and meter readers), which results in overtime hours, delayed repairs, or understaffed/deficient services.

Arcadis performed asset condition assessments of a selection of WTP and WWTP facilities corresponding to FY2022 and a sample of ancillary facilities. Arcadis visited a total of 184 facilities throughout PRASA's five Operational Regions between February and July of 2022 to conduct a condition assessment of PRASA's facilities. Of the inspected facilities, 72 (39%) 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.

PRASA's eight regulated dam conditions are rated as Poor to Adequate. Many of the recommendations from the 2020 and prior inspections saw little or no progress, resulting in the overall depreciation of ratings across the board and on all of the inspected dams.

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 24 facilities inspected, eight (33%) received a Poor overall rating, and 16 (67%) received an Adequate rating. Regarding ancillary facilities, the facility criteria rating of wells, WPS, and WST increased but remained at the lower end of Adequate and, if left unattended, could continue to deteriorate. WWPSs facility criteria rating stayed the same rating (1.7).

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. 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 the end of the third quarter of FY2022, PRASA had over 266 active projects in the CIP at different stages for a total investment of $2,951 million.

PRASA's insurance program including risk management, policies, and the OCIP was reviewed to determine if is appropriate for the System. Several key recommendations for PRASA's insurance program were made and is recommended they get implemented in a timely manner.

PRASA’s forecast reflects the financial projections included in the 2022 PRASA Fiscal Plan certified by the Oversight Board on May 20, 2022. With PRASA’s projected additional revenues, cost savings, new federal funds, and proposed rate increases, the forecast reflects a total surplus of $0.8 million.

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 currently 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 3.2 million residents[1] and millions of visitors annually. PRASA is the only utility in Puerto Rico providing water and wastewater services to approximately 96% and 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 an area of 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 many more treatment facilities than most utilities serving 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 June 2022, PRASA owns and operates:

- Eight dams
- 112 Water Treatment plants (WTPs)
- 137 active Raw Water Intakes (RWIs)
- 51 Wastewater Treatment Plants (WWTPs)
- 238 water supply wells
- 1,136 Water Pump Stations (WPSs), of which 75 are Raw Water Pump Stations (RWPSs)
- 1,564 Water Storage Tanks (WSTs)
- 831 Wastewater Pump Stations (WWPSs)
- More than 21,000 miles of water and wastewater pipelines islandwide.

## 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

[1] Source: U.S. Census Bureau as of July 1, 2020.

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 which 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 FY2022 (2022 CER or the “Report”), which covers the FY starting on July 1, 2021, and ending on June 30, 2022.

## 1.3 Approach and Methodology

This section presents the approach and methodology used in the evaluation to achieve the goals of the CER and the organization of the Report.

- Section 2 PRASA’s Fiscal Situation: This section provides an overview of 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 FY2022.
- 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 2022 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 made to the System and assets that were retired in FY2022, 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 FY2022 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, demographic, and severe weather 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 is facing several significant challenges, including service affordability, aging infrastructure, high volume of non-revenue water (NRW), regulatory mandates, and increasing renewal and replacement (R&R) needs. Puerto Rico was also impacted by Hurricanes Irma and María in 2017, a series of earthquakes in 2020, and the COVID-19 pandemic. However, 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.

PRASA is committed to building on its past accomplishments, particularly in further improving its Systems condition, increasing operational efficiencies, and timely and on budget implementation of its CIP. These areas are expected to be properly addressed due to the 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 water and wastewater systems. The initiatives and challenges faced by PRASA during FY2022 are summarized in this section.

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

On May 2016, the United States Congress enacted the Puerto Rico Oversight, Management, and Economic Stability Act, also known as 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 20, 2022, the FOMB certified PRASA's Fiscal Plan, according to Section 201(d)(2) of PROMESA (2022 PRASA Fiscal Plan). The 2022 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 to provide the essential services to its customers.

For this Report, Arcadis used the certified 2022 PRASA Fiscal Plan as the official fiscal plan, which provides for its CIP to cover six years from FY2022 to FY2027 (the six-year CIP) as well as PRASA's six-year forecast covering preliminary results for FY2022 and projections for FY2023 through FY2027 (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 2022 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 State Revolving Funds (DWSRF and CWSRF) program and bonds or loans under the United States Department of Agriculture Rural Development (USDA RD) program. On July 2019, PRASA was able to modify the debt obligations under the SRF 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 between FY2021 and FY2031 and $214 million between FY2018 and FY2022.
- 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 $26 million granted under the Agreements of the SRF program.

## 2.4 2020 and 2021/2022 Refunding

PRASA issued its 2020 Senior Bonds in the principal amount of $1,370 million in December 2020 to refund a significant portion of its outstanding 2008 Senior Bonds and all of the 2008 Guaranteed Bonds. The issuance of the 2020 Senior Bonds resulted in a reduction in average annual senior debt service of $13 million, total debt service savings to final maturity of approximately $348.2 million or approximately $213.3 million 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 $1,089.8 million, and in June 2022, completed the issuance of its 2022 Senior Bonds in a total principal amount of $565.2 million 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 $22 million, total debt service savings to final maturity of approximately $569.7 million or approximately $361.5 million NPV savings, representing 20% of refunded par amount.

After the Federal Debt modification in July 2019 (Refer to Section 2.3) and the issuance of the 2020 Senior Bonds, no Commonwealth Guaranteed Indebtedness 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

On July 1, 2022, after following the process required by Act 21-1985, the PRASA implemented a new rate structure and charges, simplifying its rate to only two charges – base charge and a consumption charge. The new rate is expected to increase by 4.95% in base charge revenues and 2% in 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% but not more than 5% annually, up to a limit of 30% cumulative. Refer to Section 8.3 for additional details.

## 2.6 Energy Management

Since 2011, PRASA has been working on two initiatives at a regional level to reduce overall electrical consumption since electricity is a substantial operating expense. Since FY 2013, PRASA has implemented regional measures such as facility consolidations, minor repairs, operational optimization, and installation improvements to reduce electrical consumption. PRASA also 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).

PRASA plans to access federal or other sources of funding to implement additional projects that could provide renewable energy and realize cost savings. In addition, PRASA plans to implement non-capital investment measures to improve water conservation and also evaluate additional alternative energy processes such as waste to energy, liquefied natural gas, liquefied propane gas, and biogas.

## 2.7 2017 Hurricanes

In September 2017, Hurricanes Irma and María (2017 Hurricanes) struck the island causing massive devastation. Both hurricanes badly damaged the electric power infrastructure, which affected the water and sewer services to customers throughout the island and caused widespread damage to PRASA's infrastructure. In addition, the 2017 Hurricanes were the beginning of a decrease in revenue projections because of the population decline and water consumption.

As a result of the 2017 Hurricanes, PRASA made the execution of the CIP projects a priority and was able to secure federal funding under the Federal Emergency Management Agency (FEMA) Accelerated Award Strategy (FAASt) for the reconstruction and recovery of PRASA's System.

## 2.8 2020 Earthquakes

In January 2020, Puerto Rico was struck by a 6.4 magnitude earthquake that resulted in major damages to water and wastewater infrastructure, mainly in the southern portion of Puerto Rico, as well as power outages and water shortage issues islandwide. Per a preliminary assessment of the damages caused by the earthquake and subsequent aftershocks by the U.S. Geological Survey, the estimated economic impact of the damages islandwide totaled approximately $838M.

Similar to the 2017 Hurricanes aftermath approach, PRASA made the execution of the CIP projects a priority and received federal funding to address the infrastructure damages. Refer to Section 2.10 for additional information on the available funding for PRASA.

## 2.9 COVID-19 Pandemic and American Rescue Plan Act

Like the rest of the world, Puerto Rico was confronted with the COVID-19 global pandemic in late February 2020, which required immediate and urgent action. On April 9, 2020, the Government approved Act 39-2020, preventing PRASA from disconnecting residential customers' water services due to non-payment. On February 7, 2022, the Puerto Rico Department of Justice issued an opinion that concluded, as of July 1, 2021, the conditions permitting service disconnections under Act 39-2020 had been met. As a result, in March 2022, PRASA recommenced the implementation of the disconnection process for overdue accounts that do not have a payment plan.

On March 2021, the United States President approved the American Rescue Plan Act (ARPA) to provide additional relief in response to the COVID-19 pandemic impacts. ARPA allocated $350 billion to the states and territories to address revenue losses, increased expenses, and unforeseen budget-related issues caused by the pandemic. In addition, a total of $195 million in ARPA funds were assigned to PRASA to address infrastructure projects.

On September 2021, PRASA received $7.5 million to pay essential employees and comply with applicable guidelines. This program is known as Premium Pay. In addition, on December 2021, PRASA received $65 million for infrastructure projects; and in February 2022, an additional $130 million was allocated for the Caño Martín Peña Program.

Table 2-1 includes the projects funded by ARPA.

*Table 2-1 ARPA Funded Projects*

| Project Name | Allocation Date | Allocation Dollars (in Millions) |
|---|---|---|
| Naranjito WTP | December 2021 | $54.88 |
| Santa Rita Sanitary Sewer System Improvements | December 2021 | $6.37 |
| Ceiba Norte and Gurabo Abajo Juncos Sanitary Sewer System Improvements | December 2021 | $1.25 |
| La Piedra and Pasto Viejo Distribution System Improvements | December 2021 | $2.50 |
| Pajita Falcón Water Supply System Improvements | December 2021 | $0.44 |
| Caño Martín Peña Program | February 2022 | $130 |
| Repairs and Upgrades to the Wastewater Pump Station in Hacienda Las Lomas in Ceiba | October 2022 | $0.368 |
| | **Total ARPA Allocation** | **$195.81** |

ARPA also assigned funding for the Low-Income Household Drinking Water and Wastewater Assistance Program (LIHWAP). PRASA requested funding allocated to Puerto Rico for the benefit of qualifying low-income households' clients through the Office of Administration for the Families Socioeconomic Development (ADSEF by its acronym in Spanish). On February 1, 2022, ADSEF was notified that the LIHWAP State Plan for Puerto Rico was approved. PRASA expects to receive the funds in October 2022.

## 2.10 Federal Funds for Disaster Recovery and Resilience

In addition to the historical type of funding available (e.g., SRF and USDA RD), PRASA was able to secure funding for the recovery efforts related to the 2017 Hurricanes, the 2020 Earthquakes, and the COVID-19 pandemic. Table 2-2 includes a summary of the identified, obligated, and received funds as of April 2022, and a description of each program follows below.

*Table 2-2 Federal Funding Summary (As of April 2022, $ in millions)*[1]

| Fund Name | Program | Funding Source | Identified Amount | Obligated/Approved | Received |
|---|---|---|---|---|---|
| Reconstruction & Recovery | Emergency Work (Category A&B) | FEMA (PA) | $207.1 | $207.1 | $185.7 |
| | Permanent Work (FAAst, Section 428) | FEMA (PA) | $3,662.7 | $3,662.7 | $16.1 |
| | Disaster Related Hazard Mitigation | FEMA (406) | $319.6 | - | - |
| | Non-Disaster Related Hazard Mitigation (HMGP) | FEMA (404) | $1,163.7 | $3.4 | - |
| | CDBG-DR (Non-Federal Match Program) | HUD | $406.9 | $200.0 | $1.2 |
| | RD – Harvey, Irma, and María Grant | RD | $24.7 | $24.7 | $19.4 |
| | **Hurricane Recovery Funds** | | **$5,784.6** | **$4,097.9** | **$222.4** |
| COVID-19 Relief Funds | Cares Act | OMB | $2.1 | $2.1 | $1.4 |
| | Infrastructure Projects (Naranjito, Santa Rita, etc.) | ARPA | $79.9 | $65.4 | - |
| | Caño Martín Peña | ARPA | $130.0 | $130.0 | - |
| | Premium Pay | ARPA | $7.5 | $7.5 | $7.50 |
| | LIHWAP | ARPA/CAA | $5.0 | - | - |
| | ERAP – Emergency Rental Assistance | HUD | TBD | $12.2 | $12.2 |
| | Mortgage Assistance Program | HFA | TBD | - | - |
| | **Total Coronavirus Relief Funds** | | **$224.6** | **$217.3** | **$21.1** |
| Infrastructure Funds | CWSRF | USEPA | $195.0 | $195.0 | $40.5 |
| | DWSRF | USEPA | $46.0 | $46.0 | $18.4 |
| | RD – Rural Utility Services (ULOs) | RD | $22.0 | - | - |

| Fund Name | Program | Funding Source | Identified Amount | Obligated/Approved | Received |
|---|---|---|---|---|---|
| | 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: 2022 PRASA Fiscal Plan

## 2.10.1 Reconstruction & Recovery Programs

### 2.10.1.1 Emergency Work Program

FEMA can provide funding for Emergency Work after a disaster to help the island. It includes two categories: Category A for debris removal and Category B for emergency protective measures. PRASA identified $207.1 million for both categories and has received $185.7 million as of April 2022.

### 2.10.1.2 Permanent Work Program

PRASA receives reimbursement for permanent work through FEMA's Section 428 Alternative Procedures Program. Funding for permanent work applies to restoring facilities through repair or restoration to pre-disaster design, function, and capacity following codes or standards.

A total of $3.66 billion for infrastructure projects to rebuild the System from the devastation caused by the 2017 Hurricanes was awarded to PRASA. This amount has been agreed upon between all responsible parties, including PRASA, Central Office for Recovery, Reconstruction, and Resilience (COR3), and FEMA under the FAASt Initiative. However, this obligation of funds from FEMA does not constitute an authorization for construction, and each project must be submitted to FEMA for eligibility determination and formulation.

### 2.10.1.3 Disaster Related Hazard Mitigation (Section 406)

Section 406 provides funding for cost-effective measures that would reduce or eliminate the threat of future similar damage to a facility damaged during a disaster. The 406 funding provides discretionary authority to fund mitigation measures in conjunction with the repair of the disaster-damaged facilities and is limited to the eligible damaged facilities. Therefore, section 406 funds should be applied to work on the disaster-damaged facilities when the mitigation measure directly reduces the potential of a future similar disaster, and damages to the eligible facility.

### 2.10.1.4 Non-Disaster Related Hazard Mitigation (Section 404/HMGP)

Section 404 funds can mitigate undamaged parts of a facility or prevent or reduce damages caused by future disasters. Section 404 mitigation measures are funded under the Hazard Mitigation Grant Program (HMGP). Funds under the HMGP may be used with 406 mitigation funds to bring an entire facility to a higher level of disaster resistance when the current disaster event damaged only portions of the facility. PRASA has submitted five HMGP 404 applications with total requested assistance of $583.7 million.

#### 2.10.1.5 CDBG-DR (Non-Federal Match Program)

The Community Development Block Grant – Disaster Recovery (CDBG-DR) Program provides annual grants on a formula basis to develop viable urban communities by providing decent housing and a suitable living environment, and by expanding economic opportunities, principally for low- and moderate-income persons. The Puerto Rico Department of Health (PRDOH) is the designated grantee of the CDBG-DR funds. PRASA is the sub-recipient, meaning that funds are managed through the United States Department of Housing and Urban Development (HUD).

PRASA plans to meet its cost-share portion with CDBG-DR Program funds as they become available. Under the Non-Federal Match Program (NFMP), PRASA has $406.9 million in eligible costs from the FAASt obligation and additional costs from the Section 404 and 406 programs to cover the state match needs for funding under FEMA programs. Therefore, if these funds are unavailable, PRASA must identify alternate options to cover the required local cost share obligation. On September 2021, PRDOH and PRASA entered into an award agreement for $200 million under the CDBG-DR NFMP to fund the state match of the FAASt award.

#### 2.10.1.6 USDA RD Program

PRASA expects to acquire funds from the USDA RD program to assist with the financing of the CIP; this will include bonds and grants for the funding of water and wastewater projects in rural areas in Puerto Rico. Table 2-2 includes RD funds to reconstruct and recover from damages caused by hurricanes Harvey, Irma, and María for $24.7 million, and PRASA has received $19.4 million through April 2022.

### 2.10.2 COVID-19 Relief Funds

#### 2.10.2.1 CARES Act

The Coronavirus Aid, Relief, and Economic Security Act (CARES Act) established the Coronavirus Relief Fund and appropriated $150 billion. Under the law, the fund is to be used to make payments for specified uses to States and certain local governments, the District of Columbia, and U.S. Territories (consisting of the Government of Puerto Rico, the United States Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands); and Tribal governments. The CARES Act provides that payments from the fund may only be used to cover costs that:

5. Are necessary expenditures incurred due to the public health emergency concerning COVID–19.
6. Were not accounted for in the budget most recently approved as of March 27, 2020 (the date of enactment of the CARES Act) for the State or government.
7. Were incurred during the period that begins on March 1, 2020, and ends on December 30, 2020.

PRASA identified $2.1 million of funds under the CARES Act and has received $1.4 million through April 2022.

#### 2.10.2.2 Infrastructure Projects, Premium Pay and ARPA

Refer to Section 2.10 for additional information on the infrastructure projects, the Premium Pay, and the LIHWAP to be funded with ARPA.

#### 2.10.2.3 Emergency Rental Assistance Program

Even as the economy continues its recovery from the devastating impact of the pandemic, many faced deep rental debt, evictions, and the loss of basic housing security. Unfortunately, COVID-19 has exacerbated an affordable housing crisis that predated the pandemic and has deep disparities that threaten the strength of an economic recovery that must work for everyone.

To meet this need, the Emergency Rental Assistance Program (ERAP) makes funding available to assist households unable to pay rent or utilities. Two separate programs have been established: ERA1 provides up to $25 billion under the Consolidated Appropriations Act, 2021, which was enacted on December 27, 2020, and ERA2 provides up to $21.55 billion under the American Rescue Plan Act of 2021, which was enacted on March 11, 2021. The funds are provided directly to states, U.S. territories, and local governments. Grantees use the funds to assist eligible households through existing or newly created rental assistance programs. As of April 2022, PRASA received $12.2 million applied to outstanding balances for water and wastewater services of qualifying beneficiaries through the HUD.

### 2.10.3 Infrastructure Funds

#### 2.10.3.1 CWSFR and DWSRF

In addition to the funds obligated by FEMA, CDBG-DR, and ARPA, and after the modification of the federal debt (Refer to Section 2.3), PRASA expects to obtain additional financing for CIP from the CWSRF and DWSRF loans. This renewed access to SRF loans amounts to $195 million for CWSRF and $46 million for DWSRF, for a total of $241 million that will be used for water and wastewater projects. As of April 2022, PRASA has received $40.5 million in CWSRF loans and $18.4 million in DWSRF loans.

#### 2.10.3.2 Rural Utility Services

Through the USDA RD program, PRASA expected $22 million to improve water and wastewater services in rural areas in Puerto Rico.

#### 2.10.3.3 Electrical Power System

Under CDBG-DR Program, in June 2021, $2 billion were assigned for electric power system enhancements and improvements for Puerto Rico and the Virgin Islands. CDBG-DR funds for electrical power system improvements provide a unique, significant opportunity for Puerto Rico to carry out strategic and high-impact activities to address necessary expenses, mitigate disaster risks to their electrical power systems, and improve system reliability, resiliency, efficiency, and sustainability.

Most of these funds are expected to be assigned to the PREPA; however, PRASA requested $63.3 million from this program to finance equipment and installation for solar energy projects at 15 sites (approximately 45 million Kilowatt-Hour or kWh of generation capacity) which represents approximately 7% of its annual electricity consumption.

# 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 all institutional activities. Several departments offer support to the EMT, including finance, compliance, human resources, customer services, and information systems. Figure 3-2 shows PRASA's current organization.

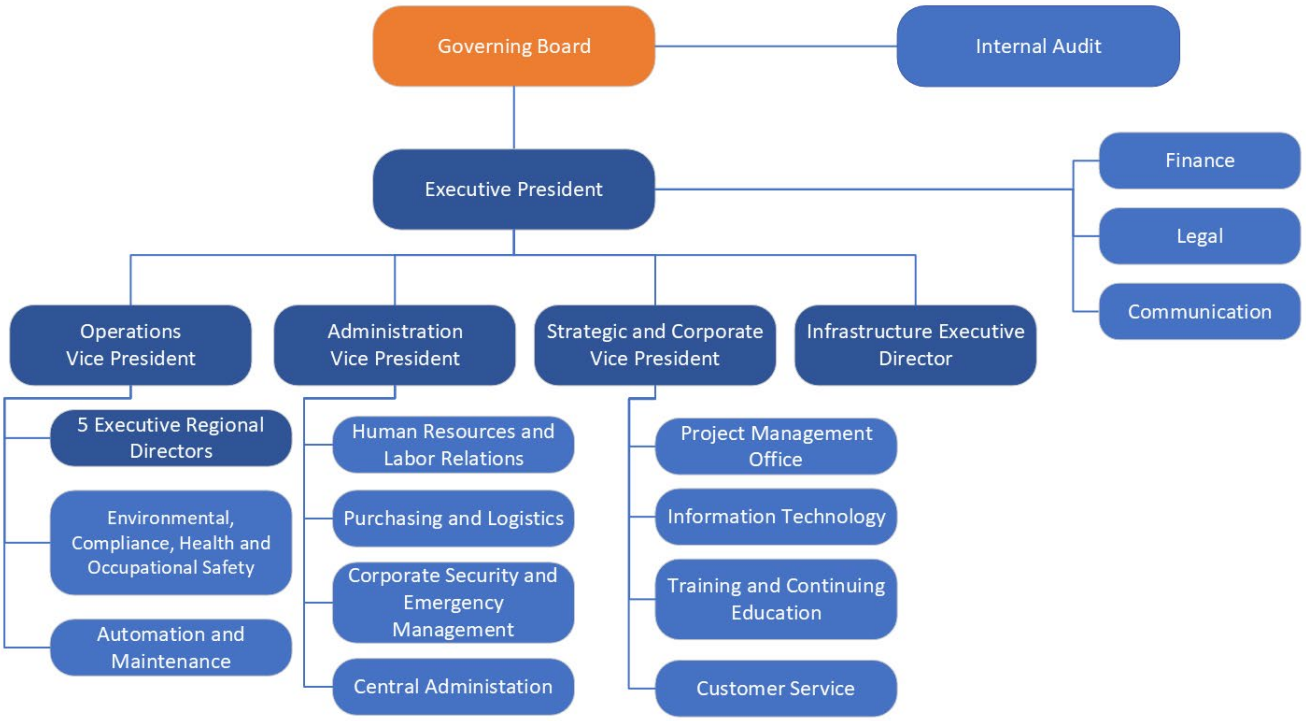



*Figure 3-2 PRASA's current Legislated and Executive Management Structure*

# 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:
  d. One engineer licensed to practice in Puerto Rico with ten years of experience.
  e. One authorized legal advisor with at least ten years of experience in Puerto Rico admitted to practicing in the Government.
  f. One member with broad knowledge and experience in the field of corporate finance.
  g. 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 the Authority's customers.
- Two ex-officio members, the Executive Director of the Association of Mayors, and the Executive Director of the Federation of Mayors.

*Table 3-1 PRASA's Governing Board Members (as of August 24, 2022)*

| Name | Board Position | Position Description | Term Ends |
|---|---|---|---|
| Héctor J. del Río Jiménez, Esq. | President | Independent Director/Finance | Pending[1] |
| Alberto Castañer Padró, Esq. | Vice-President | Independent Director/Legal | Pending[2] |
| Iván E. López Báez, PE | Director | Independent Director/Engineering | Pending[3] |
| 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 19, 2020[4] |

[1] Mr. del Río occupied the original appointment term from December 8, 2017, through November 20, 2021. He continues to serve uninterruptedly. He is currently pending consideration for confirmation from the Senate of Puerto Rico.
[2] 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.
[3] 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.
[4] 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 is allowed to continue his role in this position.

Except for the Consumer Representative, the AAFAF Representative, and the Executive Directors of the Association of Mayors and the Federation of Mayors, all other members of the Board are named by the acting Governor of Puerto Rico, with the advice and consent of the Senate of the Government of Puerto Rico.

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

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

PRASA's Governing Board is assisted by an Internal Audit Unit responsible for conducting internal audits for the Board and a Board Secretary, who maintains Board records, among other responsibilities.

### 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, 2022, including previous positions held and years of experience, is presented in Table 3-2.

*Table 3-2 PRASA's Executive Management Team (as of June 30, 2022)*

| Name | Current Role | Term Ends | Prior Role | Experience Total/Experience at PRASA |
|---|---|---|---|---|
| Eng. Doriel Pagán | Executive President | February 2025 | Operations Vice-President | 32 years/30 years |
| Eng. Damaris Santini Martínez | Operations Vice-President | Indefinite[2] | Interim Executive Director South Region | 25 years/15 years |
| Eng. Arnaldo Jiménez | Strategic and Corporate Planning Vice-President | Indefinite[2] | Executive Advisor, Presidency | 23 years/20 years |
| Keralia Moreda, Esq. | Administration Vice-President | Indefinite[2] | Private Sector | 16 years/4 year |
| Omar Rivera Rolón | Executive Director of Finance | Indefinite[2] | PRASA Treasurer | 24 years/15 years |
| Eng. Joel Lugo Rosa | Interim Executive Director for Infrastructure[1] | Indefinite[2] | Interim Executive Director West Region | 23 years/23 years |
| Eng. Roberto Martínez | Executive Director Metro Region[1] | Indefinite[2] | Deputy Executive Director Metro Region | 34 years/28 years |
| Eng. José Rivera | Interim Executive Director North Region[1] | Indefinite[2] | Toa Alta Area Director | 24 years/22 years |
| Eng. Bruce León Ng | Interim Executive Director South Region[1] | Indefinite[2] | Deputy Executive Director South Region | 27 years/16 years |
| Eng. Enrique Rosario | Interim Executive Director East Region[1] | Indefinite[2] | Deputy Executive Director East Region | 24 years/14 years |
| Eng. Erick Rosa Lugo | Interim Executive Director West Region[1] | Indefinite[2] | Deputy Executive Director West Region | 23 years/10 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 FY2022 regarding its organization and changes in leadership and management: Eng. Damaris Santini Martínez was appointed as Operations Vice-President in replacement of

engineer Luis González Delgado, who was designated as the East Region Sub-Director during FY2022, and Bruce León Ng was named Interim Executive Director of the South Region.

### 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 FY2022, PRASA had a total headcount of 4,604 employees, including 254 employees under the Voluntary Pre-Retirement Program. Staff decreased by 1.4% from FY2021 to FY2022, including a reduction of four HIEPAAA employees and 44 management employees. Based on the total number of active FTE employees for FY2022 (4,350), the ratio of service accounts (counting the water service and sanitary sewer service for the same client as two separate accounts) to employees was 470, representing an increase of 1.8% compared to FY2021, which was 462. The industry standard for combined (water and wastewater) utility operations averages ranges from 359 to 631, with a median of approximately 461 customer accounts per employee[2]. 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 | Pre-Retired Employees | Total Employees |
|---|---|---|---|---|---|---|---|
| 2018 | 154 | 1,058 | 117 | 2,952 | 9 | 335 | 4,625 |
| 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 |

[2] Source: 2021 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

| End of FY | Appointed Employees | Management Employees | HIEPAAA Employees | UIA-AAA | Temporary Employees | Pre-Retired Employees | Total Employees |
|---|---|---|---|---|---|---|---|
| 2022 | 171 | 1,094 | 116 | 2,963 | 6 | 254 | 4,604 |
| **5-year CAGR[1]** | **2.65%** | **0.84%** | **-0.21%** | **0.09%** | **-9.64%** | **-6.69%** | **-0.11%** |

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 FY2022 total headcount of 4,604 employees, PRASA will ideally need to hire 426 additional employees. 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.

In FY2022, 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 further develop a systematic recruitment plan. In addition, PRASA is exploring alternatives to post job openings on different platforms to identify candidates and qualified resources for the available positions.

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 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 plans to evaluate the potential implementation of the following:

- Absenteeism trends compared with levels of overtime to monitor and track the use of unplanned absences.
- Identify major reasons for overtime to define the optimal level of overtime versus regular time.

- Develop productivity metrics and improve personnel processes.
- Identify the optimal level of internal versus external resources.

PRASA retained an outside consultant to evaluate the current pay scales among the different groups to align compensation levels with the labor market. The evaluation indicated that PRASA's salaries are lower than the median compared to the labor market. PRASA implemented new payment scales for all 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 2017, 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 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 offered incentives to certain eligible employees to voluntarily retire early and still 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 a term of two years. These incentives are applicable until they meet the requirements for full retirement. The program attempts to reduce the workforce progressively and voluntarily. Besides reducing expenses, Act 211-2015 stipulates that the resulting vacant positions from the retirement program be eliminated and that agencies take administrative or operational measures to restructure in the absence of these positions. However, the Puerto Rico Office of Management and Budget (OMB) might authorize maintaining positions if certified as essential and following the plan submitted by PRASA.

Some of the eligible PRASA employees occupied managerial or supervisory positions, which may create organizational challenges.

#### 3.2.4.2 Act 26 of 2017 – Fiscal Plan Compliance Law

To assure 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 all marginal benefits to be the same for all employees of the Government of Puerto Rico, 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:

1. Marginal benefits standardization for all public service employees of the Government of Puerto Rico, including public corporations (Article 2.04 of Act 26-2017).
2. No temporary employment (derogation of Act 89-2016).
3. Revision to mandatory insurance fee every two years (Amendment to Article 3 of Act 253-1995).
4. Additional service charge on mandatory vehicle insurance (Amendment to Article 7 of Act 253-1995).
5. Transfer remaining funds at the end of the FY of all government agencies, instrumentalities, and public corporations to the General Fund.

Measure No. 1 in the list above standardized the marginal benefits of all government employees to reduce operational costs in terms of payroll and benefits, specifically in the vacation, sickness, and overtime compensations, and in the Christmas Bonus. Article 2.04 of Act 26-2017 affects the following marginal benefits:

- Vacation License: Accumulation rate and maximum accumulation
- Sickness License: Accumulation rate and maximum accumulation
- Maternity License
- Paternity License
- Breastfeeding Special License
- Unpaid Licenses
- Special Licenses
- Standardization of holidays (15 holidays)
- Uniform medical insurance employer contribution (minimum of $100 contribution)
- Only one bonus: Christmas bonus ($600 per year)
- Overtime compensation at a maximum of 1.5 times
- Vacations and sickness days liquidation (no liquidation at the end of the year)

Table 3-4 below compares and summarizes Act 26 of 2017.

*Table 3-4* Act 26 of 2017 Summary

| Category | Act 26-2017 |
|---|---|
| Economic Benefits | Marginal benefits will be the same for all Executive Branch employees, including all agencies, instrumentalities, and public corporations of the Government of Puerto Rico, except for the University of Puerto Rico. |
| | Vacations shall be accumulated up to a maximum of 60 days at the end of each natural year. All employees will have the right to enjoy 15 days of vacation each natural year, for which no less than ten days shall be enjoyed consecutively.<br>If deemed necessary, a public corporation shall concede vacations up to 50 days in a year to employees who have accumulated vacation days. |
| | Accumulation of sickness days will be at a rate of 1.25 days per month of service for those employees contracted before Act 8-2017. The monthly accumulation rate will be one day for those contracted after Act 8-2017. Sickness days shall be accumulated up to a maximum of 90 days per natural year, and no monetary liquidation is accepted. |

| Category | Act 26-2017 |
|---|---|
| | The Christmas bonus will be $600 each year for all Central Government and Public Corporations employees. |
| Negotiation of Collective Agreements | This law has supremacy over any collective agreement or contractual letter that interferes with the dispositions in this law. |
| Operational Costs | Mandatory vehicle insurance fees will potentially increase due to the additional service fee and fee revision every two years; this will be reflected in the operation and maintenance costs of PRASA's fleet. |
| | All government instrumentalities, agencies, and public corporations of the Executive Branch, except for the University of Puerto Rico, shall transfer a specific amount, as stipulated by the designated committee, from the surplus revenue at the end of each economic year to the State General Fund. |

#### 3.2.4.3 Collective Bargaining Agreements

PRASA and its largest union, the UIA-AAA, reached a Negotiation Agreement. 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. Due to the parties, UIA and PRASA, failure to provide notice of their intention to negotiate a new labor collective bargaining agreement within the required timeframe, the labor agreements were extended for an additional year and, successively, each year after that. However, parties were able to negotiate other provisions as included in the Negotiation Agreement, such as:

1. The impact on labor conditions and salaries for UIA employees in case of a privatization or Public-Private Partnership (P3) project implementation will be subject to negotiation.
2. PRASA should notify employees of the calendar year administrative recess by December 15 of such year. In addition, to reduce the possibility of unpaid leaves, PRASA will also allow employees with ten days or less of vacation to remain working during the calendar year administrative recess.
3. The positions identified as difficult recruitment are those of Licensed Plant Operators and electromechanics. Therefore, the parties will promote the payment of incentives to such positions in FY2023.
4. Paying a $600 premium by June 30, 2022, to recognize UIA employees' commitment during the last years.
5. Payment to active UIA members of Christmas Bonus balances for FY2015 and FY2016, which were legally disputed by UIA, without interest or penalties.

### 3.2.5 Training

PRASA offers varied training programs to its employees to improve work management and productivity. During FY2022, PRASA provided over 56,183 training hours to its employees, representing an average of approximately 13 hours per employee. During FY2022, the training program used virtual tools and remote courses, and the number of training hours significantly increased. The increase in training could also be attributed to PRASA leveraging the contract with *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. Currently, PRASA is utilizing an internet-based training platform called Moodle, where new pieces of training are designed and incorporated into the tool. In addition, to expand the utilization of Moodle, a recording

studio was created at Central Administration Building to facilitate the development of new training. PRASA's goal is to continue offering diverse training programs to its employees to improve work management and productivity. PRASA is also carrying out activities and training through the *Programa de Orientación Social al Empleado* (POSE), which is the same as the *Programa de Ayuda al Empleado* (PAE) governed by Act 167 of 2002.

About 99% (4,171) of the total employees participated in training activities offered by PRASA during FY2022. In addition, PRASA continues to invest in personnel training to increase work ownership and productivity levels. PRASA also continues with the training and certification of its treatment plant operators in compliance with requirements established by regulatory agencies. Table 3-5 summarizes the number of operators by the type of license held.

*Table 3-5 FY2022 Operator Licensing*

| Facility | In Training | Type I | Type II | Type III | Type IV | Total |
|---|---|---|---|---|---|---|
| Water | 107 | 23 | 43 | 76 | 222 | 471 |
| Wastewater | 29 | 2 | 7 | 19 | 81 | 138 |
| **Total** | **136** | **25** | **50** | **95** | **303** | **609** |

# 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 in a manner to achieve operational goals.
3. Evaluate if PRASA's CIP is aligned with the System's identified needs.

Arcadis performed asset condition assessments of a selection of WTP and WWTP facilities corresponding to FY2022 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, 2021, through December 31, 2021. The inspections for the dams were performed in February 2022. The facility inspections for WTPs, WWTPs, and ancillary facilities were performed between March 2022 and July 2022. This section summarizes the inspection results, findings, and recommendations based on the condition of the assets inspected during FY2022 and is detailed in the FY2022 Asset Condition Assessment (ACA) Report.

## 4.2 Facility Inspections

A summary of the facilities inspected between March and July of 2022 is presented in Table 4-1. A total of 184 facility inspections were performed out of the 3,940 facilities that comprise the System, excluding 137 active RWIs and 75 RWPSs. Inspected facilities include eight dams, 48 WTPs, 24 WWTPs, 20 Wells, 33 WPSs, 31 WSTs, and 20 WWPSs.

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 Assets Inspected by Category*

| Asset Category | Total PRASA Facilities[1] | Inspections Performed | |
|---|---|---|---|
| | | Quantity | Percent |
| Regulated Dams | 8 | 8 | 100 |
| Water Treatment Plants | 112 | 48 | 43 |
| Wastewater Treatment Plants | 51 | 24 | 47 |
| Wells | 238 | 20 | 8 |
| Water Pump Stations | 1,136 | 33 | 3 |
| Water Storage Tanks | 1,564 | 31 | 2 |
| Wastewater Pump Stations | 831 | 20 | 2 |

| Asset Category | Total PRASA Facilities[1] | Inspections Performed | |
|---|---|---|---|
| | | Quantity | Percent |
| **Total** | **3,940** | **184** | **5** |

[1] Data obtained from PRASA Geographical Information System (GIS) updated in June 2022. The total excludes 137 active RWIs and 75 RWPSs.

### 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 | 3 | 2 | 1 | 1 | 1 | 8 |
| Water Treatment Plants | 14 | 1 | 12 | 14 | 7 | 48 |
| Wastewater Treatment Plants | 6 | 0 | 7 | 6 | 5 | 24 |
| Wells | 4 | 0 | 4 | 4 | 8 | 20 |
| Water Pump Stations | 6 | 9 | 6 | 6 | 6 | 33 |
| Water Storage Tanks | 6 | 7 | 6 | 6 | 6 | 31 |
| Wastewater Pump Stations | 4 | 4 | 4 | 4 | 4 | 20 |
| **Total** | **43** | **23** | **40** | **41** | **37** | **184** |

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 Arecibo and Manatí (North Region), Coamo and Guayama (South Region), Cayey and Humacao (East Region), San Germán and Aguadilla (West Region), and Bayamón and Carolina (Metro Region). The wells in the Bayamón Operational Area were not visited during this inspection period. The Carolina Operational Area does not have wells. Arcadis visited additional wells at the San Germán Operational Area.

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 GPS coordinates. Each facility's compliance parameters were summarized and verified using a Microsoft PowerBi Dashboard. Arcadis designed the Compliance Dashboard, and the source data is the information provided by PRASA for the calendar year 2021. The dashboard summarized the following parameters including, but not limited to: Total Organic Carbon (TOC), Trihalomethane (TTHM), 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.

Within each evaluation criterion, the asset inspected was assigned a numerical score between zero and three. 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 listing 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 FY2022 ACA Report for the detailed evaluation and results.

## 4.2.2 Inspection Results

According to the facilities inspections performed in FY2022, 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 Dams

PRASA's eight regulated dams were inspected between February 7 and 11, 2022. PRASA operates approximately 168 water distribution systems, of which 109 are supplied by surface water contained by the dams, including those not owned and managed by PRASA. All eight dams inspected for this assessment are classified as high-hazard dams, which could cause more than very little loss of life and serious damage to communities, industry, and agriculture if a failure occurs. Arcadis utilized the previous inspection reports from 2016, 2018, and

2020, along with PRASA's follow-up reports from 2019, as a baseline to perform independent visual inspections and operational assessments of the dam structures.

According to Puerto Rico's Dam Safety Program regulations, regulated dam facilities are to be inspected every three years. Timely and ample inspection of these dams is essential for permitting or approval required for the construction, modification, repair, or removal of the dam or the appurtenant works. Aside from the daily observation and operations of the fully staffed dam facilities, all these structures are given a cursory safety inspection annually by PREPA) before the hurricane season. Each recommendation based on the inspection is rated, indicating the action's priority. With this in consideration, Arcadis developed and used criteria and weighting factors to evaluate regulated dams. The criteria include Equipment and Maintenance, Regulatory Compliance, Operations and Process Control, and Staffing and Training with Good, Adequate, or Poor ratings. Refer to the FY2022 ACA for details on the criteria and factors evaluated for the eight regulated dams inspected.

Table 4-3 summarizes the facility ratings by each evaluation criteria and the overall facility rating. In 2020, four dams (Río de La Plata, Cidra, Isabela, and Las Curías) received a Poor rating in the Equipment and Maintenance category. The same four dams received a rating of Poor in the Regulatory Compliance category. Cidra Dam and Fajardo Dam received a Poor rating in the Operation and Process Control category. Finally, Las Curías Dam and Isabela Regulator Dam received a rating of Poor in the Staffing and Training category.

As was the case in 2020, four dams (Río de La Plata, Cidra, Isabela, and Las Curías) received an overall rating of Poor, and four dams received an overall rating of Adequate. No dam received a combined rating of Good. Overall, there was a decrease in ratings on indicators on all dams due to the lack of improvements to address deficiencies noted in the previous inspections.

*Table 4-3 Regulated Dams – Number and Percentage of Ratings by Category*

| Rating Range | Regulatory Compliance | | Operations/Process Control | | Equipment/Maintenance | | Staffing/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) | 4 | 50 | 2 | 25 | 4 | 50 | 2 | 25 | 4 | 50 |
| Adequate (1.5-2.4) | 4 | 50 | 6 | 75 | 4 | 50 | 6 | 75 | 4 | 50 |
| Good (2.5-3.0) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Average Rating** | **1.4** | | **1.5** | | **1.3** | | **1.7** | | **1.4** | |

### 4.2.2.2 Water Treatment Plants

PRASA operates 112 WTPs where it treats raw water to produce potable water for its customers. The islandwide WTP's design production capacity is approximately 625 million gallons per day (MGD). The WTPs range from several thousand gallons per day to 100 MGD. For FY2022, PRASA reported a total water production of 519

MGD, of which approximately 89% or 462 MGD are from WTPs. A total of 48 WTPs (43% 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 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 FY2022 ACA for details on the criteria and factors evaluated for the WTPs inspected.

Table 4-4 summarizes the inspection results for the 48 WTPs sorted by the four evaluation criteria and the overall facility rating. Three of the inspected WTPs, Lares Nueva (Espino) WTP, Aceitunas WTP, and Toa Vaca WTP, were rated as Good, and the rest were rated Adequate with an overall average rating score of 2.3. However, even though 94% of the WTPs were classified as Adequate, one of the 48 WTPs, Ceiba Sur WTP, received a low-end rating of Adequate that could deteriorate to a Poor rating if not attended.

*Table 4-4 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) | 0 | 0 | 3 | 6 | 1 | 2 | 25 | 52 | 0 | 0 |
| Adequate (1.5-2.4) | 0 | 0 | 31 | 65 | 46 | 96 | 20 | 42 | 45 | 94 |
| Good (2.5-3.0) | 48 | 100 | 14 | 29 | 1 | 2 | 3 | 6 | 3 | 6 |
| **Average Rating** | **2.9** | | **2.2** | | **1.9** | | **1.6** | | **2.3** | |

#### 4.2.2.2.1 Regulatory Compliance Findings

All facilities were rated Good in this category. The overall rating of the WTPs in this assessment category increased from the previous inspection. However, several compliance parameters only had interim limits or monitoring, which consequently did not negatively affect the compliance rating. Whether the facility can meet the actual (permanent) limits when the interim/monitoring requirement expires is unknown at this point. 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 to implement several operational strategies in the System to minimize incidences. Efforts are mainly targeted to address WTPs 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 USEPA's 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.

#### 4.2.2.2.2 Operations and Process Control Findings

The Operations and Process Control in most WTPs inspected were rated as Adequate. Three facilities (6% of inspected WTPs) were rated as Poor, and 14 (29% of inspected WTPs) were rated as Good. The operations and process control scores increased from the previous year. The facilities rated as Poor and Good are:

- Aguas Buenas Urbano WTP (East Region) – Poor
- Farallón WTP (East Region) – Poor
- Ceiba Sur WTP (East Region) – Poor
- Utuado Urbano WTP (North Region) – Good
- Lares Nueva (Espino) WTP (North Region) – Good
- Quebradillas WTP (North Region) – Good
- Morovis Urbana WTP (North Region) – Good
- Juncos Urbano (KTP 90) WTP (East Region) – Good
- Aceitunas WTP (South Region) – Good
- Adjuntas Vieja (Olimpia) WTP – Good
- Guaraguao WTP (South Region) – Good
- Peñuelas Urbana WTP (South Region) – Good
- Guayanés WTP (South Region) – Good
- Yauco WTP (South Region) – Good
- San Sebastián WTP (West Region) – Good
- Añasco WTP (West Region) – Good
- Monte del Estado WTP (West Region) – Good

#### 4.2.2.2.3 Equipment and Maintenance Findings

The facilities inspected were rated either as Poor, Adequate or Good in this criterion. No facility was rated as Unacceptable. Of the 48 facilities inspected, 33 (69%) had a rating under 2.0. Only one (4%) of the facilities inspected was rated Good regarding equipment and maintenance practices. The facility is Toa Vaca WTP (South Region). Of the facilities inspected, only one (4%) was rated Poor in terms of equipment and maintenance practices. The facility is Jagüeyes-Villalba 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:

- Arecibo Urbano WTP (North Region)
- Utuado Urbano WTP (North Region)
- Lares Urbana WTP (North Region)
- Lares Nueva (Espino) WTP (North Region)
- Quebradillas WTP (North Region)
- Jayuya Urbano WTP (North Region)
- Mameyes Arriba Limón WTP (North Region)
- Morovis Urbana WTP (North Region)
- Almirante Sur WTP (North Region)
- Cedro Arriba WTP (North Region)
- Corozal Urbano WTP (North Region)
- Las Delicias WTP (North Region)
- Cubuy WTP (Metro Region)
- Aguas Buenas Urbano WTP (East Region)
- Minillas WTP (East Region)
- Caguas Sur WTP (East Region)
- Barranquitas Urbano WTP (East Region)
- Ceiba Sur WTP (East Region)
- Juncos Urbano (KTP 90) WTP (East Region)
- Humacao (Las Piedras) WTP (East Region)
- Morovis (Río Grande) WTP (East Region)
- Guayama Urbano WTP (South Region)
- Yahuecas WTP (South Region)
- Ponce Vieja WTP (South Region)
- Guaraguao WTP (South Region)
- Peñuelas Urbana WTP (South Region)
- Guayanés WTP (South Region)

- Yauco WTP (South Region)
- San Sebastián WTP (West Region)
- Isabela Urbana WTP (West Region)
- Añasco WTP (West Region)
- Maricao WTP (West Region)

#### 4.2.2.2.4 Staff and Training Findings

The Staffing and Training category's overall rating was 1.6, which fell at the lower end of Adequate and decreased by 0.3 compared to the 2021 inspections. Three (6%) facilities received a Good rating, 20 (42%) facilities received an Adequate rating, and 25 (52%) facilities received a Poor rating in this category, mostly due to the need for staffing, including certified operators and/or lack of training. In FY2021, only 15 facilities were rated as Poor compared to 25 in FY2022, which is a 67 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. In addition to licensed operators, there is also a need for STS operators, maintenance staff, managers, potable water technicians, operator's assistants, and operational service workers (TSOs for its Spanish Acronym).

#### 4.2.2.2.5 Lowest Rated Facilities

Only one facility scored below 2.0 out of the 48 WTPs inspected. The observations of this facility are described in Table 4-5.

*Table 4-5 WTPs – Lowest Rated Facilities and Observations*

| WTP | 2022 Score | Observations |
|---|---|---|
| Ceiba Sur (East Region) | 1.9 | During the evaluation period, the facility compliance was rated as good. No exceedances were reported for SDWA and NPDES requirements. The facility operations and process control of the WTP were rated as poor. The available version of the O&M Manual is from May 2015. The operators perform the necessary sampling and follow Standard Operating Procedures (SOPs) to adjust the process. The process data is reported to the supervisor in the daily report. Chemical dosing and adjustments are based on water quality sample results and jar tests. The jar test is performed once per shift. The Chlorine Contact Time (CT) is performed three times a day. The EGU (200 kW) can energize the WTP. However, the automatic transfer switch (ATS) is not working for the WTP and Intake. The EGU is tested biweekly.<br>The laboratory equipment is not adequate. The control room is shared with the Operator's office, laboratory, and bathroom. The Operator's office is in the same room as the Motor Contro Center, which is a safety hazard. The general safety is not adequate due to heavy corrosion in the equipment, stairs, and catwalks. Exposed pipes were observed on the perimeter of the facility. The access road has holes and needs asphalt. The facility needs lighting in the superpulsator (used as pre-sedimentation) area. The facility has adequate communication tools. The facility sign with emergency phone numbers is not posted at the facility. The overall facility is not adequate, and typical clean-up is needed. The facility equipment and maintenance of the WTP were |

| WTP | 2022 Score | Observations |
|---|---|---|
| | | rated as adequate; however, major equipment and treatment processes need significant improvements to operate efficiently.<br>One pump system for the water intake, stream current monitor, two mechanical mixers for the flocculation basin, and one backwash pump are out of service. Two superpulsators are working as pre-sedimentation tanks. Two primary polymer day tanks are out of service. Two tote containers for the primary polymer are located without dike protection—no labels in the tote containers for primary and secondary polymers. Flocculation/sedimentation basins tube settlers and launders are deteriorated and exhibit corrosion. Filter units need to assess the filter media and the underdrains' condition. At the time of the visit, the facility was in the process of rehabilitating the filter media. In addition, the facility switched from chlorine gas to liquid (Sodium Hypochlorite 12%).<br>The post-disinfection system (pump room) is in poor (housekeeping) condition. The flow meter's display cannot be viewed. Some of the STS equipment and dechlorination system show signs of deterioration. Geotubes sludge dewatering technology replaced the sludge drying beds. The Dechlorination System is dechlorination tablets (D-CHLOR). The dechlorination tablets were spilled on the floor of the chlorine pump room. The facility's appearance was in poor condition, with equipment debris in multiple locations. Housekeeping was poor. Plant staff performs routine maintenance. The facility has corrective maintenance and procurement process challenges due to extended delays. The facility is not under a CIP project and does not have as-built drawings. The staffing and training category's overall rating was on the upper end of poor (rating 1.3). The plant is understaffed and needs a plant manager, a TSO, and an at-large operator to operate the facility efficiently. One operator is pending the PRDOH certification. |

The major concern is the facilities' physical condition, which continues to deteriorate 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.

#### 4.2.2.3 Wastewater Treatment Plants

PRASA currently operates 51 WWTPs. The facilities range from several thousand gallons per day up to 80 MGD. The islandwide design treatment capacity is approximately 378 MGD, and the treated wastewater for FY2022 was estimated at 203 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 230 MGD of treatment capacity) provide primary treatment.

A total of 24 WWTPs (47% 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, backup power, septage). Refer to the FY2022 ACA for details on the criteria and factors evaluated for the WWTPs inspected.

Table 4-6 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 1.6. Eight (33% of the visited facilities) WWTPs were rated as Poor, and 16 (67%) WWTPs were rated as Adequate in the overall rating. However, seven of the 16 WWTPs rated as Adequate in the overall rating are on the lower end, close to being rated as Poor.

*Table 4-6 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 | 33 | 1 | 4 | 0 | 0 | 4 | 17 | 0 | 0 |
| Poor (0.5-1.4) | 3 | 13 | 1 | 4 | 5 | 21 | 2 | 8 | 8 | 33 |
| Adequate (1.5-2.4) | 8 | 33 | 19 | 79 | 19 | 79 | 13 | 54 | 16 | 67 |
| Good (2.5-3.0) | 5 | 21 | 3 | 13 | 0 | 0 | 5 | 21 | 0 | 0 |
| **Average Rating** | **1.3** | | **2.0** | | **1.7** | | **1.7** | | **1.6** | |

#### 4.2.2.3.1 Regulatory Compliance Findings

The WWTPs received an overall combined score of 1.3 in Regulatory Compliance, which is considered a Poor rating. The condition of the equipment and having treatment units out of service have negatively impacted the compliance criterion. Scores could be even lower at some of the facilities inspected since some NPDES parameters have interim limits or are for monitoring only. Despite this, the results show that there were still exceedances. PRASA intends to address requirements stipulated under the USEPA 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 (33%) were rated as Unacceptable, and three (12.5%) received a Poor rating under the regulatory compliance criterion. The remainder treatment plants were rated as Adequate, except for Jayuya WWTP, Parcelas Borinquen WWTP, Barranquitas WWTP, Guánica WWTP, and Las Marías WWTP, which were rated as Good. The facilities that were rated as Unacceptable and Poor in this criterion are:

- Camuy-Hatillo WWTP (North Region) – Unacceptable
- Unibón WWTP (North Region) – Unacceptable
- Morovis RWWTP (North Region) – Unacceptable

- Vega Alta WWTP (North Region) – Unacceptable
- Comerío RWWTP (East Region) – Unacceptable
- Santa Isabel WWTP (South Region) – Unacceptable
- Yauco WWTP (South Region) – Unacceptable
- Guayanilla WWTP (South Region) – Unacceptable
- Adjuntas WWTP (South Region) – Poor
- Aguadilla WWTP (West Region) – Poor
- Maricao WWTP (West Region) – Poor

In addition, six (22%) of the WWTPs that were rated as Adequate should be closely monitored since they received a regulatory compliance score between 1.5 and 1.9 as a result of reported exceedances in fecal coliforms, Total Nitrogen (NO2+NO3+TKN), Total Suspended Solids (TSS) Concentration (Monthly and Weekly), TSS Removal Percentage, Biochemical Oxygen Demand (BOD) Concentration (Monthly and Weekly), BOD Removal Percentage, P, and residual chlorine. These facilities are:

- Vega Baja WWTP (North Region)
- Naranjito WWTP (North Region)
- Culebra WWTP (East Region)
- Vieques WWTP (East Region)
- Patillas WWTP (South Region)
- Mayagüez WWTP (West Region)

The nutrient removal and aeration process need to 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.

#### 4.2.2.3.2 Operations and Process Control Findings

The WWTPs Operations and Process Control criteria were rated as Adequate, with a 2.0 overall rating. Of the 24 facilities inspected, one (4%) received an Unacceptable rating, and one (4%) received a Poor rating under this criterion. The rest were rated as Adequate, except for Unibón WWTP, Santa Isabel WWTP, and Lajas WWTP, rated as Good. The facilities that were rated as Unacceptable and Poor in this criterion are:

- Culebra WWTP (East Region) – Unacceptable
- Camuy-Hatillo 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 some parameters with interim limits.

#### 4.2.2.3.3 Equipment and Maintenance Findings

The Equipment and Maintenance category had an average overall rating of 1.7, which is barely Adequate. Equipment condition is the primary driver under this criterion. Out of the 24 facilities inspected, five (21%) received a Poor rating under this criterion, and the remaining facilities were rated as Adequate. The facilities rated as Poor are:

- Morovis WWTP (North Region)
- Vega Baja WWTP (North Region)
- Comerío WWTP (East Region)
- Culebra WWTP (East Region)
- Guánica WWTP (South Region)

Despite 19 (79% of inspected WWTPs) of the facilities being rated as Adequate at the time of inspection, 16 (67% 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 16 facilities are:

- Camuy-Hatillo WWTP (North Region)
- Unibón WWTP (North Region)
- Vega Alta WWTP (North Region)
- Naranjito WWTP (North Region)
- Jayuya WWTP (North Region)
- Parcelas Borinquen WWTP (East Region)
- Cayey WWTP (East Region)
- Barranquitas WWTP (East Region)
- Vieques WWTP (East Region)
- Adjuntas WWTP (South Region)
- Patillas WWTP (South Region)
- Yauco WWTP (South Region)
- Guayanilla WWTP (South Region)
- Aguadilla WWTP (West Region)
- Mayagüez WWTP (West Region)
- Las Marías WWTP (West Region)

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

#### 4.2.2.3.4 Staff and Training Findings

The Staffing and Training category was rated as Adequate, with an overall score of 1.7. Four (17% of inspected WWTPs) facilities were rated as Unacceptable, two (8% of inspected WWTPs) facilities were rated as Poor, five (21% of inspected WWTPs) as Good, and the remaining 54% of visited WWTPs received an Adequate rating in this category. The facilities that were rated as Unacceptable or Poor in this criterion are:

- Naranjito WWTP (North Region) – Unacceptable
- Jayuya WWTP (North Region) – Unacceptable
- Parcelas Borinquen WWTP (East Region) – Unacceptable
- Barranquitas WWTP (East Region) – Unacceptable
- Vega Alta WWTP (North Region) – Poor

- Aguadilla WWTP (West Region) – Poor

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, centrifuge operators, sanitary sewer technicians, managers, supervisors, maintenance and housekeeping staff, and wastewater workers (TA, by its Spanish acronym). PRASA mitigates the needs by having existing staff work overtime or by reducing shifts which, in turn, increases 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 at the time of 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.

#### 4.2.2.3.5 Lowest Rated Facilities

The facilities with the lowest overall score (below 2) are summarized in Table 4-7. 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 2015 USEPA 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.

Equipment and Maintenance is the category of primary concern. Similar to the WTPs, the major concern is the facilities' physical condition, which continues to deteriorate 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 4-7 WWTPs – Lowest Rated Facilities and Observations*

| WWTP | 2022 Score | Observations |
|---|---|---|
| Camuy-Hatillo (North Region) | 1.0 | The facility's Compliance criterion was rated as unacceptable during the evaluation period. There were significant non-compliance (SNC) exceedances of the following parameters: Residual CL, Total Nitrogen Concentration, TSS Removal %, TSS Concentration (Monthly and Weekly), TSS Load (Weekly), and Fecal Coliforms 20%-30DA. Also, minor non-compliance (MNC) exceedances of the following parameters: BOD Concentration (Weekly), BOD Removal %, Total Load (Weekly), and TSS. It needs further analysis to determine violations. The facility's Operations and Process Control criteria were rated as poor. The operators perform the necessary sampling to make adjustments to the process. However, the O&M Manuals were not updated, no chemical feed pump calibration records were found, and there is no potable water meter. The facility does not have a control room or a laboratory on-site. Also, poor lighting, safety, and security are compromised by a broken fence and erosion near the Chlorine Contact Chambers. Housekeeping and overall appearance were not adequate. Most buildings showed deterioration; one Final Clarifier has significant structural deterioration, and buildings need maintenance and painting. The facility's Equipment and Maintenance criteria were rated as adequate. The Pre-treatment Area has structural cracks, deterioration (weathering), and poor lighting. Fall and electrical hazards are observed. Degritter is out of service. Most of the critical equipment is old and with some degree of deterioration. One Final Clarifier is out of service. Several blowers for Biofilters are out of service. One Belt Filter Press is out of service. The facility's Staffing and Training criteria were rated as adequate. Although, a non-licensed operator is still in the process of getting certified. |
| Vega Alta (North Region) | 1.0 | The facility's Compliance criterion was rated as unacceptable during the evaluation period. There were SNC exceedances of the following parameters: Fecal Coliforms 20%-30DA, Fecal Coliforms, TSS Load Weekly, BOD Removal, BOD Load Weekly, BOD Concentration Weekly, TSS Removal, TSS Concentration Weekly, TSS Load Weekly, TSS Concentration Monthly, Total Nitrogen, and Total Suspended Solids. Also, there was an MNC exceedance in BOD Concentration Monthly. The plant has exceeded permit limits on 13 compliance parameters, with consistent exceedances of Total Nitrogen and Fecal Coliforms. Plant capacity is based on the operation of two package Plants; however, only one is in operation. The facility's Operations and Process Control criteria were rated as adequate. The operators perform the necessary sampling, following SOPs, to adjust the process. The facility has sufficient backup power to operate without significant interruption. SDS is available but not located in an accessible location. NPW is out of service. The facility's Equipment and Maintenance were rated as adequate. Most equipment is in adequate condition. The facility's Staffing and Training criteria were rated as poor. It needs at least one licensed operator to cover vacation and sick and reduce overtime. Also, a centrifuge operator is needed. Staff needs training refreshers. |

| WWTP | 2022 Score | Observations |
|---|---|---|
| Morovis (North Region) | 1.1 | The facility's Compliance criterion was rated as unacceptable during the evaluation period. There were SNC exceedances of the following parameters: BOD Removal, BOD Concentration Monthly, BOD Concentration Weekly, TSS Concentration Monthly, TSS Concentration Weekly, and Total Nitrogen. The sequencing batch reactor (SBR) system shall be evaluated for improvements. The filter system should be repaired. The facility's Operation and Process Control criteria were rated as adequate. The operators perform the necessary sampling to make adjustments to the process. However, the equipment manuals were not observed at the facility. The Emergency Response Plan and O&M need to be updated, and SDS needs to be visible. Some pipes were not colored appropriately. The general appearance of the facility was good. The facility's Equipment and Maintenance criteria were rated as poor. The condition of the equipment has not improved since the last inspection. It may cause compliance exceedances. SBR blowers need some improvements. The mixers for SBR and Digester need to be replaced. The Mechanical Bar Screens are operational, but issues were observed. The Filters are out of service. The facility's Staffing and Training criteria were rated as adequate. An additional licensed operator may improve it. Training is good for the operation of this facility. |
| Culebra (East Region) | 1.1 | The facility's Compliance criterion was rated as adequate during the evaluation period. However, the facility had SNC exceedances of the following parameters: BOD Concentration (Weekly) and Total Nitrogen. Also, an MNC exceedance for BOD Removal (%) was identified. The facility's Operations and Process Control criteria were rated as unacceptable. The operators perform the necessary sampling to make adjustments to the process. However, O&M manuals are not updated. The equipment manuals were not available. The chemical dosing modifications are determined and conducted by the operator's experience and sampling results. Also, the calibration data for the pumps was not found. Jar tests are not being performed, the laboratory equipment is inadequate, the exterior lights are not working, and EGU and its auto-transfer switch are not operational. The facility does not have a control room, no additional security is available, and it is not equipped with proper communication tools. During the visit, honeycombs were found in various areas of the facility, which limited and obstructed the inspection of selected equipment; the facility needs groundskeeping.<br>Gasoline accumulated in tote containers located in a green area of the facility. The facility operates manually (no SCADA system). The facility's Equipment and Maintenance criteria were rated as poor. Most of the critical equipment has some deficiency or are not operating: One Mechanical Bar Screen; one Degritter System; one Aeration System (blower); one Nitrate Return pump; seven Mixing System; two Secondary Clarifier due to broken weir, corrosion, and electrical issues; (2) Scum Handling System – pump; (1) RAS pumps; (1) granular media filter; (1) Septage Receiving Tank and pump; (1) EGU and (1) ATS. The WWTP requires significant repairs. Plant staff performs routine maintenance. The appearance of the facility is deteriorating. The facility is not under the CIP project and has as-built drawings. The facility's Staffing and Training criteria were rated as adequate. The facility is understaffed since it needs at least two Licensed Operators, one Licensed Operator, and one TSO. |

| WWTP | 2022 Score | Observations |
|---|---|---|
| Guayanilla (South Region) | 1.1 | During the evaluation period, the facility's Compliance criteria were rated as unacceptable. There were SNC exceedances of the following parameters: Total Nitrogen, TSS removal, TSS Load Weekly, and TSS Concentration Weekly and Monthly. Also, there were MNC exceedances for BOD, Phosphorus, and Total Suspended Solids. The exceedances might be due to the problems of the equipment that is out of service (Degritter System, Secondary Clarifier, and Clari-Digester). The facility's compliance has been downgraded from the last inspection in 2020. The facility's Operation and Process Control criteria were rated as adequate. The O&M manual has not been updated since 2005.<br>The effluent of the facility tends to have the presence of sediments or solids due to grease. The facility does not have a control room. In terms of security, the facility does not have security cameras or alarms. Also, there is equipment that requires replacement or repair. Also, there is much debris around the facility. Some structures of the facility have been affected by the earthquakes of 2020, and the Sludge Drying Beds have missing translucent roofs. The facility's Equipment and Maintenance criteria were rated as adequate. However, the Degritter System of the facility is out of service and requires repair. Also, the Clari-Digester and Secondary Clarifier are not in operation. The facility equipment requires improvements and repair due to the presence of corrosion. The facility's Staffing and Training criteria were rated as good. The personnel of the facility has all its training up to date. |
| Comerío (East Region) | 1.2 | The facility's Compliance criterion was rated as unacceptable during the evaluation period. There were MNC exceedances of the following parameters: BOD% Removal, Residual Cl, TSS% Removal, Total Suspended Solids Concentration, TSS Load Weekly, TSS Concentration Monthly, and TSS Concentration Weekly. There was an SNC exceedance in Total Nitrogen Concentration. The facility's Operations and Process Control criteria were rated as adequate. The operators perform the necessary sampling to make adjustments to the process. However, all process operations are done manually, and the O&M Manual is not updated. Housekeeping at the facility needs to be improved. The facility's Equipment and Maintenance criteria were rated as poor, particularly the equipment component. Three major process units are out of service, including one Primary Clarifier, one Biofilter, and one Secondary Clarifier. Also, one Degritter unit is out of service. The roof of the Sludge Drying Beds is broken in some areas. The facility's Staffing and Training criteria were rated as adequate. However, the facility needs an additional licensed operator. |

| WWTP | 2022 Score | Observations |
|---|---|---|
| Yauco (South Region) | 1.2 | The facility's Compliance criterion was rated as unacceptable during the evaluation period. There were SNC exceedances for the following parameters: BOD Removal, BOD Load Monthly, BOD Concentration Weekly, BOD Concentration Monthly, Total Nitrogen, and TSS Concentration Monthly; this might be due to the damages to the equipment and the repairs performed at the secondary biological nutrients removal (BNR) unit. The personnel indicated that at the time of the inspection, they had to use an odor control system due to the issues occurring during the treatment. There were MNC exceedances of the following parameters: TSS Removal and TSS Concentration Weekly. The facility's Operation and Process Control criteria were rated as adequate. The operators conduct the sampling of the facility's primary parameters and modify the dosage that will be applied to the wastewater treatment based on the results. 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 security cameras and alarms. The facility's Equipment and Maintenance criteria were rated as adequate. The facility only operates with one BNR unit since the secondary is undergoing repair. Also, equipment is out of service, including the RAS pump, Recirculation pump, and Grit Removal System (one is clogged). Also, the Disk Filters of the facility are out of service since they are being repaired at the moment, and the Belt Filter Presses are not in use since the structure of the building was compromised by the damages of the 2020 earthquakes. The facility is using the services of transporting the generated sludge directly to the landfill (via a truck) without using the Dewatering System of the Sludge Drying Beds. The facility's Staffing and Training criteria were rated as adequate. However, the facility requires additional staff for maintenance. |
| Unibón (North Region) | 1.4 | The facility's Compliance criterion was rated as unacceptable during the evaluation period. The BOD Removal %, the Monthly BOD Concentration, and the Total Nitrogen are in Significant Non-Compliance status. Additionally, the TSS Removal % and the Monthly and Weekly TSS Concentration are in Minor Non-Compliance status. The low compliance score may be related to having one of the Package Plants out of service. The facility's Operation and Process Control criteria were rated as good. The operators perform the necessary sampling to make adjustments to the processes. At the visit, O&M and ERP were not updated, and the SDS was unavailable. The Laboratory area was recently retrofitted. Also, there was no NPW system nor control room; the bathroom facilities and illumination must be upgraded. In general, the facility's appearance is good. The facility's Equipment and Maintenance criteria were rated as adequate. However, the Circular Package Plant is not operating due to problems in some components and corrosion in the clarifier mechanism. The Rectangular Package Plant's catwalks are loose, which can cause a safety hazard. Both Package Plants need improvements to have a better operation. The facility's Staffing and Training criteria were rated as good. |

| WWTP | 2022 Score | Observations |
|---|---|---|
| Santa Isabel (South Region) | 1.5 | During the evaluation period, the facility's Compliance was rated as unacceptable. There were Significant Non-Compliance exceedances in the following parameters: BOD Removal, BOD Concentration Monthly, BOD Concentration Weekly, TSS Removal, TSS Concentration Monthly, and TSS Concentration Weekly. Exceedances may be due to equipment being out of service and equipment operating with problems in the SBR area. A thorough evaluation of the system shall be performed. The facility's Operations and Process Control categories were rated as good. The operators perform the necessary sampling, following SOPs, to adjust the process. However, O&M Manual was not updated. The illumination, fence, and gate have been improved significantly since the last inspection. The facility's Equipment and Maintenance were rated as adequate. Most of the equipment and components were in good condition and operating adequately. However, there are some pending projects to make improvements for a better operation of the WWTP. Attention shall be given to the Grit Removal, SBR Aeration, and effluent handling components. The facility's Staffing and Training were rated as adequate. An additional licensed operator may improve it. |
| Naranjito (North Region) | 1.6 | During the evaluation period, the facility's Compliance was rated as adequate. There were Significant Non-Compliance exceedances in Total Nitrogen. Also, Minor Non-Compliance exceedances in the following parameters: TSS Removal % and TSS Concentration (Monthly and Weekly). The facility's Operations and Process Control category was rated as adequate. The O&M manuals of the facility are not updated, as well the SOPs documents. The facility operators conduct all laboratory sampling at the site and keep sampling records. However, the facility's laboratory requires maintenance and reparation of the cabinets for ideal storage of the chemicals. The NPW System is available, and it is used for the cleanup of the facility units. In terms of security, there are no available security cameras or guards. Lastly, the facility's Emergency Generator Unit (EGU) is functioning, but some parts of the equipment require reparation. The facility's Equipment and Maintenance were rated as adequate. The Lift Pump Station Programmable Logic Controller (PLC) panel of one pump is currently damaged. The transmission motor of one Clarifier Basin is damaged. One unit of the Aeration System (blowers) is out of service. Lastly, one pump of the NPW System is out of service. The facility's Staffing and Training were rated as unacceptable. The facility requires additional staff for the maintenance and operation of the facility. The personnel training and refreshers were affected due to COVID-19 issues. |

| WWTP | 2022 Score | Observations |
|---|---|---|
| Adjuntas (South Region) | 1.6 | During the evaluation period, the facility's Compliance was rated as poor. Minor Non-Compliance exceedances in the following parameters: BOD Concentration Weekly, BOD% Removal, TSS Concentration Monthly, TSS Concentration Weekly, and TSS% Removal. There was a Significant Non-Compliance exceedance in Total Nitrogen. The facility's Operations and Process Control category was rated as adequate. The operators perform the necessary sampling to make adjustments to the process. However, the O&M manual is not updated, and no equipment manual is available on-site. There is no NPW system or control room, and some pipelines are colored/labeled inadequately. Also, no additional security, and the landscaping needs improvement. The facility's Equipment and Maintenance were rated as adequate. Housekeeping and landscaping need improvement; it has grime on most concrete structures and needs painting, it has concrete spalling on several concrete structures, old WWTP equipment is still on-site, it has a concrete light pole with significant structural damage creating a hazard at the area, and various SDBs have damages in the area where the gates should be installed. The facility's Staffing and Training were rated as adequate. However, the facility needs an additional licensed operator. |
| Aguadilla (West Region) | 1.6 | During the evaluation period, the facility's Compliance was rated as poor. There was Significant Non-Compliance in the following parameters: Fecal Coliforms 20%-30DA, Fecal Coliforms, and TSS Concentration Monthly. Also, a Minor Non-Compliance exceedance in TSS Loading. Some of these exceedances might be caused by the reduced operation of the Centrifuge System. The facility's Operations and Process Control category was rated as adequate. The operators perform the necessary sampling, following SOPs, to adjust the process. Also, the O&M manual is not updated with equipment installed after the original design, and there are areas without illumination. The facility's Equipment and Maintenance were rated as adequate. Regional staff performs routine maintenance. The degritter equipment is not operational, and Belt Filter Press is in the process of being replaced. The facility's Staffing and Training were rated as poor. Training refreshers are needed; the supervisor is the only one with access to SAP. Also, staffing needs at least a permanent Lab Technician for water analysis. |

| WWTP | 2022 Score | Observations |
|---|---|---|
| Vieques (East Region) | 1.7 | During the evaluation period, the facility's Compliance was rated as adequate. However, the facility had a Significant Non-Compliance exceedance of the Total Nitrogen parameter—also a Minor Non-Compliance exceedance with BOD Concentration (Monthly and Weekly). The facility's Operations and Process Control category was rated as adequate. The operators perform the necessary sampling to make adjustments to the process. However, O&M manuals were not updated, and the equipment manuals were unavailable. The chemical dosing modification is determined and conducted by the operator's experience and sampling results. In addition, no jar tests are being performed, no odor control, and no additional security is available. Brand new EGU was available and in working order. The EGU is tested (AAA-500C) biweekly. The operator samples for process control.<br><br>The Laboratory cabinets are severely damaged. The NPW is not being used due to the change of chlorine gas to liquid chlorine. The potable water meter is damaged. The pipe's paint is faded. Grounds keeping issue with the surrounding grass of the facility since the tractor needs replacement. The telephone only uses fiber optic; if not, it does not work. Lastly, general safety is inadequate because the facility's control room has a condensation problem that caused electrical equipment damage. The facility's Equipment and Maintenance were rated as adequate. The manual bar screen had the presence of minor debris. The piping for screening equipment had the presence of corrosion and debris. One lift pump station and one pump of the septage receiving tank are out of service. The tank of the packaged plant was rehabilitated; it has new catwalks and was painted. The blowers deficiently operate since they work more hours than they should. The lever or handle of one of the submerged pumps is not functional. One Sludge Drying Bed (SDB) is used for chemical storage. The roof of SDBs was repaired after Hurricane María, but it is not translucent. The SDBs do not have gates since the beds have a great incline. Only 60 UV lamps are functioning.<br><br>The polymer application (TAN PAC 131 and sodium hydroxide), disinfection system, and bisulfite solution (Dechlor) have only one pump, thus no spill containment nor redundancy. The EGU was replaced with a new one with a capacity of 200 kW/250 kVA. The generator can supply energy to the whole facility, and the ATS was replaced. The Plant's staff performs routine maintenance at the WWTP. Lastly, the facility is under CIP and has no as-built drawings. The facility's Staffing and Training were rated as adequate. It needs at least (1) licensed operator at Large to cover sick/vacation days so that the facility's operating hours are addressed effectively and (1) maintenance personnel. |

| WWTP | 2022 Score | Observations |
|---|---|---|
| Vega Baja (North Region) | 1.8 | During the evaluation period, the facility's Compliance was rated as adequate. There was a Significant Non-Compliance exceedance in Total Nitrogen. Also, there was Minor Non-Compliance in BOD Concentration Monthly and Phosphorus. The facility's Operations and Process Control category was rated as adequate. The operators perform the necessary sampling to make adjustments to the process. However, equipment manuals were unavailable, and no jar tests were performed to establish coagulant dosage. Also, the facility's illumination is poor and needs frequent Maintenance Personnel to cut the grass and maintain the grounds. The facility does have EGU to provide power for the entire plant. The facility's Equipment and Maintenance were rated as poor. The plant has major equipment out of service (Rotating Biological Contactor, Filters, and UV Systems). The Screening System is in adequate condition, with improvements needed in the disposal of conveyed solids—some rust on the Clarifiers and Package Plant. The Sludge Filter Press is in very good condition. The facility's Staffing and Training were rated as adequate. Staff is adequate for plant operations. Should provide HAZWOPER training/refreshers. Currently, the Rotating Biological Contactor operator is covering the second shift even if Rotating Biological Contactor units are not in service. |
| Mayagüez (West Region) | 1.8 | During the evaluation period, the facility's Compliance was rated as adequate. Significant Non-Compliance exceedances in the following parameters: BOD Removal, Fecal Coliforms 20%-30DA, and Residual Chlorine. Recent modifications to the chlorine injection point are expected to improve compliance with this parameter and the CT to reduce fecal coliforms. The facility's Operations and Process Control category was rated as adequate. Equipment manuals were unavailable on-site, and manuals for the O&M were not up to date. However, the ERP does not apply because the chlorine system has been upgraded to 15% liquid chlorine. In addition, four of the five emergency generators have an ATSARPA in operation, and there is no control room. Overall, the safety is adequate, and the lighting system has been upgraded. The facility's Equipment and Maintenance were rated as adequate. New mechanical bar screens have improved the removal of solids into the plant. Degritters have been recently fixed and operating in good condition. Primary clarifiers are out of service as water flows through them. Some solids do settle, but no means to remove solids or scum. One BNR tank was recently rehabilitated, and others are in adequate condition. There are no proper storage conditions for liquid chlorine as the tank is outdoors without sunlight protection, which significantly accelerates chlorine degradation. The sludge thickeners center well is clogged, creating pulsations in the tank, which may impact efficient sludge decanting. The facility's Staffing and Training were rated as adequate. Only a one-day shift operator is not licensed but is in the process of applying for a license. |

| WWTP | 2022 Score | Observations |
|---|---|---|
| Maricao (West Region) | 1.8 | During the evaluation period, the facility's Compliance was rated as poor. Significant Non-Compliance exceedances were in the following parameters: BOD Removal, TSS Removal %, and Total Nitrogen. In addition, there was a Minor Non-Compliance exceedance in BOD Concentration Monthly. The facility's Operations and Process Control category was rated as adequate. The operators perform the necessary sampling to make adjustments to the process. No coagulant was added; thus, no jar test was performed. The facility has adequate emergency power, and it is tested regularly. However, O&M manuals are the originals and have not been updated. No ERP is available, no NPW System, and no control room. The facility's Equipment and Maintenance were rated as adequate. However, during the site visit, it was observed that the Clarifier's Scum Handling System and Scrapper Motor were damaged. The facility's Staffing and Training were rated as adequate. |
| Cayey (East Region) | 1.9 | During the evaluation period, the facility's Compliance was rated as adequate. There were Significant Non-Compliance exceedances in the following parameters: Phosphorus and Total Nitrogen. In terms of Total Nitrogen, the exceedances were all year long in 2021. However, the Phosphorus exceedances occurred for nine months. The facility's Operations and Process Control category was rated as adequate. The operators conduct the sampling of the facility's primary parameters and modify the dosage that will be applied to the wastewater treatment based on the results. However, the O&M manuals and ERP of the facility were not updated. In terms of maintenance, the facility requires housekeeping of its green areas. Also, the illumination of the facility requires reparation, especially in the area of the Belt Filter Press. The facility's Equipment and Maintenance were rated as adequate. The facility has offsite Mechanical Bar Screens and Grinders from the Troncal Cayey Wastewater Pump Station. In 2021, the facility started receiving influent directly from septage trucks, discharging in the septage tank manhole. Following this, one pump of the RAS/WAS Pump Station is out of service, as well as one unit of the Disk Filters and Belt Filter Press for the sludge. However, the UV lamps have been repaired since the last inspection in 2020. The facility's Staffing and Training were rated as adequate. However, the facility requires additional maintenance staff, sanitary sewer technicians, and security. |
| Patillas (East Region) | 1.9 | During the evaluation period, the facility's Compliance was rated as adequate. Minor Non-Compliance in the following parameters: DO, BOD Removal, BOD Concentration Monthly, and Total Nitrogen. The Compliance score has improved significantly since the year 2020 inspection. The facility's Operations and Process Controls were rated as adequate. The operators perform the necessary sampling to make adjustments to the process. However, the O&M manual was incomplete and not updated, the equipment manuals were incomplete, the fence was damaged, and there was no NPW System. Additional security in virtual monitoring has been added since the last inspection in 2020. The facility needs improvements in the Influent Pre-Treatment and Sludge Drying Beds System. The facility's Equipment and Maintenance were rated as adequate. However, the Comminutor in the Influent Area is not in place. The Grit Removal System is out of service due to the corrosion in the structure, and the Sludge Drying Beds need improvements and better maintenance. The facility's Staffing and Training were rated as good regarding the operation and operating hours. |

#### 4.2.2.4 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 Arecibo, Manatí, Toa Alta, Manatí, Cayey, Humacao, Coamo, Guayama, Aguadilla, and San Germán were inspected in FY2022. The wells in the Bayamón Operational Area were not visited during this period. The Carolina Operational Area does not have wells. Arcadis inspected six wells in the San Germán Operational Area. The facilities were assessed using the following criteria: facility-specific and regional-specific criteria. The facility-specific evaluation criterion considers operations, process control, and equipment aspects related to a specific facility. The regional-specific criterion considers maintenance aspects carried out either 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 and 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 the evaluation of wells, this category was not included in the evaluation. The wells were rated as Good, Adequate, Poor, or Unacceptable. Refer to the FY2022 ACA for details on the criteria and factors evaluated for the wells inspected.

Out of the 20 wells inspected, four received a rating of Poor, two were rated Good, and the remainder were rated Adequate under the overall rating criteria. Note that even though only four wells were rated as Poor, seven (equivalent to 50% of the wells inspected) of the 11 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. Of particular note is the condition of the well Tejas Trinidad, which was barely Adequate, with an overall rating of 1.5.

Table 4-8 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. Five (25%) wells were rated as Poor, 14 (70%) were rated as Adequate, and one (5%) was 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 4-8 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 | 0 | 0 | 0 | 0 |
| Poor (0.5-1.4) | 5 | 25 | 4 | 20 | 4 | 20 |
| Adequate (1.5-2.4) | 14 | 70 | 8 | 40 | 14 | 70 |
| Good (2.5-3.0) | 1 | 5 | 8 | 40 | 2 | 10 |

| Rating Range | Facility Evaluation | | Regional Evaluation | | Overall Rating | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| **Average Rating** | **1.9** | | **1.8** | | **1.9** | |

Table 4-9 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 Bayamón, Carolina, Humacao, and Cayey Operational Areas were rated as Poor for the regional-specific category. The Arecibo and San Germán Operational Areas were rated as Adequate with fewer deficiencies. In the Manatí, Coamo, Guayama, and Aguadilla Operational Areas, which were rated as Good, the issues reported included: unavailability of O&M manuals and as-built drawings, lack of a plan to implement major improvements, maintenance parts inventory is inadequate and challenges in the parts procurement process.

*Table 4-9 Wells Rated as Poor in Facility – Specific Category*

| Facility | 2022 Observations |
|---|---|
| Capriles<br>(West Region, San Germán) | The facility is visited daily. Moderate leakage from the air vents and in one of the bolts of the pipeline was observed during the inspection. Also, the spike flange is corroded. There is no EGU at the facility. The supervisor indicates that the facility fence gets constantly vandalized, and a section of the fence is damaged. The facility needs exterior lighting and security cameras. The facility requires cleaning. |
| Manatí 2<br>(North Region, Manatí) | The facility is visited, and it is monitored remotely as well. Chlorine is monitored adequately. Also, moderate leakage is visible at the pipeline of the well. There is no EGU at the facility. There were bolts and screws on the floor around the facility, causing a health and safety concern. |
| Piedra Gorda<br>(North Region, Arecibo) | Regarding equipment, the flow meter is out of service, and minor corrosion is visible at the well cap. Also, the facility does not have a Self Containment Breathing Apparatus (SCBA) or emergency Kit “A”. In addition, the interior lighting of the facility is not functioning, and the fence is obstructed with vegetation. |
| Manatí 1<br>(North Region, Manatí) | The facility is visited, and it is monitored remotely as well. Chlorine is monitored adequately. The wellhead casing is not extended at least 12 inches above the ground. Also, there is no windsock, and the fence does not surround the entire facility’s perimeter. There is no EGU at the facility. The facility requires maintenance and repainting. Regarding safety, the facility requires a grate to protect the personnel from falling in the section where the isolation valve and flow meter is located. |
| Ollas<br>(South Region, Coamo) | The facility lacks a remote monitor (i.e., telemetry) and EGU. The facility is visited daily. The residual chlorine is controlled by a meter and is sampled. The paint on the distribution lines is fading. The wellhead casing does not exceed 12 inches above the ground. The screws of the wellhead are missing and filled with concrete. Minor corrosion along the pipeline was observed. The chlorine feed system is chlorine gas (150-lb cylinder). The facility is located in a flood zone area, and the structure of the ceiling of the facility is collapsing. |

PRASA should look into mitigation initiatives to address some deficiencies identified during the inspections. However, for the time being, these wells are expected to continue serving their intended supplemental water supply function. One of the main concerns is the lack of backup power at most of the well facilities inspected. This lack of backup power compromises the quality of service to PRASA's customers, making the potable water supply intermittent during electrical power outages. Also, 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.

#### 4.2.2.5 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 in 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 capability from less than 100 gpm to over 9,000 gpm. A total of 33 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 understand the facility's conditions better and obtain an overview of the Regional Operational Areas. The facility-specific criterion considers operations, process control, and equipment aspects related to a particular facility. The regional-specific criterion considers maintenance aspects, which are 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 FY2022 ACA for additional details on the evaluation of the WPSs inspected.

Table 4-10 summarizes the facility ratings for each of the evaluation criteria, as well as the overall facility rating. The average WPSs overall rating is Adequate, with a score of 1.8. The facility-specific criterion accounts for 75% of the weighted factor, as it is the key criterion for assessing the condition of the WPSs. Six (18% of inspected WPSs) facilities were rated as Unacceptable under this category which includes: Mariana III, from the Humacao Operational Area; Cerro Gordo 1 and Peña 2, both from the Bayamón Operational Area; La 22 and La 15, both from the San Germán Operational, and Arrayanes 2, from the Carolina Operational Area; Area. In addition, six (18% of inspected WPSs) facilities were rated as Poor under this category which includes: Mariana II and Mariana IV, both from Humacao Operational Area; Bermejales 1, from Coamo Operational Area; Piedras Blancas (Amigos Unidos), from Aguadilla Operational Area; La Torre, from Cayey Operational Area; and Carruzos 4, from Carolina Operational Area. Note that 13 WPSs were rated as Unacceptable or Poor in the overall rating, and 12 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 4-10 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) | 6 | 18 | 0 | 0 | 3 | 9 |
| Poor (0.5-1.4) | 6 | 18 | 15 | 46[1] | 10 | 30 |
| Adequate (1.5-2.4) | 17 | 52 | 6 | 18 | 17 | 52 |
| Good (2.5-3.0) | 4 | 12 | 12 | 36 | 3 | 9 |
| **Average Rating** | **1.7** | | **1.9** | | **1.8** | |

Table 4-11 lists the deficiencies of the facilities rated as Unacceptable or Poor in the facility-specific category.

*Table 4-11 WPSs Rated as Unacceptable or Poor in Facility–Specific Category*

| Facility | 2022 Observations |
|---|---|
| Cerro Gordo 1 (Metro Region, Bayamón) Unacceptable | Only one pump is in working order; therefore, no redundancy is available. The facility lacks a flow meter. Also, the facility does not have rails for the crane, and there is no backup power available on-site. Severe leakage at the base of the pumps and along the pipeline was observed. The facility requires housekeeping, maintenance, and better security. |
| Peña 2 (Metro Region, Bayamón) Unacceptable | Only one pump is in working order; therefore, no redundancy is available. Only pump remote visualization is available. Also, there is no crane and rails in place. The facility does not have backup power available on-site. There is a severe leakage at the pipeline, and corrosion was observed along the pipeline and pumps' base. The facility sign is fading. The facility requires cleaning and repainting in various areas. |
| La 15 (West Region, San Germán) Unacceptable | The pumps do not have elapsed time meters. Two pumps are out of service; therefore, no redundancy is available. There is a severe leakage at the check valve, and the drive shaft is severely corroded. The control panels are not in good condition, and there have been electrical problems. The diesel containment tank needs maintenance, as well as the gate and fence of the facility. The facility requires cleaning in various areas. |
| Arrayanes 2 (Metro Region, Carolina) Unacceptable | One pump is out of service, and one "fitting" is broken. There is a severe leakage and moderate corrosion along the pipeline and air vents. There is no flow meter on-site. The EGU is out of service; however, the personnel at the facility mentioned that the unit is unnecessary. Some exterior lights are not working, and there are security cameras. The facility sign is not readable. The facility's overall appearance is poor. |

| Facility | 2022 Observations |
|---|---|
| Mariana III<br>(East Region, Humacao)<br>Unacceptable | The facility does not have a telemetry system. Also, the drive shaft of the pumps has severe leakage and corrosion. The facility does not have an EGU. The emergency numbers of the facility are not posted. The facility's fence is damaged and requires housekeeping in terms of cleaning and maintenance. |
| La 22<br>(West Region, San Germán)<br>Unacceptable | All pumps are in service. The facility does not have rails on the crane. The drive shafts are severely corroded, and there is a severe leakage from them. The facility's personnel indicates there have been electrical issues at the facility. The surroundings of the pumps are heavily obstructed by vegetation, as well as the facility fence. |
| Mariana II<br>(East Region, Humacao)<br>Poor | The pump base is damaged. There is a severe leakage at the pump's drive shaft and moderate corrosion. The facility does not have an EGU. The facility doors are highly damaged, and it is unknown if the exterior lights are operational. |
| Bermejales 1<br>(South Region, Coamo)<br>Poor | The control panel is not adequately labeled. The facility lacks remote monitoring, crane or rails, flow meter, and backup power. Only one pump is in working order; therefore, no redundancy is available. There are minor leaks in the pressure-reducing valve, and minor corrosion was observed on the pipeline. Site security needs improvement due to the damages observed at the fence and door. |
| Piedra Blancas (Amigos Unidos)<br>(West Region, Aguadilla)<br>Poor | The control panel is not adequately labeled. The facility is monitored remotely. All pumps are in service. The facility does not have a crane or a flow meter, and there is no backup power available on-site. Also, corrosion and moderate leaks were observed on the pump's drive shaft. Some fence sections are damaged, and the interior lighting is inadequate. The overall facility's appearance is inadequate since it needs painting, and repairs to the access room where the pumps are located are also needed. |
| La Torre<br>(East Region, Cayey)<br>Poor | The drive shaft of the pumps has moderate leakage and exhibits severe corrosion. The facility does not have a flow meter for the equipment. In terms of security, the facility complies with the requirements. |
| Mariana IV<br>(East Region, Humacao)<br>Poor | One of the pumps is under repair. The drive shaft of the pump has moderate corrosion. In addition, the facility has electricity problems due to the voltage. The facility emergency numbers are not posted, and there is no EGU. |
| Carruzos 4<br>(Metro Region, Carolina)<br>Poor | The pump's elapsed meters are not functioning properly. Only one pump is in working order; therefore, no redundancy is available. There was small cavitation on the day of the site visit. Also, the facility has a crane, and no flow meter is available on-site. Minor corrosion was observed along the pipeline. The EGU is out of service. The facility sign with emergency phone numbers is not posted at the facility. The door of the generator room is damaged. The facility requires housekeeping and cleaning. |

The observed deficiencies in terms of the regional-specific category evaluations for Bayamón, Carolina, Humacao, and Cayey Operational Areas for potable water systems, which were rated as Poor, were the following:

- Unavailability of O&M manuals

- Maintenance parts inventory inadequate
- Lack of procedure to prioritize repairs
- Challenges in the parts procurement process are very slow
- Unavailability of as-built drawings
- Unavailability of proper written procedures to handle emergencies
- Insufficient staff
- Lack of training

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) its needs. Note that PRASA has included in its CIP program several projects to address WPSs, and it is expected to see improvement in the following years.

#### 4.2.2.6 Wastewater Pump Stations

PRASA owns and operates 831 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 FY2022. 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 FY2022 ACA for additional details on the evaluation of the WWPSs inspected.

The facilities were evaluated using facility-specific and regional-specific criteria to understand the facility's conditions better and obtain an overview of the Regional Operational Areas. The facility-specific criterion considers operations, process control, and equipment aspects related to a specific facility. The regional-specific criterion considers maintenance aspects, which are 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, 13 (65%) received an Adequate overall rating, seven (35%) received an overall rating of Poor, and none were rated as Good and Unacceptable. Table 4-12 summarizes the facility ratings by each evaluation criteria and the overall facility rating for the facilities inspected.

*Table 4-12 WWPSs – 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 | 0 | 0 | 0 | 0 |
| Poor (0.5-1.4) | 10 | 50 | 11 | 55 | 7 | 35 |
| Adequate (1.5-2.4) | 10 | 50 | 3 | 15 | 13 | 65 |
| Good (2.5-3.0) | 0 | 0 | 6 | 30 | 0 | 0 |

| Rating Range | Facility Evaluation | | Regional Evaluation | | Overall Rating | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| **Average Rating** | **1.7** | | **1.8** | | **1.8** | |

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 4-13 lists the deficiencies of the ten facilities rated as Poor in the facility-specific category.

*Table 4-13 WWPSs Rated as Poor in Facility–Specific Category*

| Facility | 2022 Observations |
|---|---|
| Jaucas<br>(South Region, Coamo) | The last overflow occurred on February 5, 2021. Only one pump station is in service (Pump 2), and the other is damaged; hence, no redundancy. The facility has exhaust fans that operate manually. The pump station is not remotely monitored. The diesel has adequate containment for the tank. |
| Montaña<br>(West Region, Aguadilla) | The control panel is labeled inadequate with a permanent marker. The bar screen had visible debris. Pump 1 is out of service. There is severe corrosion along the pressure gauge, check and isolation valves, and the influent pipeline. The facility only has crane rails. The EGU is available, and the diesel containment has a capacity of 1,000 gallons. |
| Rosario<br>(West Region, San Germán) | The facility is visited every three to four days. There is severe visible corrosion along the pipeline. Also, there are no cranes at the facility, and only the rails are available. The facility requires housekeeping in terms of cleaning and repainting. |
| Coamo Main<br>(South Region, Coamo) | The last of various overflows occurred on May 31, 2021. Two pumps are out of service, and the exhaust fan operates manually. During the site visit, the bar screen and pipeline were not visible due to the wastewater level. Regarding security, the facility fence has vegetation obstruction, and the exterior lighting is not functioning. |
| Sabana Hoyos<br>(North Region, Arecibo) | The facility sign with emergency numbers needs to be replaced since it is barely visible. The bar screen had visible debris and is cleaned weekly. The facility needs a crane since only the crane rails are available. The facility does not use float level controls; another type of level control equipment is installed. |
| San Rafael Estates<br>(Metro Region, Bayamón) | The control panel is adequately labeled. The overflows occurred due to the float valves being stuck. Interior/exterior audible alarms are unavailable, and the facility is not remotely monitored. The facility has a backflow preventer, check valve, and isolation valve. The bar screen and the pumping pit were not clean at the moment of the Inspection. The check valves and air vents have early signs of corrosion. The exhaust fan works manually. The reported power failure was related to LUMA operations. |

| Facility | 2022 Observations |
|---|---|
| Villa Carolina<br>(Metro Region, Carolina) | The elapsed time meters of the pumps are digitals. The bar screen is cleaned daily. The operation of this facility is not remotely monitored. One of the pumps is out of service, and the working pump had cavitation at the time of the inspection. There is minor leakage at the check valve area. The transfer switch of the EGU is not operating adequately. |
| Bajaderos<br>(North Region, Arecibo) | The facility sign with emergency numbers needs to be replaced since it is barely visible. The personnel notified that the bar screen is cleaned biweekly. However, at the site visit, the bar screen had visible debris. Regarding security, the exterior lighting appears to be in good condition. |
| Isla Verde (Villamar)<br>(Metro Region, Carolina) | The last overflow occurred in the facility due to a pump malfunction on December 21, 2021. The bar screen was not visible, but it was informed that they are cleaned weekly. The transfer switch is out of service (burned out). In terms of security, the facility complies with all requirements. |
| Cuidad Cristiana<br>(East Region, Humacao) | The exhaust fan is out of service. Also, there is moderate corrosion along the pipeline. The interior lights of the facility are not functioning. The facility does not have a telemetry system. |

The common deficiencies observed in terms of the Regional evaluations for Bayamón, Carolina, Cayey, Aguadilla, and San Germán 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, Arecibo and Humacao, were rated as Adequate and had some of the previously mentioned deficiencies. On the other hand, the Manatí, Coamo, and Guayama Operational Areas were rated as Good and experienced fewer deficiencies than the other areas.

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. Note that PRASA has included in its CIP several projects to address WWPSs, 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.

### 4.2.2.7 Water Storage Tanks

PRASA owns and operates 1,564 WSTs that vary in storage capacity (size) from 100 to 10 million gallons. A total of 31 WSTs were inspected in FY2022. 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 understand the facility's conditions better and obtain an overview of the Regional Operational Areas. The facility-specific criterion considers operations, process control, and equipment aspects related to a specific facility. The regional-specific criterion considers maintenance aspects, which are 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 31 WSTs inspected, eight (26%) received a Good rating, 21 (68%) were rated as Adequate, and two (6%) were rated as Poor under the overall rating. Note that the average overall rating was in the Adequate range (1.8); six WSTs (equivalent to 21% 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 Poor, Adequate, and Good. Table 4-14 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 Unacceptable, 15 (48% of inspected WSTs) were rated as Adequate, and 14 (45% of inspected WSTs) were rated as Good.

*Table 4-14 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) | 2 | 7 | 0 | 0 | 0 | 0 |
| Poor (0.5-1.4) | 0 | 0 | 13 | 42 | 2 | 6 |
| Adequate (1.5-2.4) | 15 | 48 | 6 | 19 | 21 | 68 |
| Good (2.5-3.0) | 14 | 45 | 12 | 39 | 8 | 26 |
| **Average Rating** | **1.8** | | **1.9** | | **1.8** | |

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 4-15 lists the deficiencies of the two (7%) facilities rated as Unacceptable in the facility-specific category.

*Table 4-15 WSTs Rated as Unacceptable in Facility – Specific Category*

| Facility | 2022 Observations |
|---|---|
| La Pepilla<br>(West Region, San Germán) | The facility is not visited daily. The facility has telemetry to notify the level of the tank. The roof and bottom of the tank have minor holes and cracks. Also, there is a severe leakage at the bottom of the tank. The air vents of the tank are severely rusted. The internal inspection of the tank occurs every six months to two years. The cleaning and flushing procedures occur every six months to two years. The facility does not have exterior/interior lighting, and the roof railing on the tank's roof is corroded. |
| La 22<br>(West Region, San Germán) | The interior of the tank is inspected as needed. The water quality is tested every two years. The facility is not visited daily. The facility is inspected every three to four times a month. The tank has minor cracks that require repair. Also, the air vents of the tank are moderately rusted, and the access ladder to the tank is obstructed by vegetation. The facility does not have any requirements for security, such as security cameras or lighting. The emergency phone numbers (facility sign) are posted. The fence of the facility is collapsed in one section. The facility requires cleaning of its area. |

The observed deficiencies in the Regional evaluations are the same as described in the WPS section for potable water systems. Note that PRASA has included in its CIP several projects to address WSTs, and it is expected to see improvements in the following years. In addition, remote monitoring is still a recommendation 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 that have been 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 targets 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 Customer Service Department.

### 4.3.1 Water Meters

PRASA owns over 1.4 million 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 805,732 small meters (1-inch in diameter or less) and over 5,652 large meters (greater than 1-inch in diameter) were replaced between FY2009 and FY2022. 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 62,193 small and 116 large meters were replaced during FY2022. These replacements were mainly due to maintenance, theft, or special client requests.

Due to available federal funding, PRASA is currently focusing on planning and implementing the 2022 PRASA Fiscal Plan. One of the main initiatives is implementing a project to modernize PRASA's metering system, improve billings and collections, and reduce NRW. 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 June 2022, PRASA owns over 15,219 miles of water pipelines, including transmission and distribution pipes ranging from two inches 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 make up 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 water used for 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 4-16 summarizes key water distribution system metrics since FY2018, 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 4-16 Water Losses and Non-Revenue Water*

| Fiscal Year | Total Water Production (MGD)[1] | Water Losses | Non-Revenue Water |
|---|---|---|---|
| | | (MGD) | (MGD) |
| FY2018 | 507 | 308 | 314 |
| FY2019 | 542 | 342 | 349 |
| FY2020 | 541 | 352 | 359 |
| FY2021 | 551 | 356 | 368 |
| FY2022 | 519 | 328 | 339 |
| Difference FY2022-2021 | **-26** | **-28** | **-29** |
| Cumulative Difference FY2018-2022 | **12** | **20** | **25** |

[1] Includes a metering-error adjustment identified by PRASA in its water balance audits. Note that water production in FY2018 was affected by the impact of the 2017 Hurricanes.

As shown in Table 4-16, from FY2018 to FY2022, PRASA reports having reduced the amount (volume) of water produced (12 MGD reduction), amount of water losses (20 MGD reduction), and NRW (25 MGD reduction). In FY2022, of the total 519 MGD produced, approximately 339 MGD was NRW, a decrease in NRW over FY2021 results (368 MGD). Of this amount of NRW, 328 MGD was due to water losses (both apparent and real), and

11.15 MGD was due to unbilled authorized consumption. Of the total water losses in FY2022, approximately 49.60 MGD was due to apparent (commercial) losses, while approximately 278.72 MGD was due to real (physical) losses. According to the FY2022 PRASA Fiscal Plan, PRASA's goal is to reduce water losses by 54 MGD by FY2027 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 losses 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 2022 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's goal is to reach a metered reading of 93% of the water production by the end of FY2023. During FY2022, PRASA exceeded the expected goal of 92%.

#### 4.3.2.1 Leak Monitoring and Control

Table 4-17 shows that leaks reported in FY2022 amounted to 58,553 and includes the average annual leaks per 100 miles of water piping for recent fiscal years. In FY2022, there was an increase of 3% compared to FY2021.

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 10.2 and 37.9, with a median of 21.7). 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 4-17 Reported Leaks from FY2018 Through FY2022*

| Fiscal Year | Total Annual Reported Leaks | Annual Leaks per 100 miles Using 15,219 miles of Water Pipeline |
|---|---|---|
| 2018 | 45,873 | 311 |
| 2019 | 57,997 | 393 |
| 2020 | 56,536 | 383 |
| 2021 | 56,831 | 375 |
| 2022 | 58,553 | 385 |

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

Refer to the FY2022 ACA for additional details on statistics related to leaks and the backlog of repairs. Regarding water storage tank overflows 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 providing training to its employees to carry out the necessary maintenance activities.

### 4.3.3 Wastewater Collection System

PRASA's GIS, updated in June 2022, shows that PRASA owns approximately 6,018 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 FY2022 were 28,555 (Refer to Table 4-18). 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 4-18 also shows the average annual overflows occurrence per 100 miles of sewer. 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. In FY2020, there was a negligible increase of 1% in reported overflows. In FY2021, there was an increase of 4% in reported overflows. In FY2022, there was a negligible decrease of 1% in reported overflows. Note that Arcadis has not made an independent evaluation to identify the root causes of the 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 0.8 and 4.9 overflows (with a median of 2.0)[3]. However, this high rate is not surprising given the size and complexity of the System. Contributing factors to these high overflows rate could be aging infrastructure, damages from the 2017 Hurricanes, earthquakes, and inadequate customer use (i.e., illegal connections and discharges).

*Table 4-18 Reported Overflows from FY2018 Through FY2022*

| Fiscal Year | Reported Overflows | Annual Overflows per 100 miles Using 6,018 miles of Wastewater Pipeline |
|---|---|---|
| 2018 | 23,819 | 397 |
| 2019 | 27,253 | 455 |
| 2020 | 27,478 | 455 |

[3] Source: 2021 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

| Fiscal Year | Reported Overflows | Annual Overflows per 100 miles Using 6,018 miles of Wastewater Pipeline |
|---|---|---|
| 2021 | 28,769 | 467 |
| 2022 | 28,555 | 549 |

Source: PRASA SAP (Commercial) Database.

Refer to the FY2022 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 a total of 184 facilities throughout PRASA's five Operational Regions between February and July of 2022 to conduct a condition assessment of PRASA's facilities. Of the inspected facilities, 72 (39%) 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. Tables 4-19 and 4-20 summarize the inspection's overall rating results. Note that the comparison of asset condition for the dams is against FY2020 since that was the latest inspection performed before the FY2022 inspection. The data indicates that only 9% of the facilities inspected in FY2022 are in Good condition, and 71% are in Adequate condition. However, 33% (43 of 130) 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.

Twenty-one 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.

*Table 4-19 2022 vs. 2020 Dams Condition Inspection Results Summary*

| Asset Category | Unacceptable | | Poor | | Adequate | | Good | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2022 | 2020 | 2022 | 2020 | 2022 | 2020 | 2022 | 2020 | 2022 | 2020 |
| Dams | 0 | 0 | 4 | 4 | 4 | 4 | 0 | 0 | **8** | **8** |

*Table 4-20 2022 vs. 2021 Asset Condition Inspection Results Summary*

| Asset Category | Unacceptable | | Poor | | Adequate | | Good | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2022 | 2021 | 2022 | 2021 | 2022 | 2021 | 2022 | 2021 | 2022 | 2021 |
| Water Treatment Plants | 0 | 0 | 0 | 2 | 45 | 49 | 3 | 6 | **48** | **57** |
| Wastewater Treatment Plants | 0 | 0 | 8 | 10 | 16 | 13 | 0 | 0 | **24** | **23** |
| Wells | 0 | 2 | 4 | 2 | 14 | 12 | 2 | 0 | **20** | **16** |
| Water Pump Stations | 3 | 1 | 10 | 12 | 17 | 16 | 3 | 1 | **33** | **30** |
| Water Storage Tanks | 0 | 2 | 2 | 10 | 21 | 19 | 8 | 3 | **31** | **34** |
| Wastewater Pump Stations | 0 | 0 | 7 | 9 | 13 | 9 | 0 | 2 | **20** | **20** |
| **Total** | **3** | **5** | **35** | **49** | **130** | **122** | **16** | **12** | **184** | **188** |
| **Percent of Total** | **2%** | **3%** | **19%** | **26%** | **71%** | **65%** | **9%** | **6%** | **-** | **-** |

Comparing the assessment results by asset category with those of the FY2022 condition assessment for treatment plants (WTPs and WWTPs) and FY2020 condition assessment for dams, positive changes were observed for WTPs, and negative changes were observed for dams and WWTPs. Also, the overall rating for ancillary facilities increased to different degrees for wells, WPS, WST, and WWPS.

### 4.4.1 Dams

PRASA's eight regulated dam conditions are rated as Poor to Adequate. Many of the recommendations from the 2020 and prior inspections saw little or no progress, resulting in the overall depreciation of ratings across the board and on all of the inspected dams. Four were rated as Poor, and four as Adequate. All dams appear to have deteriorated since the last inspection, although some improvements were observed but not well-documented. Most minor issues from past inspections were again observed during the most recent inspection. All non-functional gates, valves, and low-level outlets (LLOs) should be evaluated and repaired, and repeated deficiencies should be prioritized and addressed. Systems of dam maintenance, routine repairs, instrumentation monitoring, record keeping, and Emergency Action Plan (EAP) exercises should be comprehensively planned and implemented. Improved record keeping should be used to facilitate instrumentation data evaluation, development of surveillance and monitoring plans, and performance of potential failure modes analysis. A dam safety training program is recommended to improve the knowledge and capability of the staff who routinely maintain and monitor the dams. We strongly recommend that PRASA act on past and present priority recommendations as documented in the inspection reports by Arcadis and PREPA.

### 4.4.2 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 2.9 rating, and WWTPs were on the upper end of Poor, with a 1.3 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) limits.

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 FY2021 inspection results, the Staffing and Training criteria scores decreased, and the Regulatory Compliance and Operations and Process Control scores increased. The Equipment and Maintenance scores stayed the same. The recent score increase in the Operations and Process Control criteria can be attributed partly to the process control initiatives implemented at the WTPs as part of the compliance effort to control DBPs. The Equipment and Maintenance criteria rating scores have remained fairly constant for the past few years; this can be attributed to the same equipment being out of service or deteriorating, as previously reported. The score increase of the Regulatory Compliance criterion may be because several parameters had interim limits or were only being monitored, which do not negatively affect the compliance rating.

The WWTPs generally range from Poor to Adequate conditions in the overall rating. Out of the 24 facilities inspected, eight (33%) received a Poor overall rating, and 16 (67%) received an Adequate rating. Five of those eight facilities had a Poor rating in terms of Equipment and Maintenance. Compared to the FY2021 inspection results, Regulatory Compliance stayed the same. The Operations and Process Control and Equipment and Maintenance scores increased 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. The Regulatory Compliance criterion was on the upper end of Poor despite some facilities having interim limits or monitoring only on certain parameters. Also, PRASA must plan and make the necessary improvements to both WWTPs and WTPs so that when the interim limits are lifted, the facilities can meet the permanent limits.

### 4.4.3 Wells, Water and Wastewater Pump Stations, and Water Storage Tanks

Regarding ancillary facilities, the facility criteria rating of wells, WPS, and WST increased but remained at the lower end of Adequate and, if left unattended, could continue to deteriorate. WWPSs facility criteria rating stayed the same rating (1.7). 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 continue to 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.

### 4.4.4 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 2022 PRASA Fiscal Plan WRO's main initiatives: pressure management and optimization, water leak reduction (reported and unreported); WST overflow avoidance; and data quality improvement (reduce estimation) 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 the duration of these overflow events and their 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.

### 4.4.5 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 the implementation of 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 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.

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.

Despite all the challenges faced by PRASA in recent years, including slow recovery from the impact of the 2017 Hurricanes, the 2020 earthquakes, and the COVID-19 pandemic, most of the facilities have been brought to operational status and, at least continue to serve their intended purpose of providing potable water supply and treating the wastewater. Therefore, 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 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 need.

## 5.3 O&M Costs

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

PRASA's FY2022 O&M expenses preliminary projection for the water and wastewater system (combined) is approximately $741 million, of which $683 million are directly related to the O&M of the System. The remainder of $58 million is related to commercial activities and provision of customer services, including but not limited to staffing and operation of customer service offices islandwide; meter reading; connection and disconnection

services; invoice preparation, printing, and distribution; and customer service call centers, among others. PRASA estimates that during FY2022, approximately 73% of its System's O&M budget ($498 million) was allocated to the water system and the remaining 27% ($185 million) 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 Table 5-1 and Table 5-2 below. A comparison to benchmark values is also provided.

*Table 5-1 PRASA FY2022 O&M Water System Budget Benchmarks*

| Performance Indicator | FY2022 PRASA | 2021 AWWA Benchmark Median[1] |
|---|---|---|
| Cost per Account[2] | $394 | $429 |
| Cost per MG Processed[3] | $2,629 | $2,713 |
| Cost per 100 miles of pipe[4] | $3,272,226 | $2,806,039 |
| Total O&M System FY2022 Results | $498 million | - |

[1] Source: 2021 AWWA Utility Benchmarking: Performance Management for Water and Wastewater. Values are rounded. [2] Based on the total accounts at the end of FY2022 of 1,263,948 (water accounts) and 779,583 (wastewater accounts).
[3] Based on FY2022 total water production and distribution of approximately 519 MGD of potable water.
[4] Based on 15,219 miles of water pipeline obtained from PRASA"s GIS Database.

*Table 5-2 PRASA FY2022 O&M Wastewater System Budget Benchmarks*

| Performance Indicator | FY2022 PRASA | 2021 AWWA Benchmark Median[1] |
|---|---|---|
| Cost per Account[2] | $237 | $390 |
| Cost per MG Treated[3] | $2,497 | $2,750 |
| Cost per 100 miles of pipe[4] | $3,074,111 | $3,354,685 |
| Total O&M System FY2022 Results | $185 million | - |

[1] Source: 2021 AWWA Utility Benchmarking: Performance Management for Water and Wastewater. Values are rounded.
[2] Based on the total accounts at the end of FY2022 of 1,263,948 (water accounts) and 779,583 (wastewater accounts).
[3] Based on FY2022 total treatment of an estimated 203 MGD of wastewater.
[4] Based on 6,018 miles of wastewater pipeline obtained from PRASA's GIS Database.

### 5.3.1 Chemical Expenses

In FY2022, chemical-related expenses were one of the largest operating expenditures at nearly $60 million. 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 it is driven by supply and demand market factors. PRASA will continue to identify alternatives for chemical usage related to the System and has identified a task force to evaluate the cost savings strategies. PRASA plans to issue 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.

## 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 FY2022, PRASA had a total staff headcount of 4,604. Overall, staff decreased by 1.5% from FY2021 to FY2022; hence staff limitations continue to be one of the greatest challenges for achieving efficiency. Plant operators, electromechanics staff, and maintenance crews are still needed islandwide. PRASA's Human Resources (HR) Department is currently focusing on these main objectives: 1) achieving PRASA's headcount goal of 4,950 employees by FY2027 (with no vacant positions) as presented in the 2022 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, which provides incentives to eligible employees to retire early voluntarily. In FY2022, there were 254 employees in this program.
- 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 so that the candidate gets exposure to the working environment and confirms 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.
- Complete assigning corporate emails to employees to access the My Portal Application. Once this is complete, the employees can complete the application registration.
- Updating in-house training modules and staff qualifications.

Initiatives for the HR Department for FY2023 and beyond include:

- In FY2023, HR could potentially explore and evaluate alternatives to promote remote work under Law 36 for different positions, which requires an evaluation by the labor unions.
- New pay compensation scales were negotiated with UIA-AAA and HIEPPA based on the compensation study performed by *Meléndez, Bravo y Asociados, Incorporated*, with an effective date of July 1, 2022.

#### 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 as well as in call centers.

PRASA is currently operating 11 commercial offices. The Culebra office is still waiting to sign a contract with the municipality to rent a space. The Department is looking for a new location to rent for the Rio Piedras before December 2022, and the Mayaguez office needs to be relocated in FY2024. Visits can be scheduled by appointments or walk-ins. PRASA has two private call centers currently under contract 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 has been slowly re-establishing the Key Performance Indicators (KPIs) set for measuring actual consumption at each water meter instead of estimating the quantity. The Metro area has the lowest amount of water meters read at 89%. The Department is now allowed to disconnect customers that have not paid their bills since the service disconnection moratorium due to COVID-19 is no longer applicable.

New 5/8-inch meters are being bought through a solicitation awarded in 2022. The Department is buying mechanical meters to replace damaged ones, have certain Reading Routes (*Unidad de Lectura*, UL), or for new service connections. PRASA released the RFP to replace all the water meters in Puerto Rico with ultrasonic or electromagnetic technology. This RFP includes an Advanced Metering Infrastructure (AMI) system for the remote reading of all meters, which are approximately 1,400,000 meters islandwide. PRASA plans to begin the AMI project with a pilot program to select the technology that will be installed islandwide. PRASA is evaluating the proposals and will commence the pilot program in the first half of the calendar year 2023.

Another key initiative for the Department is billing collection. The Department is working on an RFP to hire up to two collection agencies to assist PRASA with collecting payments. They expect to have the contract(s) in place by the end of FY2023. 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 been a total success in recovering $155 million through FY2022.

As the Department shifts its efforts into new projects, such as the 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 working on updating the SOPs. They are currently working on SOP Nos. 601, 603, and 608. New initiatives that the Department hopes to adopt in FY2023 are verifying the utility bonds on file to ensure they are up to date, and working with the Unions to align with regulations updates.

#### 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 warehouse assistants and purchasing analysts.

Since 2017, the Logistics Department has been developing a system to manage the inventory of each PRASA warehouse. This initiative is called Warehouse Management (WM) and was implemented successfully in Ponce and Arecibo in May 2022 and August 2022, 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 has been scheduled to be fully implemented in FY2023 for Humacao, Puerto Nuevo, San Germán, Coamo, and Aguadilla warehouses. However, PRASA plans to implement this initiative at all warehouses soon. For example, the Puerto Nuevo warehouse uses WM to track chlorine cylinders (150 pounds and 1 ton). Also, the Logistics Department is working on buying new chlorine cylinders since many do not pass the hydrostatic test because of aging. PRASA owns cylinders that are more than 50 years old, and in FY 2023, they expect to replace the 116-ton cylinders and 100 150-pound cylinders.

Due to a lack of funds, the Department has not been able to create a new materials catalog or install security cameras at the warehouses in 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.

To reduce chemical costs, the Department issued two bids to purchase chlorine gas and sodium permanganate for use in the facilities. For two WTPs, Enrique Ortega and Cubuy, PRASA is working with AquaTech to purchase and optimize the use of chemicals at these specific facilities as a cost-saving initiative.

During FY2023, the Purchasing Department plans on revising two SOPs related to Procedures Nos. 399 and 400 to align with the updates to Law 73 from *Administración de Servicios Generales* (ASG), in addition to remodeling the bathroom area adjacent to the Central Administration Building, and acquiring new equipment for two new analysts.

The KPI metrics being monitored by each region and islandwide 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 orders approval
- KPIs for average days for the whole process
- KPIs for emergency orders

#### 5.4.1.4 Systems and Information Technology

PRASA Systems and IT Department continues the development of information technology areas and implementing various initiatives to improve software and hardware practices.

During FY2022, the following initiatives and programs were implemented by the Department:

- SAP improvements
  - Integration of SAP with QPLUS, a software that utilizes an Android platform. The implementation within the Preventive Maintenance Department was performed in 2020, and during FY2022, all the Android units were updated with the integration. In FY2023, IT will continue developing new functionalities for the system.
  - Business Warehouse – BW 4 HANA is a SAP tool used to obtain real-time reports and was fully implemented during FY2022.
  - SAP WM will improve the materials management efficiency at PRASA's warehouses. During FY2022, WM was implemented in the Arecibo and Ponce warehouses. The system is expected to be implemented in other warehouses during FY2023.
  - SAP budget and billing new functionalities for small infrastructure projects were implemented in June 2022.
  - The SAP customer payment channel development for PRASA's website and mobile application. This channel allows for safe transactions when customers pay their bills. The implementation was completed in FY2022.
  - The SAP project system continued to be updated in FY2022. New functionalities to the SAP Project Module were implemented, like digitalization, invoice certification, and payments.
  - The SAP maintenance contract with a company to provide professional services was executed in FY2022.
- The Arin application to provide internet redundancy continues to be used by PRASA. The routers were purchased, and the software is complete. A consultant continues to work on this initiative throughout FY2023.
- The Automated Hydrant Inspection System (SAIH, for its Spanish acronym) application was completed during FY2018; however, the implementation contract is still pending approval due to delays related to the outstanding Memorandum of Understanding between PRASA and the Puerto Rico Fire Department. This application enhances the hydrants' inspection process.
- The Dynatrace Software, an artificial intelligence program, will help identify errors, diagnose and fix performance issues and find the root cause analysis of IT systems issues. The first phase was completed, and PRASA continues to evaluate the next steps.
- SAP Analytic Cloud works like Microsoft PowerBI with real-time analytics, forecasting, and dashboards. It has been implemented and is in place.
- Q Order is a program similar to QPLUS with Preventive Maintenance and Customer Service as end users. Q order allows tracking maintenance and repair tasks for both scheduled and corrective maintenance. The program was implemented in FY2022.
- System Integration Initiative – This initiative consists of the integration of different databases within PRASA's systems, such as SAP ISU (clients), GIS (location and cadaster information), SIM (emergency information), and SCADA (real-time asset information) that will allow PRASA to join information on specific systems providing accurate and detailed information when areas are without service. This initiative will also aid by providing maps with detailed client information. The first phase was completed in October 2021 by integrating GIS and SAP ISU. Phase 2, which includes the implementation of SAP ISU and SCADA, has been planned and will be executed soon.

- Q Plus (Archiving) – Typically, the backup of Q Plus takes a long time (up to a day) to complete. The daily backup will be faster by archiving the older files using Q Plus upgrades. This upgrade was completed in October 2021.
- IT Master Plan – This Master Plan is specific to IT-related projects and includes the framework through the Year 2027. The master plan was completed and is being discussed with PRASA's main stakeholders.
- SAMS Industrial Pretreatment Program – The IT Department assisted the Compliance Department with implementing and configuring the system for the Industrial Pretreatment Program during FY2022. Phase 2 consists of an application for the management of the program and is expected to be completed in December 2022.

Initiatives for the IT Department for FY2023 and beyond include:

- Security Awareness Program – The IT Department is looking to upgrade its security system and is currently looking for suppliers and preparing the purchase order request. It is expected to be implemented during FY2023.
- Business Continuity Plan – The Department is updating the existing business plan and intends to complete this activity in June 2023.
- SubastasAAA – The Department plans to implement a new platform to manage the procurement process and integrate it with the purchasing system. This upgrade is expected to be completed in December 2022.
- Customiza Mobile Application – The Department will configure and deploy the Customiza software to automate processes and manage the procedures in the Legal and PPP (Public and Private Projects) areas during FY2023.
- Starlims Mobile Application – This application will implement a solution for managing field data from sampling stations using a smartphone. To use the software, the IT Department upgraded the existing infrastructure to support the new Starlims application. The application is currently in use, and new functionalities will be developed during FY 2023.
- Kronos Upgrades – The software used by HR for employee time tracking is being upgraded to Version 8.1. This project is in process and is expected to be completed in FY2023.

The IT Department continues to support all the departments within PRASA. Ongoing tasks for 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 the different social media platforms such as Instagram, Twitter, Facebook, YouTube, and LinkedIn. The quick availability of information and images received through social media also allows PRASA to respond faster to its customers. PRASA also 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, sharing campaigns, etc., to keep the public informed of ongoing and resolution of operational situations. Press conferences and other events are also shared on social media. Regional Communications Directors are in charge of producing materials for the accounts; each director is

responsible for addressing comments and messages on the posts. During FY2023, PRASA also plans to include employee recognition through social media.

The Communications Department, in coordination with the IT Department, continues updating and improving PRASA's website, which includes an investor relations section, Consent Decree information, press releases, 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.

Three key positions related to the Educational Program, Webmaster, and Auxiliary Director for the South Region are pending to be filled in FY2023.

The Communications Department has been working on ongoing initiatives, including:

- The internal newsletter is published once a month, including information from all the regions.
- Through Youtube, the Communications Department has been producing *AcueductosTV* once a month with a focus on educational programs and information on the different departments.
- The media tour for the infrastructure projects was introduced during FY2022 and will continue through the FY. This tour collaborates with the Presidency and Infrastructure Department to promote CIP projects through different media, including social media, radio, TV, and the press.
- Educational events are programmed in person unless the school or center asks for an online course. PRASA's participation in public events is ongoing.
- The Water Conservation Program and Educational campaigns are ongoing.
- PRASA continues to use the hashtag: #somosAAA.
- A recognition program was implemented in March 2022 for the administrative personnel, in August 2022 for the Operations group, and in November 2022 for the Customer Service Department and WRO. 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.
- 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) seminar.
- Assist all departments with campaigns and create 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 two events and plans to participate in at least one event quarterly.
- 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 *Administracion de Desarrollo Socioeconómico de la Familia* (ADSEF).
- Lead the yearly drawing contest where 12 children related to the employees are selected for the art to be included in PRASA's outreach calendar.

Initiatives for the Communication Department for FY2023 and beyond include:

- Hiring a marketing agency to assist with the development of future campaigns. The Department is in the procurement process and plans to execute the contract with the selected agency in FY2023.

- The Department is creating an initiative within PRASA's LinkedIn page to create content to get to know PRASA employees.
- Create a program 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.
- Participate in an internship program with the University of Puerto Rico Arecibo campus.
- Getting to know PRASA (*Conoce la AAA*) initiative is a collaboration 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. The Department is in the process of assigning staff to this initiative and providing adequate training to provide guided tours to the students and faculty of the selected schools.
- Acquire new equipment such as televisions, microphones, and cameras for the use of the Department.

#### 5.4.1.6 Compliance

DBPs continue to be one of the greatest challenges for PRASA to achieve and maintain compliance. PRASA recognizes that no single corrective action will solve the DBP issues. Still, operational adjustments and treatment optimization and, in most cases, capital projects at the WTPs and/or the distribution system will need to 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. Eventually, additional efforts will be implemented throughout the distribution system. 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 DBPs compliance:

- Installation of in-line equipment to measure precursors of DBPs 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
- Ongoing Process Control Program to address DBPs
- Site visits and field data gathering
- Optimization of chemical dosing application and training

PRASA's Compliance Department performs monthly meetings to discuss operational adjustments, challenges, and lessons learned to implement the necessary steps to improve in this area. 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. Approximately 60 percent of the samples are analyzed in-house, and the remaining 40 percent are subcontracted to an outside laboratory. In September 2022, Hurricane Fiona caused some damage (roof leaks, floors, and ventilation) to the temporary laboratory; however, the sample processing was not interrupted. The new PRASA Central Laboratory construction is currently at 78% completion and is expected to achieve substantial completion during FY2023. Therefore, PRASA will continue to use the temporary facilities and subcontracted laboratories until the new facility is completed. Regarding the smaller-scale laboratories located at strategic points on the island, only PRASA Mayagüez Laboratory operates normally. During FY2022, the Arecibo laboratory closed and the Central Laboratory or the subcontracted laboratory analyzed the samples.

PRASA completed the Groundwater Under the Direct Influence of Surface Water (GWUDI) assessment of 169 wells, from which 116 were determined to need Microscopic Particulate Analysis (MPA) testing. A total of 98 wells have completed the sampling requirement, of which 96 resulted as No-GWUDI, and two were medium to high risk. These two wells were disconnected from the water system. The remaining 18 wells were identified as out of service; therefore, MPA sampling will resume once they become active.

PRASA diligently allocates efforts and resources to ensure compliance with the Agreements' requirements (2015 Consent Decree and 2006 PRDOH Transactional 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 FY2022, PRASA achieved sewer line reconnaissance of 98% of the high-priority areas, 94% of sewer line reconnaissance of the 30-in or greater mains, repairs of 86% of the sanitary defects, 95% of sewer line cleaning of the high-priority areas, and awarded contracts to complete some for the remaining works. 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 more than 2,800 Metro Region and Central Administration Building employees.

Regarding the transactional 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. The Indiera Alta WTP was eliminated in FY2022.

The Department continues to be responsible for PRASA's Environment, Health, and Safety Program, which includes workshops, meetings, accident investigations, and task risk assessments to improve O&M practices and employee safety. Although some efforts have been directed at developing and implementing the Health and Safety Plan, it has been delayed mainly due to the limited staff available due to personnel reduction and budget limitations. Also, procedures are very tedious and are performed manually, and PRASA should consider automatization and digitalization to improve effectiveness. Currently, efforts are focused on prioritizing needs, maximizing the available resources, and implementing training (workshops, accident investigations, etc.) for consistent procedures throughout PRASA.

Regulations for potable water systems (PWSs) will continue to become more stringent. 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 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 delays in program initiatives' implementation.

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

#### 5.4.1.7 Legal

The Legal Department is mainly responsible for the following:

- Claim resolution (courts and extra-judicial).
- Litigations including damages, contract non-compliance (class action lawsuits, service and construction contracts), bid injunctions, bankruptcy, and administrative (bills, water theft, injunctions).
- Management of the contracted external counsel for damages, ongoing contracts with 11 firms for insurance purposes, and experts in economic cases, in addition to two firms for judges, when needed.
- Prejudgment litigation related to insurance claims.
- 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. Note that the Department has various vacancies, including three legal resources, four administrative resources, and one office administrator.

The invoice objection and water theft litigations are managed through virtual and in-person administrative proceedings, with an average of seven to eight daily administrative hearings. In addition, hearings are held from Tuesday to 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 preliminary re-negotiations shall be completed in December 2022. PRASA continued negotiating the 2006 PRDOH Drinking Water Settlement Agreement and expects to submit the action plan for the whole agreement to the PRDOH in FY2023.

Ongoing initiatives in FY2022 that will continue into FY2023 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.
- The following metrics continue to be implemented and are reported in weekly 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 is five days.

- 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.

For the next fiscal years, the Legal Department expects an upturn in contracts, claims, and land acquisition cases due to the implementation of the CIP and the funding available to PRASA. As a result, the Department is experiencing an increase in 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 program management consultants (PMCs) to assist with the CIP implementation. As a result, PRASA has implemented a CIP that is currently running at full capacity.

Some of the urgent projects and new initiatives of the Department include the following:

- PRASA Central Laboratory in Caguas
- Compliance Projects as stipulated in the USEPA Consent Decree and PRDOH Agreements
- Reconstruction & Recovery projects
- Carraízo Dam dredge and improvements
- Renewal and rehabilitation of the overall deteriorated infrastructure
- Master Plan Update

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 annual renewal of the Strategic Plan (2022-2026).

##### 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 2022 PRASA Fiscal Plan and other important internal projects, such as rate structure simplification, metering optimization, and physical water loss reduction. An RFP to establish structure, process, roles, and responsibilities for the PMO was released on September 1, 2022. The contract should be executed in FY2023.

##### 5.4.1.9.2 Water Recovery Office

The 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 plans 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.

Refer to previous sections for updates related to the IT Department and training activities.

### 5.4.2 Regional Updates: Initiatives and Challenges

Meetings with all five regional directors were conducted to assess the progress of each region based on the established KPIs, impacts of the fiscal situation, the ongoing challenges, the programs and initiatives developed in FY2022, overall operational activities updates, and future initiatives.

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 restored remote access to many assets in the System, 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.
- Limited availability of fleet vehicles, mainly due to age, long repair times, and limited budget for purchasing new vehicles. Even though PRASA was able to acquire and distribute a very limited number of vehicles for each region during FY2022, 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.
- Challenges to 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 FY2022, all the regions reported a shortfall in qualified employees, which has caused an increase in overtime costs and 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.

DBPs 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. It may require a capital project to address the issues in some cases. The CIP has included several projects, and the System is expected to see improvement in the near future. Also, the regions continued their efforts to control costs and improve System optimization to the extent possible. Other programs implemented during previous fiscal years are proceeding at a slow pace due to the current lack of personnel and funding, 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. It continues to improve due to the implementation of various financial initiatives, including recent debt refunding resulting in debt service savings without increasing the maturities of the refunded debt. 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 continue to be important to note and are summarized below.

- West Region – Budgeting for repairs or new equipment, fleet maintenance and vehicle upgrades, addressing corrosion at the WWTPs, and performing plant upgrades is still challenging. In addition, STS presents significant equipment and management issues for the region.
- Metro Region – Due to fleet and staff limitations, the sewer main inspections and cleaning are still challenging. Despite this limitation, the Metro Region continues cleaning sewer mains and identifying sanitary defects and illegal connections per the SSOMP requirements.
- North Region – The North 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. Also, the reduction of service areas and several WTP elimination projects (under evaluation) are being performed for optimization and compliance purposes.
- East Region – The region experiences delays in installing pressure regulators, and main repairs, among other necessary work for optimizing the systems, due to limitations in personnel and funding.

Table 5-3 summarizes some of the initiatives and projects being implemented or planned during FY2022 and initiatives to be implemented during FY2023, subject to funding availability.

*Table 5-3 Ongoing and Future Initiatives and Projects by Operational Region*

| Region | Initiatives and Projects | Description |
|---|---|---|
| West | Optimization Initiatives | • Pipeline rehabilitation.<br>• Repair leaks in the Aguadilla Operational Area.<br>• Seventeen rehabilitation projects towards System optimization.<br>• Optimization of WTPs was performed through the evaluation and measurement of water production.<br>• Elimination of WPSs at strategic locations to alleviate high pressures in the distribution system.<br>• Project for chemicals optimization and reduction, especially for chlorine and bisulfite application. |
| | Water Compliance Actions to meet DBPs | • Completed the evaluation of different chemical and injection points at the Guajataca WTP.<br>• Rehabilitation of Aguadilla (Montaña) WTP and dredging of two water sources (lakes).<br>• Lajas WTP and Sabana Grande WTP – Both facilities comply.<br>• Betances WTP – Presented problems in the oscillation of the Palmas Tank. However, the system complied after adjustments were made. |
| | Non-Revenue Water | • Projects of pipeline replacement, identification, and repairs of water main leaks.<br>• 92% installation of flow meters in the distribution at the WTPs. Pending installation of the flow meter at Añasco WTP.<br>• The West Region has very limited staff to perform pressure tests throughout the distribution system. |
| | Acquisition of Vehicle Fleet | • Fleet continues to be a challenge due to fleet limitations.<br>• Fleet needs include one *tumbita* (Mayagüez), one pipe layer *tubera* (Mayagüez), ten dump trucks, 15 small cranes, three small flushing trucks, one large flushing truck, and three vans.<br>• Two to three diggers have been leased. |

| Region | Initiatives and Projects | Description |
|---|---|---|
| | Projects | • Mayagüez Submarine Outfall - Repair of pipeline break to address violations to the discharge permit.<br>• Rehabilitation and expansion of Culebrinas WTP in the bidding phase.<br>• Improvements to the intake and pumping of the Añasco River.<br>• Installation of permanent EGUs at multiple locations.<br>• Improvements at Aguada and Mayagüez WWTPs.<br>• Rehabilitation of Lajas WWTPs (CIP 5-31-5031) that includes corrosion control.<br>• The 3.5 MGD floating raw water intake installation for Guajataca WTP is in the bidding phase.<br>• Rehabilitation of Monte del Estado WTP and the raw water intake. |
| Metro | Optimization Initiatives | • Planning for the installation of five valves (16”, 20”, and 36” pipelines) in the Santurce Area.<br>• Inspections of all WSTs (119 actives) and WPS to identify and calculate water losses to establish a work plan for repair as applicable.<br>• Asphalt service is 100% contracted through the municipalities. |
| | Water Compliance Actions to meet DBPs | • Continues the system’s flushing program and tank clean-up initiative.<br>• Tanks oscillation and potential tank elimination to reduce retention time.<br>• Application of new chemicals in raw water sources to reduce organics.<br>• The Committee for the Conservation of the Ecosystem in the Carraízo Lake Basin was created.<br>• Initiative to improve raw water quality:<br>- In the process of completing a memorandum of agreement with the University of Puerto Rico to assess how an insect called *Picudo* could help reduce the invasive plants.<br>- Perform a pilot of an herbicide effective in eliminating invasive plants.<br>- Complete a pilot to install an aerator inside the Tabanco 1 WST in Trujillo Alto. |
| | Non-Revenue Water | • Begin to measure water flushing.<br>• Pressure management – Continue with detecting, and discovering all valves. Valves marking will be performed along with this initiative.<br>• Reduce water losses in water transfers to other regions by installing flow meters at these locations.<br>• Continues the verification of WSTs with the potential of overflowing. |

| Region | Initiatives and Projects | Description |
|---|---|---|
| | Acquisition of Vehicle Fleet | • A few vehicles were acquired during FY2022: A pickup truck for operations monitoring (*cotejadores*), pipe layers (*tuberas*), and service body cranes for electromechanics.<br>• Purchase orders for vehicles for the maintenance brigade to improve labor efficiency.<br>• Flushing trucks have been leased since it is more cost-effective. |
| | SSOMP – Sewer System Operation & Maintenance Program | • Ongoing activities for sewer reconnaissance and pipeline cleaning, identification of defects, and identification of any illegal connections.<br>• Ongoing repair of pipelines to control and prevent future overflows.<br>• The SSPOMP program is ongoing as part of the Consent Decree. |
| | Energy Consumption Reduction Program | • Targeted energy reduction was achieved.<br>• Continues performing pump adjustments, reducing time in operation, and using smart systems in several areas, which reduces consumption.<br>• Completed a repair of an 8” drain valve in the sedimentation tank at Sergio Cuevas WTP, resulting in energy conservation for the region.<br>• Continues to identify potential elimination of WTPs, WWTPs, and WPSs and replace vertical pumps with variable frequency drives to reduce energy consumption. |
| East | Optimization Initiatives | • Installation of pressure regulator valves.<br>• Leaks/breaks complaints management.<br>• Analyzing the use of variable frequency drives for decreasing water use and also energy savings. |
| | Water Compliance Actions to meet DBPs | • Continues with tanks oscillation, chorine injection point, evaluation of new chemicals, and the flushing program. |
| | Non-Revenue Water | • Optimization of WTPs was performed by evaluating and measuring water production.<br>• Installation of flow meters at the discharge of the WTPs.<br>• Improvement of controls using telemetry technology.<br>• Increased remote visualization of PRASA’s East Region System WSTs.<br>• Measure water transfers to other regions. |
| | Acquisition of Vehicle Fleet | • Acquired new vehicles, however, are not enough to fulfill the fleet's needs.<br>• Will be acquiring new vehicles to improve operations and performance during FY2023.<br>• Equipment and vehicles for piping repairs and flushing are also contracted outside PRASA. |
| | Energy Consumption Reduction Program | • Continues with the installation of variable frequency drives.<br>• Change of pumps for capacity reduction. |

| Region | Initiatives and Projects | Description |
|---|---|---|
| | Projects | • Projects for pipeline repairs or rehabilitation.<br>• The planning phase of the Caguas WWTP rehabilitation includes blowers, primary clarifiers, odor control domes, dewatering (screw conveyor), centrifuge, and corrosion protection on walkways of secondary clarifiers.<br>• Rehabilitation of Río Blanco WTP in the planning phase.<br>• Aguas Buenas WWTP – Module B is complete, and the next rehabilitation module is in the bidding process.<br>• Comerío WWTP – The clarifiers 1 and 2 improvements are in construction.<br>• Farallón WTP Improvements – Under planning phase.<br>• Central Laboratory is in the construction phase.<br>• Valenciano WTP will continue construction (eliminates Ceiba Sur WTP). |
| North | Optimization Initiatives | • Installation of telemetry systems to integrate more facilities into the remote visualization system.<br>• Continues with pressure control areas.<br>• Continues with tanks' oscillation to reduce water age. |
| | Water Compliance Actions to meet DBPs | • Continues with tanks' oscillation to reduce water age.<br>• Increase flushing frequency at Manatí, and Corozal distribution tanks.<br>• Elimination of several WSTs, pressure management plan, and elimination/reduction of pre-chlorine injection.<br>• Continues plan for optimization and compliance improvements. |
| | Optimization/Energy Consumption Reduction Initiative | • Completed the installation of the timer at the Nevarez well.<br>• Evaluation of timers' installation on blowers at several WWTPs and WTPs equipment.<br>• Elimination of the Río Arriba WTP is being considered.<br>• Evaluation of a new WPS to transfer water from Enrique Ortega WTP to Toa Alta, Naranjito, and Corozal areas eliminating the path through Bayamón.<br>• Evaluation of a new WPS in the Palacios WST that could eliminate the Winche WST and Contorno WPS.<br>• Evaluation of construction of a new WTP located at Achiote Ward that could eliminate Achiote I WPS, Achiote II WPS, Caserío WPS, El Cerro WPS, and the service area of Lomas del Viento WPS. |

| Region | Initiatives and Projects | Description |
|---|---|---|
| | Pipe Repairs and Water Loss Mitigation | • Continues aggressive plans to replace or repair pipelines.<br>• 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.<br>• Zones created based on pressure, capacity, and water demand significantly reduced main breaks.<br>• Location and repair of unseen leaks - This ongoing initiative decreased potable water loss but is limited to the available budget. |
| | Sanitary Overflow Prevention Initiative | • Identification of illegal interconnections in the Arecibo Operational Area.<br>• Infiltration of saline water into Islote trunk sewer, CSWOs, and collapsed pipe segments in Manatí trunk sewer.<br>• Pipeline replacement plan, and detailed investigation for the occurrence of overflows. |
| | Projects | • Rehabilitation of the Quebrada WTP (LT2 compliance) is in the construction phase.<br>• New Dorado trunk sewer and Pretreatment improvements are in the construction phase<br>• The rehabilitation of Morovis Sur WTP and the raw water intake improvements are in the design and construction phases, respectively.<br>• Rehabilitation of Hatillo-Camuy intake and WTP is in the design phase.<br>• Rehabilitation of Quebradillas WTP and raw water intake improvements are in the planning phase.<br>• The elimination of Toa Alta, Vega Alta, Vega Baja, and Dorado WWTPs is in the planning phase.<br>• The rehabilitation of Boquilla, ~~Rábanos~~, and Cruz Rosa wells is in the planning phase.<br>• Additional future projects include:<br>  – 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).<br>  – Elimination of Río Arriba WTP<br>  – New Super Planta of 15 MGD<br>• Evaluation of a new well to support Indiera Alta customers.<br>• Installation of new pipes for Bayaney and Quebrada.<br>• Rehabilitation of the infrastructure of the parcels of Quebrada and new infrastructure nearby PR-129.<br>• Installation of new pipelines of large diameter at the Tierras Nuevas System in Manatí. |

| Region | Initiatives and Projects | Description |
|---|---|---|
| South | Optimization of Operations | • Continues to decrease water extraction from the Salinas Aquifer as part of the restoration initiatives.<br>• Hydraulic modeling of El Tuque (Brisas I & II) – This study aims to eliminate two WPS or reduce capacity.<br>• Evaluation and relocation of some STSs of WTPs that discharge to the Peñuelas Wastewater System.<br>• Elimination of Cotto Laurel WTP discharge through the connection with the Ponce Wastewater System.<br>• Continue transitioning to chlorine solution in several systems.<br>• Evaluation of different polymers to adjust dosing to reduce chemical consumption.<br>• Continue pressure control initiative. |
| | Water Compliance Actions to meet DBPs | • Elimination of pre- and post-chlorine injection points.<br>• Increased frequency of tanks' sedimentation cleaning from semi-annual to three times per year.<br>• Sampling drainage points at water distribution systems with higher concentrations of non-compliance.<br>• Continues with tanks' oscillation to reduce water age.<br>• Ongoing plant optimization program.<br>• Weekly staff training and refreshers in compliance topics and equipment. |
| | Non-Revenue Water Recovery | • Flush water metering at fire hydrants was implemented in Yauco Operational Area. The rest of the areas will begin this initiative in the future.<br>• Installation of water meters at PRASA's facilities.<br>• Increased remote visualization of PRASA's South Region WSTs.<br>• Continue to perform operational adjustments and install pressure gauges on strategic locations throughout the distribution system. |
| | Acquisition of Vehicle Fleet | • Only a few vehicles were received during FY2022 – Dump trucks, pipe layers (*tuberas*), and pickup trucks for operations monitoring.<br>• In FY2022, 164 vehicles were at the mechanic's for maintenance.<br>• Active contracts with outside mechanics in Coamo and Guayama for lightweight mechanics. Yauco and Ponce are done internally with PRASA staff.<br>• All operational areas have contracts with outside mechanics for corrective maintenance. |

| Region | Initiatives and Projects | Description |
|---|---|---|
| | Pipeline Ruptures and SSOs Control | • Validation of leak/overflow claims is ongoing.<br>• Relocation of the Guayama WTP raw water pipeline and raw water transfer of 600 gpm to Carite to decrease the water pressure in the raw water pipeline in addition to a reduction in energy consumption of the raw water pumping,<br>• Guayama Operational Area began an aggressive leak detection program.<br>• Installation of pressure regulator valves, replacement of float valves, and other pressure control initiatives. Pressure management in all operational areas except for Guayama and Patillas includes pipeline replacement.<br>• Replacing digital pressure gauges in Yauco and Ponce, the areas with the greatest number of pipe breaks. |
| | Energy Consumption Reduction Initiatives | • Hydraulic modeling study intended to eliminate pump stations in the Ponce area.<br>• Installation of timers at Orocovis WWTP, Guayama WWTP, Peñuelas WWTP, and at several wells in Yauco.<br>• The Guayama penstock is in the design phase.<br>• Facilities lighting replacement to LED.<br>• Installation of timer on blowers at package WWTPs to reduce operations at night.<br>• Installation of variable frequency drives at Orocovis WWTP.<br>• Elimination of a WPS in Monte Peleao in Guánica. |
| | Projects | • Rehabilitating the Sanitary trunk sewer from Salinas to Guayama is under construction.<br>• The elimination of Ponce Vieja WTP is under design.<br>• Improvements at Ponce Nueva WTP are under construction.<br>• Improvements at Guayama WWTP are currently under bid and construction should start in FY2023.<br>• The Yauco WWTP improvements include the aeration system, and repairs of the clarification process are under construction.<br>• The rehabilitation of Santa Isabel WWTP is in the planning phase.<br>• The rehabilitation of Ponce WWTP is in the planning phase.<br>• The new WTP for Salinas is in the design phase.<br>• Additional projects include:<br>– Improvement at the Vertedero well.<br>– Increase the capacity of Guaraguao, Río Prieto, and Matrullas.<br>– Replacement of the degritter at Guánica WWTP. |

## 5.5 Strategic Plan

PRASA's EMT updated the 2022-2026 Strategic Plan, which aligns with the objectives of the 2022 PRASA Fiscal Plan. The plan was revised and approved by PRASA's Governing Board. PRASA has reported that the updated Strategic Plan maintains the basic elements of the previous plans while striving for PRASA's goals and vision.

### 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 is currently working on the FY2022 KPIs for FY2022 evaluation and these will be included in the next report.

## 5.6 Ongoing Programs and Initiatives

The following sections are additional programs and initiatives that PRASA continued to work on in FY2022 and will continue to be implemented in future fiscal years. Below is a brief description and status of each 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 be able to account for NRW. This initiative is ongoing and currently reporting through SCADA 83% of the water produced. 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 12 procedures related to the IMP, and all have been updated; nine have been approved, and three are waiting for approval in FY2023.
- 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 will continue to be contracted to an outside firm since PRASA does not have the required staff.
- 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 performed the

corrosion evaluation at 707. 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 FY2022, IMP achieved 98% remote visualization of the WSTs and expects to install 19 visualization systems in the future.
- The WPS remote visualization related to the installation of new panels with the capacity to operate the WPSs is ongoing, and during FY2023, PRASA plans to install at least 50 new panels.
- The initiative for monitoring wells remotely continues and has achieved 39% completion in FY2022, and the goal for FY2023 is to install it in 20 wells.
- PRASA installed 191 EGUs and 25 portable units through Phase I. In FY2022, the procurement process for Phase II to install 99 units has been contested and canceled; thus, the bidding will need to be restarted soon. However, the contract for Phase III to purchase and install 55 units has been awarded and awaiting to be executed. Phase IV of the emergency generator program is ongoing, and the next facilities will be selected pending budget availability.
- In FY2021, a Command Center, *Centro de Excelencia,* was implemented to assist in planning, monitoring, and assigning tasks for preventive and corrective maintenance, contracts, and all required documentation and data collection within the IMP tasks and purview. They currently have two offices, one for planning purposes that is managed internally, and the other for centralized services that are managed externally.
- Maintenance Planning and Scheduling (MPS) procedures need to be updated to focus more on the planning aspect of the program. During FY2022, the initiative was on hold due to a shortage of resources.

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. As described in detail in Section 2, PRASA’s fiscal situation looks promising; it continues to improve due to the implementation of various financial initiatives, including recent debt refunding resulting in debt service savings without increasing the maturities of the refunded debt and the inflow of federal funds to cover (with appropriate contributions from PRASA’s internal funds) its CIP needs.

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 IMP has an inventory of vehicles available for repair or replacement; they expect to receive 25 new vehicles by January 2023 and 75 more at the beginning of 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 the managing of 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.

PRASA has initiated efforts to prepare a Gap Analysis for asset management. They have implemented various strategies, but to implement a full asset management program, they need to contract a consultant to assist them in developing the framework and its implementation.

## 5.6.2 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 Water Recovery Office, summarized next.

### 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 islandwide 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 selecting the proponents that 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 islandwide. With improved meter accuracy and precision, revenues will increase. And 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 2022 PRASA Fiscal Plan and has established three main programs for reducing physical losses to achieve a reduction of 54 MGD by FY2027. These programs are:

- Master Meters – Accurately measure water production by installing water meters at critical facilities. The goal is to measure 93% of WTPs production by FY2023.
- 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 supports other departments within PRASA.

The WRO continues its outreach to the regions by implementing its first NRW symposium offered to all employees and the general public at the CIAPR. During FY2023, the WRO will participate in a second symposium to continue spreading knowledge of the office's work and the need to work together to achieve the goals set by the 2022 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 FY2022, 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. During FY2023, 18 facilities will be visited to meet the goal of 93% of the meters measuring the water produced by PRASA.

To present visibility of the water produced, the WRO created a dashboard that monitors, with up to two days' delay, the islandwide 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, 39 pressure zones have been identified, evaluated, and optimized. Once these areas function at optimal pressure, new areas will be identified and included in the pressure management initiative.

Another pressure management initiative is creating District Metered Areas throughout the water network. During FY2022, one NRW valve that measured pressure and flow was installed. This valve allows the continuous monitoring of the area. In FY2023, the WRO expects to install five more NRW valves. The WRO also coordinates with the Infrastructure Department in the Renew and Replace initiative by monitoring and controlling pressure in certain areas to reduce pipeline breaks.

#### 5.6.2.2.3 Leak Detection and Reduction

The Leak Detection and Reduction Program, which is to 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. It has allowed the office to work in new areas, proactively locate leaks, and allow other crews to continue assisting regional directors in areas with water deficiencies.

During FY2022, the WRO exceeded its goal of recovering 4.87 MGD through detecting and repairing unreported leaks and has a goal of 6.08 MGD for FY2023.

### 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 PREB based on oil prices. Therefore, PRASA continues to implement initiatives to reduce energy consumption through the initiatives 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 740 million kWh to under 620 million kWh through facility consolidations, minor repairs, operational optimization, and miscellaneous improvements. Note that energy costs were around 617 million kWh during FY2022 (consumption data based on PREPA/LUMA invoices as of June 2022).
- 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 11.3 million kWh per year at a $0.15 per kWh blended rate. Annual savings for these facilities varies based on PREPA rates. The ten facilities operating PPAs and their average annual solar energy production are shown in Table 5-5.

*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** |

As discussed in the 2022 PRASA Fiscal Plan, there are 15 sites with potential for solar projects with an estimated capacity of approximately 42.6 million kWh per year of photovoltaic energy. PRASA has submitted this list to HUD in pursuit of CDBG funding.

### 5.6.4 Master Plan Update

PRASA develops its Waster 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. In FY2022, PRASA contracted a consultant to prepare 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 will also determine the priority of the projects included in the CIP.

## 5.7 Conclusions

PRASA continues with O&M efforts during FY2022, focusing on re-establishing the System after the aftermath of hurricanes, the 2020 Earthquakes, and the ongoing COVID-19 pandemic. As described in Section 2, PRASA's fiscal situation looks promising. It continues to improve due to the implementation of various financial initiatives, including recent debt refunding resulting in debt service savings without increasing the maturities of the refunded debt. In addition, PRASA is receiving an inflow of federal funds to cover (with appropriate contributions from PRASA's internal funds) its CIP needs. As a result, PRASA anticipates implementing the CIP projects will address some of the major system needs and 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, length of time to complete and close out maintenance work orders, and COVID-19 impacts.

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.

# 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, and 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 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 as included in the 2022 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 the end of the third quarter of FY2022, PRASA had over 266 active projects in the CIP at different stages for a total investment of $2,951 million, as shown in Table 6-1.

*Table 6-1 Active CIP Projects by Stage*

| Stage | No. of Projects | Estimated Investment ($, million) | Percentage (%) |
|---|---|---|---|
| Planning/To be Assigned | 134 | $1,792 | 61 |
| Design | 29 | $507 | 17 |
| Building/Contracting | 37 | $441 | 15 |
| Construction | 26 | $211 | 7 |
| **Total** | **226** | **$2,951** | **100** |

As of April 2022, the major projects under construction include the Caguas Laboratory, the Dorado and Salinas/Guayama trunk sewers, and the Ponce WTP improvements. In addition, the main projects under design or bidding phases include meter replacement, Carraízo dredging, Enrique Ortega WTP rehabilitation, Guayama

WWTP rehabilitation, Culebrinas WTP rehabilitation, Los Angeles liner project, and the completion of the Valenciano WTP.

## 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 Bids 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 manage the large and complex CIP better. Projects included in the CIP are major capital improvements identified throughout all five regions, as well as islandwide system improvement initiatives such as integration of technological advancements, telemetry implementation, and general R&R. The CIP was developed by PRASA with the following key points in mind: a) recovery of the System after hurricane 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, where it 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.

PRASA uses a 1.6 multiplier to determine the total investment needed and to budget for the activities necessary to execute construction. However, not all projects will require the additional 60% budget, as each project is evaluated on its specific characteristics and complexities.

Design costs typically use the CIAPR professional services compensation guidelines (vary by project type and complexity) and are modified by the local current market and availability. Previously, the construction management and inspection costs were estimated to be 5% of the net construction cost; general, administrative,

and insurance costs were estimated at approximately 15% of the net construction cost, while contingencies were estimated to be about 10% of the net construction cost. However, PRASA is reassessing these cost percentages to consider the construction materials cost increase after the 2017 Hurricanes, the earthquakes, the COVID-19 pandemic, and the recent surge in construction.

Throughout the development of a project's planning and design phases, the contingencies are modified as the construction cost estimates are updated. Once the project goes out to bid and is awarded, the amount calculated for contingencies is no longer updated, and it remains as part of the assigned funds of the project until closeout. During the construction phase of projects, contingencies cover change order costs and miscellaneous expenses that may arise, such as land acquisition, permitting, or additional design activities. The current CIP target for change order percent in construction is 5%, excluding the added scope of work or impacts due to the COVID-19 pandemic or natural disasters. This goal is lower than the typical industry average of 15 to 20%.

### 6.3.1 Project Classification and Prioritization

CIP projects, as defined in the 2022 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 to industry standards and based on the work plan submitted to FEMA on April 8, 2021 (as 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.
- Quality – These projects are meant to increase the quality of the water and wastewater service provided to customers.
- Meters – These projects include the replacement of meters to measure water consumption from customers and master meters to measure water production and exclude the replacements classified as Reconstruction & Recovery projects.
- Fleet and IT – These projects are intended to replace vehicles in PRASA's fleet and improve IT infrastructure.
- Optimization and Emergencies – These projects aim to address infrastructure emergencies and contingencies.
- Safety and Growth – These projects allow for 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 projects for 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 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 must establish a methodology for all projects during the Master Plan update project, which has been awarded and is expected to be completed during FY2023. 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 and María.
2. Mandatory compliance projects included in the 2015 USEPA Consent Decree and 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

As included in the 2022 PRASA Fiscal Plan, PRASA must establish project metrics and monitor compliance and execution through a CIP tracking tool. PRASA has reviewed and updated the CIP tracking tool used before the suspension of the CIP to ensure compliance with the forecasted execution schedules. The tracking tool is used to manage project time, develop a detailed project baseline, track the actual progress, milestones, and metrics of all projects monthly, keep track of projects on target and off target and identify causes for delays. PRASA is also in the process of implementing a new module in SAP to be able to review and update its current tracking tool to ensure 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 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 (FY2022-FY2027)

PRASA's six-year CIP for FY2022 through FY2027, as included in the 2022 PRASA Fiscal Plan, amounts to $3.45 billion. Annual capital expenditures by project category are presented in Figure 6-1 and Table 6-2. The six-year CIP comprises Reconstruction & Recovery, R&R, and Compliance (mandatory and non-mandatory) projects, which account for 90% of the total forecasted expenditures.

Reconstruction & Recovery, totaling 62.5% of the total CIP, increased by 16% compared to FY2021 to $2,157.8 million and is the largest category in terms of dollars throughout this CIP period. Mandatory and Non-Mandatory Compliance driven projects are the second largest expense, with an annual average expenditure of $98.3 million and a total of $589.6 million, increasing to 53.8%. The R&R category is now the third largest expense, with an annual average expenditure of $55 million and $329.8 million (9.5% of the total CIP) over six years.

Compared to the 2021 PRASA Fiscal Plan six-year CIP ($2,866.1 million), the 2022 PRASA Fiscal Plan CIP was increased by a total expenditure of $588.8 million, a 20.5% increase. The difference is mainly attributed to the increase in Recovery and Reconstruction and Mandatory/Non-Mandatory Compliance projects. Other categories increased as well. However, the FY2022 PRASA Fiscal Plan CIP did have some reductions in projects and expenditures for the Quality and Emergencies and Contingencies categories at $19 million (26%) and $38.5 million (88%), respectively.

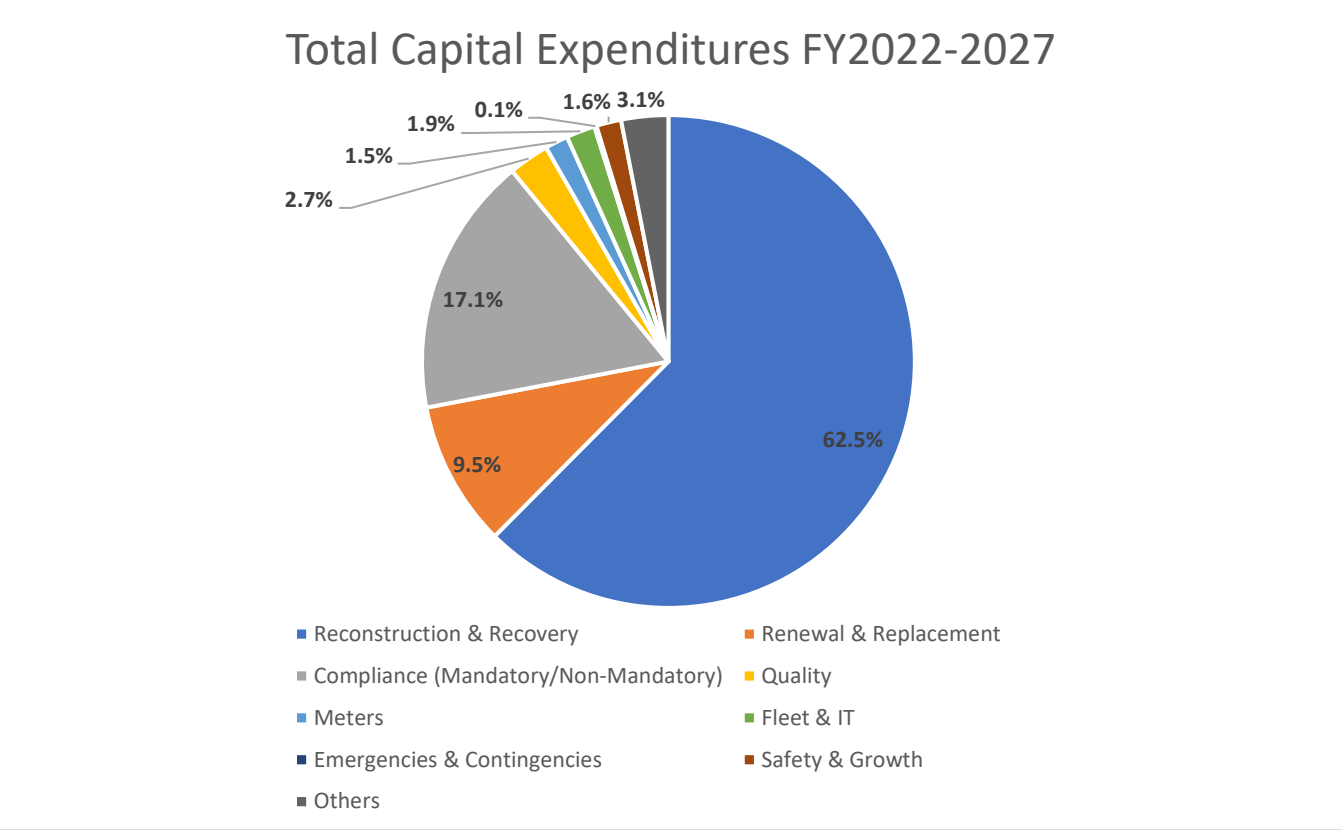



*Figure 6-1 Six-Year CIP Capital Expenditures by Category*

*Table 6-2 CIP FY2022-FY2027 by Category ($, Millions)*

| Project Category | Fiscal Year Ending June 30[(1)] | | | | | | 2022-2027 Total[(1)] |
|---|---|---|---|---|---|---|---|
| | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | |
| Reconstruction & Recovery | $61 | $274.2 | $633.5 | $661.4 | $369.0 | $158.7 | $2,157.8 |
| R&R | $58.9 | $55.2 | $54.3 | $55.2 | $54.8 | $51.5 | $329.8 |
| Compliance (Mandatory/Non-mandatory) | $66.3 | $146.0 | $164.4 | $112.9 | $65.6 | $34.3 | $589.6 |
| Quality | $19.4 | $38.7 | $27.8 | $3.2 | $1.7 | $1.5 | $92.3 |
| Meters and Electrical Generators | $18.3 | $26.6 | $2.0 | - | - | $5.5 | $52.3 |

| Project Category | Fiscal Year Ending June 30[1] | | | | | | 2022-2027 Total[1] |
|---|---|---|---|---|---|---|---|
| | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | |
| Fleet and IT | $9.8 | $23.4 | $10.0 | $7.0 | $7.0 | $8.0 | $65.3 |
| Emergencies and Contingencies | $- | $1.0 | $1.0 | $1.0 | $1.0 | $1.0 | $5.0 |
| Safety and Growth | $8.3 | $12.5 | $24.2 | $9.2 | $1.7 | $0.4 | $56.3 |
| Others | $10.8 | $28.4 | $24.2 | $19.7 | $16.2 | $7.4 | $106.6 |
| **Total** | **$252.6** | **$606.2** | **$941.3** | **$869.3** | **$517.0** | **$268.3** | **$3,454.9** |

[1] Numbers may not add due to rounding.

PRASA's six-year CIP consists of over 500 projects, for which 266 projects have already been assigned to PMCs, with a CIP investment estimated at over $2.95 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 FY2022 through FY2027 are estimated at approximately $1,298.4 million. Approximately $188.4 million is allocated for projects classified as Mandatory Compliance, and approximately $1,019.8 million 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 FY2022 through FY2027 are estimated at $1,248 million, of which approximately $253.7 million is allocated for projects classified as Mandatory Compliance, $72.6 million is allocated for projects classified as non-Mandatory Compliance, and approximately $827.8 million is allocated for projects classified as Reconstruction & Recovery, among others.

### 6.4.3 R&R, Quality, Meters and Electrical Generators, Safety and Growth, Fleet and IT, Emergencies/Contingencies, and Others

Total capital expenditures for the remaining capital project categories are estimated at approximately $707.5 million for FY2022 through FY2027. Approximately $329.8 million is allocated for repairs to infrastructure impacted islandwide by Hurricanes Irma and María and others under the R&R program. Meters and Electrical Generators projects have $52.3 million allocated, and Quality projects have $92.3 million. Fleet and IT projects have $65.3 million allocated, and Emergencies and Contingencies projects are budgeted at $5 million. The remaining $162.9 million is interspersed 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 2015 USEPA Consent Decree and the 2006 PRDOH Settlement Agreement. In addition, it considers proposed modifications to said Consent Decree and agreement in negotiations by and 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.
- 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:

- 2015 USEPA 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.
- 2006 PRDOH Drinking Water Settlement Agreement, Civil Action KPE 2006-0858, 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 continues a re-negotiation process with USEPA and the U.S. Department of Justice (USDOJ) regarding deadlines to comply with certain programs contemplated under the 2015 USEPA Consent Decree. PRASA has maintained continuous communication with the USEPA and USDOJ, notifying the force majeure events that may delay performance or cause non-compliance with any obligation as stipulated by the 2015 USEPA Consent Decree Section XXVII. PRASA, USEPA, and USDOJ are currently working towards a partial modification of the 2015 USEPA Consent Decree in court to address the effects of the force majeure events.

In addition, PRASA continues using the Microsoft PowerBI Compliance Monitoring Tool developed in 2019 to facilitate the review, monitoring, and tracking of the requirements of each program stipulated in the 2015 USEPA Consent Decree and the 2006 Settlement Agreement, as amended.

## 6.5.1 Consent Decree and 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 the System 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. 12: March 1, 2021, through August 31, 2021
  - No. 13: September 1, 2021, through February 28, 2022
- 2006 PRDOH Agreement Quarterly Progress Reports:
  - No. 54: July 1, 2021, through September 30, 2021
  - No. 55: October 1, 2021, through December 31, 2021
  - No. 56: January 1, 2022, through March 31, 2022
  - No. 57: April 1, 2022, through June 30, 2022

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

### 6.5.1.1 2015 USEPA Consent Decree – Biannual Progress Reports

In FY2022, PRASA continues under force majeure protection for ongoing and upcoming work and deadlines and stipulated penalties under the 2015 USEPA Consent Decree; therefore, no penalties were accrued during the period evaluated.

The 2015 USEPA Consent Decree requires PRASA to submit BPRs. BPRs No. 12 and No. 13 reporting from March 2021 through February 2022 are summarized below, including applicable programs, standards, and special conditions. PRASA was granted an extension for the BPR No. 14 submittal, which reports from March to August 2022; thus, it was not included in this report.

#### 6.5.1.1.1 Remedial Measures

The 2015 USEPA 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 currently working on achieving project dates in Appendices H and J base list projects for wash water and WWTPs, respectively. The base list includes 25 projects, from which only ten are outstanding, with expected completion dates by 2026. Figure 6-2 illustrates project distribution and expected completion date. The two projects included in 2021 and 2022 are delayed since additional evaluations need to be performed to address the complexity of the compliance requirements.

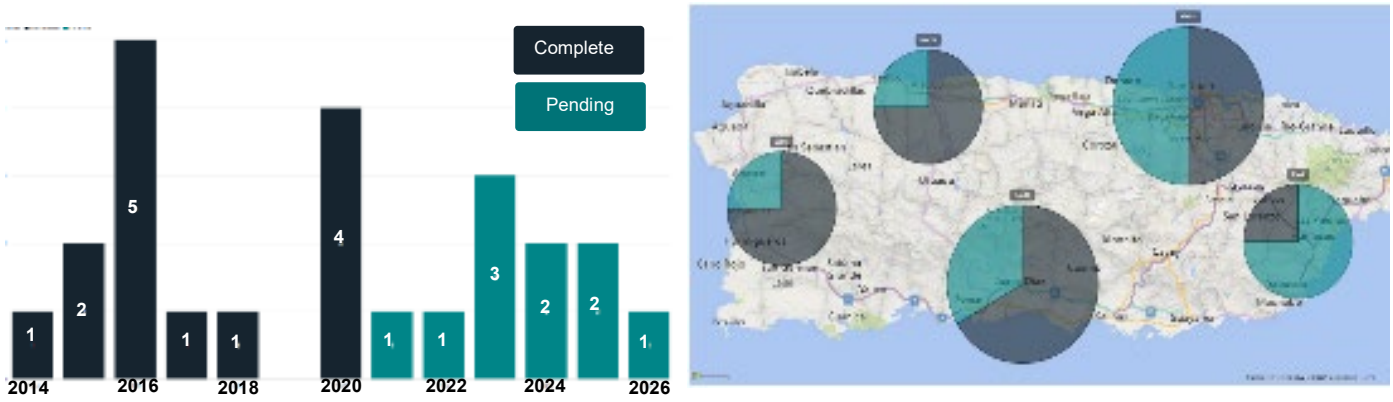



*Figure 6-2 Base List Projects for STSs and WWTPs*

Once the CIP was reactivated, PRASA began to work with some of the high-priority projects of the Remedial Measures. The completion dates for the projects included in the base list continue as planned. A detailed list, including the project description of the ten outstanding projects, is included in Table 6-3.

*Table 6-3 Base List Projects Breakdown*[4]

| 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. |

[4] BPR No.13 Appendices Nos. 1 and 2.

| Region | CIP No. | Facility | Type | Project Description |
|---|---|---|---|---|
| West | 5-37-5021 | Isabela | WWTP | Diversion of the Isabela WWTP discharge to Costa Isabela Resort. |

In addition, as stipulated by the 2015 USEPA Consent Decree, flow meter devices with flow totalizers and level indicators were installed at the point of discharge for most STS at WTPs. During FY2022, a total of seven flow meters and totalizers, and three high-level alarms at STSs were reported out of service. Three flow meters and totalizers and one high-level alarm at STSs were repaired, and one totalizer at San Sebastián New WWTP was replaced in November 2021.

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. 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.

#### 6.5.1.1.2 New Sludge Treatment System and Solid Handling

The 2015 USEPA 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 WTP constructed in FY2022.

#### 6.5.1.1.3 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 2021 SSOMP Annual Report in May 2022 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 2,800 Metro Region and Central Administration Building employees through December 2021.

**Reconnaissance and Cleaning**

The sewer system reconnaissance effort has resulted in over 1 million linear feet of sanitary sewer system pipelines having reconnaissance data. During the period evaluated, reconnaissance of an additional 49,400 linear feet was completed for 98% of the High Priority Areas. In addition, for the mains with a diameter of 30-in or greater, a total of 94% of sewer line reconnaissance has been completed. The remaining 30-in or greater sewer mains were divided into four phases with an expected completion date of June 30, 2026.

During the period evaluated, 21 defects were identified and corrected. Since the SSOMP's implementation, 242 defects have been identified, of which 86% have been corrected. 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. 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 868,000 linear feet for a total of 95% 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 2021 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*[5]

| SSOMP Activity | Start Date | End Date |
|---|---|---|
| Reconnaissance of High-Priority Area (less than 30-inch diameter) | 4th Quarter 2012 | 2nd Quarter 2021 |
| Reconnaissance of High-Priority Area (equal to or greater than 30-inch diameter) | 3rd Quarter 2021 | 2nd Quarter 2026 |
| Reconnaissance of Remaining Areas | 1st Quarter 2021 | 4th Quarter 2033 |
| Sewer Cleaning of High-Priority Areas (less than 30-inch diameter) | 4th Quarter 2015 | 2nd Quarter 2021 |
| Sewer Cleaning of TS Lines (equal to or greater than 30-inch diameter) | 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 |

As for the wet weather and dry weather discharges from combined sewer overflows outfalls, PRASA installed level sensor devices with cellular connectivity for continuous monitoring of sewer flow depth to identify discharges 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 both 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.

### 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

[5] Obtained from the 2021 SSOMP Annual Report

about the proper management of FOG. In addition, the campaign has a presence in mass media and social media.

PRASA continues with the inspection of businesses under the FOG Control Program which includes food service establishments, car washes, and auto repair shops, among others. 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 2021 through February 2022 by region is included in Figure 6-3. During the inspections, PRASA identifies if any FOG Program violations are observed and reserve the right to stipulate penalties to the business.

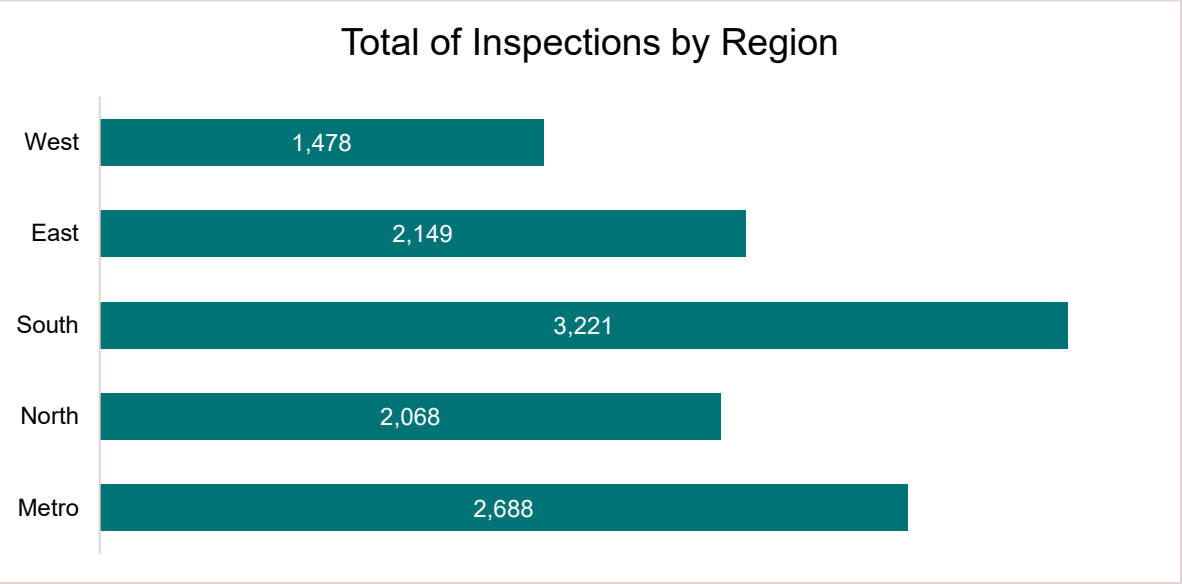



*Figure 6-3 Summary of FOG Program Inspections from March 2021 through February 2022*

**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:

- Between March 1, 2021, and February 28, 2022, PRASA did not have DWOs events.
- The USEPA was notified of these combined sewer overflow wet weather events:
  - At the Puerta San Juan outfall on April 5, 2021, and May 3, 2021.
  - At the Los Angeles outfall on June 16, 2021.
  - At Paseo La Princesa outfall on July 19, 2021, and September 21, 2021.
- Seven sanitary sewer overflows were reported that exceeded the six months to be corrected and were added to the schedule to be repaired by PRASA.

#### 6.5.1.1.4 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.

#### 6.5.1.1.5 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 as part of the consolidated SSOMP Annual Report submitted in May 2022. According to the 2021 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.

#### 6.5.1.1.6 Areas of Concern in the Puerto Nuevo WWTP Sewer System

Originally, 19 Areas of Concern within the Puerto Nuevo WWTP system were identified in Paragraph 36 of the 2015 USEPA Consent Decree. Remedial measures were stipulated for each one of these areas, and PRASA addressed the corresponding actions for each of the measures. On February 21, 2018, PRASA requested USEPA to remove two particular areas of concern (Highland Park Residential Development and Montecarlo Residential Development) from the listed areas, and the request was granted for a total of 17 active Areas of Concern. Inspections and educational campaigns were completed following the frequency stipulated in the Consent Decree.

#### 6.5.1.1.7 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. Currently, PRASA has 162 facilities with a combined total of 1,263 active interim limits. Figure 6-4 illustrates the yearly interim limits in the PRASA Compliance Monitoring tool. 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 to address compliance or renegotiation of the limit.

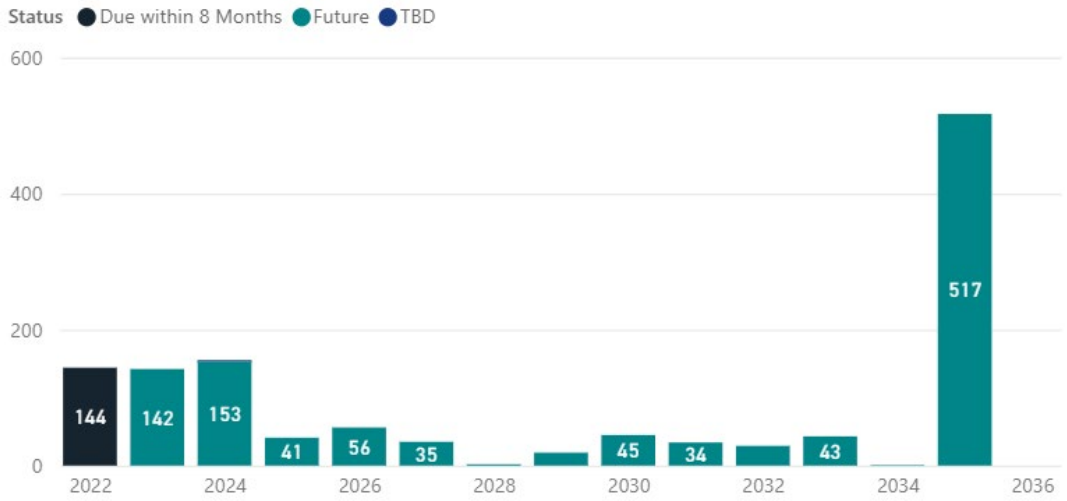



*Figure 6-4 Interim Limits Islandwide*

During this period, PRASA requested interim limits for 14 facilities, including WWTPs and STSs at WTPs. Parameters renegotiated include Enterococci, Phosphorus, Biological Oxygen Demand, Total Nitrogen, and Total Cyanide, among others. Figure 6-5 shows the interim limits distribution by region and facility type.

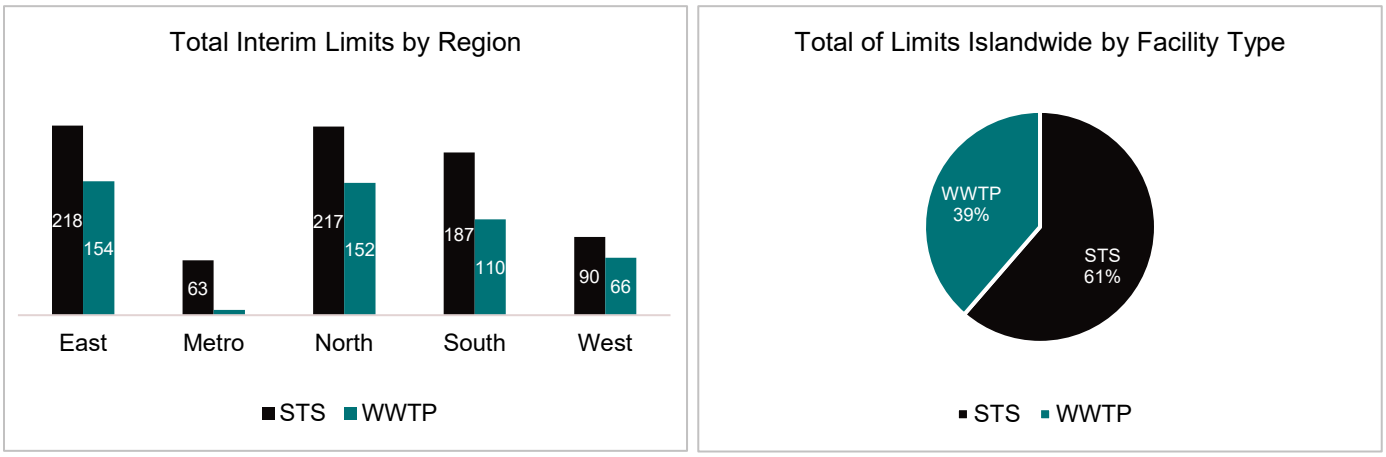



*Figure 6-5 Summary of Interim Limits*

For NPDES obligations not being complied with, including new restrictive limits of some parameters, PRASA continues to seek interim limits protection. As a result of the reactivation of the CIP projects, PRASA is moving forward with the planning, design, and construction of several facility improvements that will address treatment process issues and impaired equipment, among other identified deficiencies which are expected to decrease issues associated with non-compliance.

### 6.5.1.1.8 Integrated Maintenance Program

Preventive and corrective maintenance continues to be implemented with limitations due to force majeure events and severe limitations. Currently, there is an initiative along with the HR Department for intensive recruitment in addition to efforts towards restructuring the IMP. On the other hand, equipment calibrations are being performed

as required. The MPS procedures are being revised to focus more on the planning efforts. Although status monitoring remains part of IMP staff meetings discussions, during FY2022, the initiative was not fully implemented due to understaffing limitations. Refer to Section 5.6 for additional updates on the IMP and CCP.

#### 6.5.1.1.9 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. As per BPR No. 12, PRASA hired 26 operators for STS or WWTP from March through August 2021. PRASA offered 394 training courses included in the approved training program. 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.

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.

#### 6.5.1.1.10 Process Control System

Process Control System (PCS) is being implemented at PRASA's WTP STSs and WWTPs as stipulated by the Consent Decree. PRASA implemented the revised and updated PCS at the STSs and WWTPs in the Metro and West Regions. For the East, North, and South Regions, PCS revisions and updates were expected to be completed by June 30, 2022.

#### 6.5.1.1.11 Spill Response and Cleanup Plan

The Spill Response and Cleanup Plan review process was interrupted by the 2017 Hurricanes. In addition, further discussions between USEPA and PRASA regarding the SRCP updates were delayed due to implications associated with the COVID-19 pandemic.

PRASA switched to an Android technology to facilitate and capture more accurate data from overflows investigation. This new technology will also improve the data reporting process for the regulatory agency. Training and refreshers will be performed once the new technology is fully implemented. During a certain period, the overflows were recorded manually; hence, PRASA is currently working on an initiative with the HR Department to create incentives that promote the utilization of this technology in the field.

#### 6.5.1.1.12 Stipulated Penalties

PRASA continues to monitor and report to the USEPA the NPDES exceedances, including limits, sampling results, and violation codes. However, stipulated penalties were not assessed or adjudicated due to the force majeure protection invoked.

### 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. Accordingly, Arcadis reviewed QSARs Number 54 through 57, covering the period from July 1, 2021, through June 30, 2022.

#### 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 | Pending |
| East | 3-40-6005 | Juncos Urbano | Ceiba Sur WTP | WTP elimination | Pending |
| East | - | Juncos Urbano | Quebrada Grande WTP | WTP elimination | Pending |
| North | 2-38-6049 | Canalizo | Canalizo WTP | Improvements and expansion | Planning |
| 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 | 2-39-7105 | La Pica | La Pica WTP | WTP rehabilitation or elimination | Pending |
| West | 5-48-6006 | Monte del Estado | Monte del Estado WTP | Intake and WTP rehabilitation | Planning |

(1) Source: QSARs Number 54 through 57.

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 report to the regulatory agencies. In addition, PRASA calculates and reports the CT as part of the Continuous Monitoring Program monthly requirements. During the period evaluated, PRASA certified to PRDOH compliance with continuous monitoring parameters and status of equipment.

PRASA developed and implemented the Optimization Program for Large Water Systems. 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. PRASA implemented preventive measures on those systems with frequent DBPs violations. The progress and status of the program are reported 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 PWSs. The program requires implementing preventive measures to establish operational controls and vigilance measures to eliminate or minimize violations for the following contaminants: 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 for systems with exceedances in DBPs, including but not limited to pre- and post-chlorine application and CT calculations.

#### 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 requirements of the program established in the Agreement include equipment logs, record keeping/archives, logs sheet of activities, maintenance schedule, inventory and storage, and repairs action plan. As indicated in the QSARs, PRASA complies with the program requirement and the standard operating procedures. PRASA was able to accomplish additional initiatives within the program. During the period evaluated, several bids were announced for contracting services for 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.

#### 6.5.1.2.4 Operators Training and Licensure

Operator Training and Licensure Program establishes that PRASA must train all operators and supervisors that work in a PWS and ensure that they are certified in a licensure category according to the facilities they are responsible for. A total of 743 employees were enrolled in courses required by the Agreement; however, only 18% completed the courses by the end of FY2022. 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 6-6 illustrates the penalty distribution by category and region.

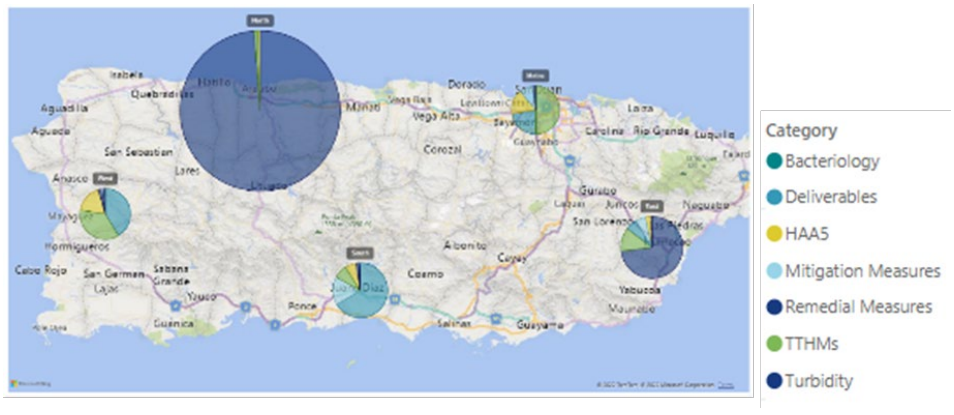



*Figure 6-6 Penalties Distribution by Category and Region*

During the period evaluated, the penalties amounted to $2,446,700, as summarized in Table 6-6. It is important to note that 99% of the penalties were associated with non-compliance remedial measures.

*Table 6-6 Stipulated Penalties*

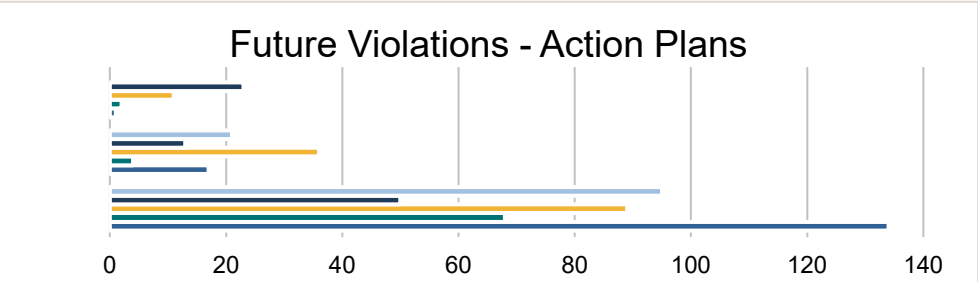
| Type | Amount |
|---|---|
| Remedial Measures | $2,444,000 |
| DBPs | $8,000 |
| Turbidity | $2,100 |
| Deliverables | $1,100 |
| Mitigation Measures (Credit) | $(8,500) |
| **Total** | **$2,446,700** |

Depending on the type of penalty, PRASA will pay either to the PRDOH or deposit in the “Cuenta Plica” as stipulated in the agreement. Note that during the period evaluated, the Indiera Alta WTP was eliminated.

### 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 6-7 illustrates the number and status of Action Plans by region.




| | Completed | Continuous | Pending |
|---|---|---|---|
| West | 95 | 21 | |
| South | 50 | 13 | -23 |
| North | 89 | 36 | 11 |
| Metro | 68 | 4 | 2 |
| East | 134 | 17 | 1 |

*Figure 6-7 Future Violations – Action Plans by Region*

There are 37 pending action plans. For those, PRASA is working to address the required actions and, in some, requested a time extension to the regulatory agency to meet the requirements. Figure 6-8 shows the number of pending action plans by type.

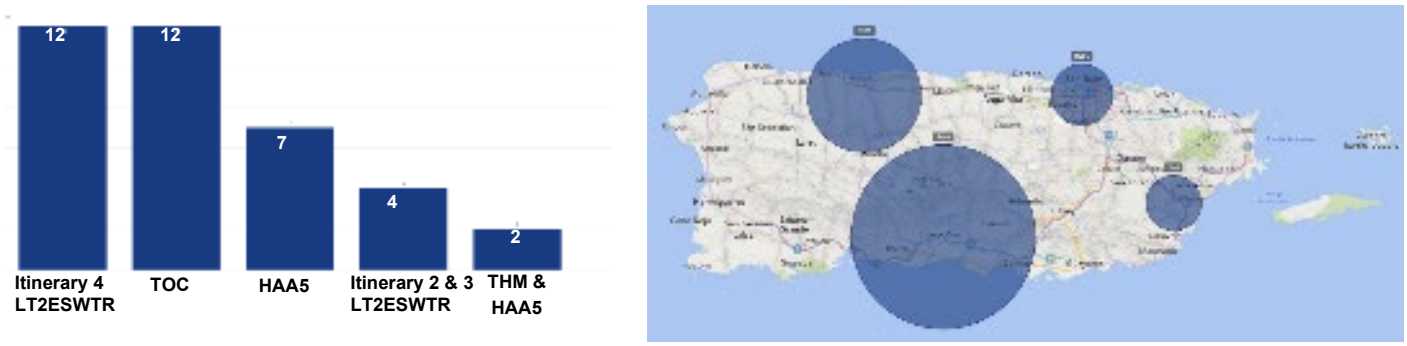



*Figure 6-8 Pending Action Plans*

### 6.5.1.3 Current Applicable Drinking Water Regulations

PRASA is subject to the Safe Drinking Water Act (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 and implementation status are outlined in Table 6-7.

*Table 6-7 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 |

| Regulatory Requirement | Summary of Requirements | Implementation Status |
|---|---|---|
| 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 |

#### 6.5.1.4 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 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.

## 6.6 Future Regulations and Other Regulatory Requirements

The CIP was reviewed 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 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. Currently, PRASA is evaluating technologies available that could potentially 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 may impact PRASA's water system operations in the future.

- Fifth Unregulated Contaminant Monitoring Rule (UCMR5)
- Revised Lead and Copper Rule
- Potential Per- and Polyfluoroalkyl Substances Rule

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 fifth Unregulated Contaminant Monitoring Rule (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 that 29 PFAS (and lithium) 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 intends to comply with this rule update as its development progresses.

In November 2019, the USEPA released proposed revisions to the Lead and Copper Rule (LCR), intending to reduce risks from lead exposure in drinking water to children and families by requiring earlier action and increased transparency and communication around the lead. These revisions can impact all community water systems (CWSs) and non-transient non-community water systems (NTNCWs). However, the largest impact will occur on systems containing lead service lines (LSLs). The LCR revisions propose over fifty significant changes in all areas, from monitoring and treatment to service line inventories and customer communication. Key changes included are summarized in Table 6-8.

*Table 6-8 Lead and Copper Rule Revision*

| Action | Description |
|---|---|
| Action Level and Exceedances | • Action level of 0.015 mg/L maintained<br>• New "trigger level" of 0.010 mg/L if exceeded at the 90th percentile<br>• Additional monitoring, corrosion control treatment (CCT), LSL replacement, and public education to reduce lead in drinking water before exceeding the action level. |

| Action | Description |
|---|---|
| Lead Service Line Inventory and Replacement | • Develop and maintain a publicly accessible inventory. The RFP to create this inventory will be developed in FY2023.<br>• LSL replacement plan within the first three years of the published rule<br>• LSLs that exceed trigger or action level at the 90th percentile are required to conduct full LSL replacement for a minimum of 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. |
| 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 if 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 LCR 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, which has all intentions of complying with the rule.

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 Contaminant Candidate List, which included a final determination to regulate PFOA and PFOS in drinking water. USEPA is developing a proposed National Drinking Water Regulation for publication by the end of 2022 for PFOA and PFOS. 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 initial sampling and work related to this future regulation. PRASA also started communication with the PRDOH regarding the effort needed as the final rule becomes effective.

Note that PRASA is evaluating the availability of funds in the Bipartisan Infrastructure Law to assist with the implementation of the LCR 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 currently implementing changes in its O&M practices to bring or maintain the PWSs in compliance. However, any additional projects identified and included in PRASA's CIP will be subject to the prioritization system.

## 6.7 Conclusions

PRASA's six-year CIP generally addresses the System's needs and complies with PRASA's existing commitments with the reconstruction from the 2017 Hurricanes, and with regulatory agencies. It includes projects covering a broad array of current and future needs identified by PRASA and as required by the Consent Decree and agreement. The six-year CIP includes funding for minor and major repair projects for PRASA's R&R program and meters projects. Most of the projected six-year CIP investment is related to Reconstruction & Recovery, Mandatory/Non-Mandatory Compliance, and R& R projects. Due to PRASA's high rate of leaks and overflows and continuing aging infrastructure, additional funds and an acceleration of the operations R&R program are required to reduce and minimize these incidences. PRASA's six-year CIP also includes funding for quality improvements and other necessary infrastructure projects (i.e., Fleet and IT, safety, NRW reduction) essential to maintaining and preserving the utility assets.

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.

However, as the impact of future regulations becomes more defined and NPDES permit limits tend to be more stringent, CIP modifications may be required to accommodate the resulting needs adequately. As a result, the CIP needs will require to be reprioritized, 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."

Arcadis contracted Marsh Saldaña, Inc. (Marsh) to review PRASA’s current insurance coverage and determine its adequacy considering the type and value of PRASA’s fixed assets. Marsh has provided a professional opinion on the appropriateness of such coverage and recommendations related to PRASA’s insurance coverage, as detailed in the following sections. The data, opinions, and comments included in this section have been based solely on PRASA’s copies of policies for the 2021-2022 period provided by PRASA for this purpose. The 2022-2023 policies were not evaluated.

## 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, risk identification and treatment are performed by all departments at all levels in conformity with local and federal regulations, including the Occupational Safety and Health Administration (OSHA) regulations. Risk management is applied through the employment of 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 adequately secure customer data.
14. Acts of terrorism affecting PRASA's facilities or customers.
15. Strikes and labor unrest causing loss of income, interruption of operations, and increased operating expenses to continue operations.

## 7.3 Insurance Program Assessment

This report section provides Marsh’s summary and recommendations concerning PRASA's insurance policies for 2021-2022.

### 7.3.1 Property Insurance

The following are the findings and recommendations under the Commercial Property Program for FY2022 currently placed through MAPFRE and London Markets:

- 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 FY2022 Property Coverage, Limits, and Deductibles*

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

| Coverage | Limit | Deductible |
|---|---|---|
| Boiler and Machinery | Included in $150 million property primary layer. | $100 million combined for property damage and business interruption, including extra expenses. |
| Asbestos Sublimit | $1,000,000 | $100 million combined for property damage and business interruption, including extra expenses. |
| Professional Fees Sublimit | $2,000,000 | $100 million 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 FY2022 policy coverage.

1. The named insured under the extended named insured and conditions (page 1 of 35) 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 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 $100 million. The policy should include a lesser deductible amount 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. On page 11 of 35, Definitions, A, iii. Earthquake, 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 which is part of the Policy, the broadest coverage, condition, and/or definition shall supersede any other.
8. On the General Conditions, page 6 of 35, Item 7 Permissions, letter B, the 90 days 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 9 of 35 under Automatic Acquisition/Capital Additions).
9. On the General Conditions, page 7 of 35, 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 days cancellation notice from the insurer and the methods for determining premium refunds stated on the policy contradict the Bureau of Public Insurance requirements. According to the Bureau of Public Insurance, a written cancellation notice should be given by the insurer 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 8 of 35, 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 8 of 35, 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 8 of 35, 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 9 of 35, 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, page 10 of 35, 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 ….". There is only one policy issued covering both risks; therefore, this Condition should be eliminated.
15. Under the General Conditions, on page 12 of 35, 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 the costs of excavation, grading, and filling. 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 25 of 35, 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 FY2022 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 undertakes a new valorization of its assets.
2. The $100 million deductible applies whether the loss sustained by PRASA is due to a catastrophic peril as well as by any other 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 be considering establishing a fund to cover possible financial losses from any future catastrophic event, but especially from any 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, 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, therefore, corroborating if the current limits of insurance carried are adequate or 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 loss discovered during the policy period.

*Table 7-2 FY2022 Crime Coverage, Limits, and Deductibles*

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

#### 7.3.4.1 Crime Coverage Recommendations

This section summarizes observations and recommendations for the FY2022 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 $10 million in limits carried by peers. Refer to Figure 7-1 for the benchmarking information.

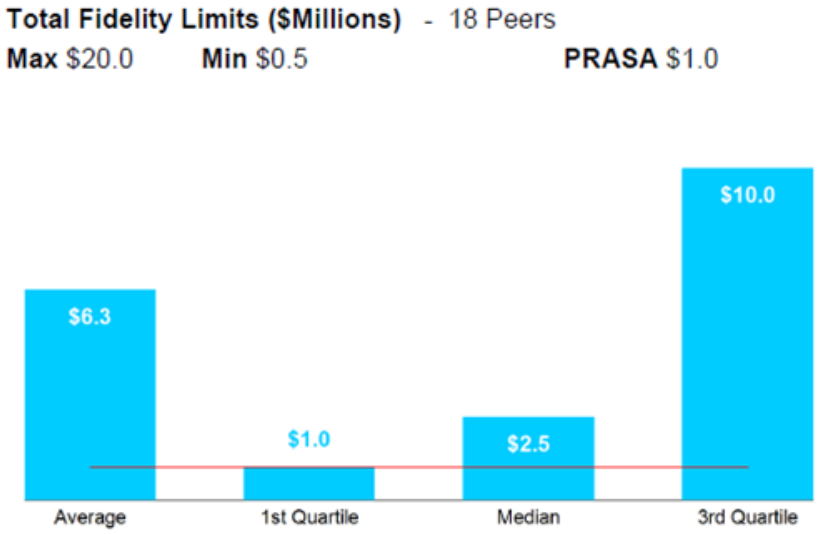



*Figure 7-1 Commercial Crime Benchmarking*

2. Consideration should be given to purchasing an ERISA Bond. The commercial crime policy includes a $500K 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, and 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 seeks a policy offering this coverage extension. Generally, the same is sub-limited to $250K. 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 coverages readily available that are 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 of the 6 Notice (page 7 of 61) should be eliminated so that the endorsements and policy forms are consistent with reporting requirements.

### 7.3.5 General Liability

MAPFRE issued PRASA's FY2022 commercial general liability program with the limits detailed in Table 7-3 below. 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, which contemplates indemnity and claims

adjustment expenses, applies to each occurrence. This self-insured retention 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 self-insured retention would apply to Indemnity payments only.

*Table 7-3 FY2022 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 the FY2022 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 3 of 11, Item 1) 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 11, Item 4) should be revised to read Severability of Interest.
d. The language used under Erroneous Notice of Occurrence (page 4 of 11, Item 3) 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 having knowledge of an accident, occurrence, claim or suit. Failure to give an immediate notice of any loss or damage, or of 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 form any responsibility under this policy."

e. All conditions in the Special Conditions Endorsement should be numbered sequentially to avoid confusion.

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 is 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 self-insured retention 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 self-insured retention.
8. It is recommended that the employee benefits liability coverage form U-110 (1/92) change the "Retroactive Date" to the date MAPFRE first wrote this coverage for PRASA. This policy currently illustrates 07/01/2021, which is not consistent 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 the FY2022 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 own 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. It is recommended that the trailer interchange coverage be included in the policy. This would cover any trailer that is 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 chassis will be paid on a replacement cost basis.
4. It is recommended that the drive other car coverage be included for liability, physical damage and medical payments coverage. This would cover management employees that 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. It is recommended to include “Special Policy Conditions” on the first declaration page under Forms and Endorsement made as part of this policy at the time of issue. 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, subject to 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 FY2022 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 Form Primary Insurance box should be marked.

### 7.3.8 Umbrella and Excess Liability

PRASA maintains a primary umbrella policy that provides a $20 million limit excess of the primary general, automobile, and employer's liability policies. The umbrella is otherwise subject to a $1 million self-insured retention (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 $40 million limit in excess of the $20 million 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 related to 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 could 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.
3. A benchmarking analysis was completed using proprietary information to determine in absolute terms if the limit purchased by PRASA is aligned with limits carried by 49 industry peers. The report showed that on average, limits of $53 million were carried. Refer to Figure 7-2 for the umbrella benchmarking statistic.

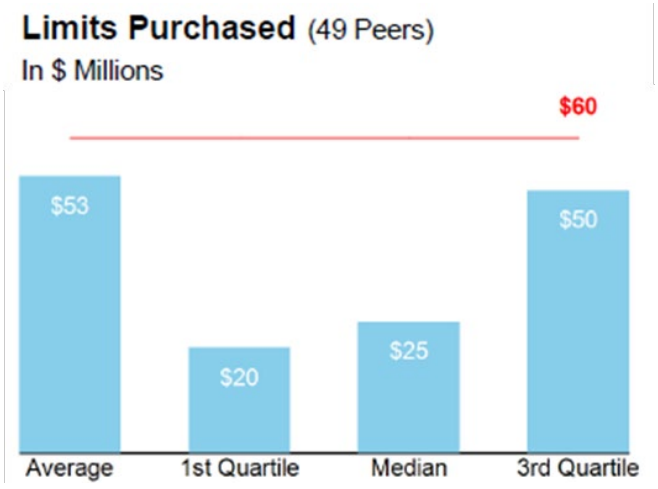



*Figure 7-2 Umbrella Benchmarking*

A risk exists for a catastrophic failure of a PRASA dam that could potentially cause a very large liability loss, especially if there are residential communities located downstream of the dam. PRASA's exposure to liability from the failure of a dam was raised previously and Marsh understands that there is a potential for a substantial loss of life if a PRASA dam collapses. In such event, a $60 million total liability limit may not be enough to settle claims if PRASA was found to be negligent.

## 7.3.9 Directors and Officers Liability

PRASA holds $45 million 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.

With regard to 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 FY2022 Directors and Officers Liability Program*

| Insurer | Limit | Retro Date | Prior and Pending Litigation Date |
|---|---|---|---|
| Chubb (Primary) | $15 million | July 1, 2007 | July 1, 2007 |
| Berkley Insurance Company (First Excess Layer) | $10 million excess of $15 million | July 1, 2014 | July 31, 2020 |
| Liberty Mutual Insurance Company (Second Excess Layer) | $5 million excess of $25 million | Underlying | July 31, 2020 |
| Antilles Insurance Company (Third Excess Layer) | $10 million excess of $30 million | July 1, 2021 | July 31, 2020 |
| Liberty Mutual Insurance Company (Fourth Layer) | $5 million excess of $40 million | Underlying | July 31, 2020 |
| Total D&O Limit | $45 million | - | - |

### 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 prior to 2014, only $15 million in limits are available. In examining the $10 million excess of $30 million 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 prior to this date. To optimize coverage retro dates should be consistent.

2. Renegotiate the pricing of excess limits of liability as pricing is inverted – With regard to 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 as shown in Figure 7-3 and Figure 7-4. It should be noted that in addition to the traditional D&O policies carried by PRASA, peers also carry a Side A excess DIC (difference in conditions) policy with an average limit of $15 million. This policy protects only the D&O and has fewer exclusions than a typical D&O policy. If PRASA were to purchase $60 million in total limits, its D&O program would better align with industry standards.


*Figure 7-3 D&O Liability Benchmarking*

**Peer Group Financial Summary**- 17 Peers

| | PRASA | Average | 1st Quartile | Median | 3rd Quartile | Max | Min |
|---|---|---|---|---|---|---|---|
| Total Revenue ($Millions) | $1,094 | $234 | $34 | $188 | $325 | $885 | $0 |
| Total Employee Count | 4,225 | 322 | 8 | 161 | 620 | 693 | 2 |
| Total Program Limits as a percent of Revenue* | 4.11 % | 155.03 % | 4.52 % | 21.84 % | 68.59 % | 2,083.33 % | 0.62 % |

**Inclusive of excess Side A coverage*

*Figure 7-4 D&O Liability Benchmarking Peer Group Reference*

4. PRASA should consider renegotiating policy exclusions to provide coverage for 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 carveback providing coverage for claims arising from private placements less than $50 million. All other securities claims are excluded. Both 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 price. 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 related to the insured's regulator capacity in establishing tariffs for water consumption to clients, customers and cogeneration companies. 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 limit coverage under the policy.

5. As excess follows form markets, Berkley Insurance Company, Antilles Insurance, and Liberty Mutual all incorporate the exclusion of the primary Chubb policy. We have noted that each of the excess carriers has incorporated additional and reinstated a more restrictive exclusionary language which is then 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 and 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.
   b. In addition, numerous typographical errors were noted. If not corrected, they might lead to inconsistency in the interpretation of coverage in a claims scenario.
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 Berkley 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 claims reporting threshold that allows for periodic bordereaux. Instead of amending Section IV Defense, Settlement and Allocation, the endorsement should amend Section 6 Notice. It is recommended that a 45-day grace period be granted after the quarter end 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 $10 million in the aggregate annually for employee claims alleging wrongful termination, employment-related misrepresentation, sexual harassment, retaliation, or other violation 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 (64% increased limit factor).

#### 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 economical characteristics showed that on average, limits of $10 million were carried. Refer to Figure 7-5 for the benchmarking statistics.

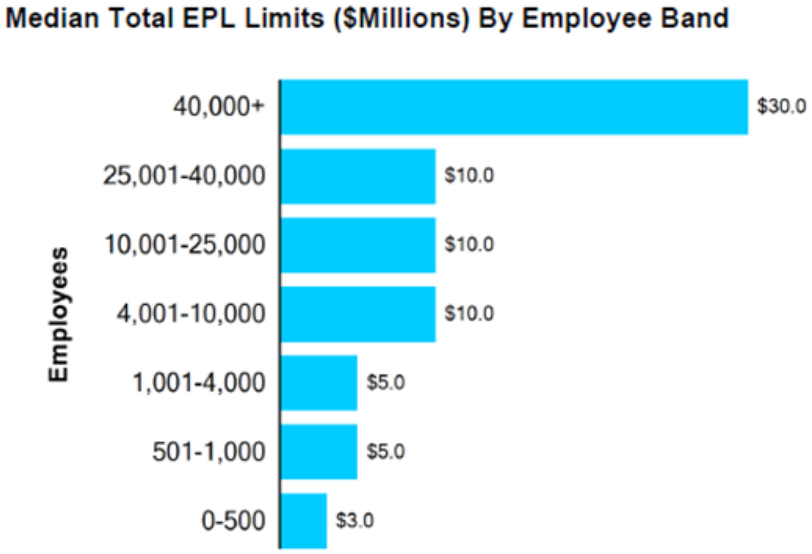



*Figure 7-5 Employment Practices Liability Benchmarking by Employee Band*

2. Consideration should be given to including 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 collective bargaining agreement that is 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 fully erode the limit of liability.

## 7.3.11 Premises Pollution Liability

ACE Insurance Company provides pollution liability coverage on a claims-made basis at $10 million per pollution condition and a $10 million 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 related to 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 $20 million as well.
3. It is recommended that “Underground Storage Tank Coverage” is acquired. Storage tank schedule should be submitted, or a “blanket” coverage negotiated with the insurer.
4. It is recommended that terrorism coverage should be considered under PRASA’s premises pollution liability program. The premises pollution liability program excludes coverage for any terrorism 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

PRASA’s accident coverage program for travel was issued by Chubb with the limits detailed in Table 7-5 below. Renewal occurred on July 1, 2021, and covers until July 1, 2022. The policy has a $2.5 million annual aggregate limit. Coverage is available for PRASA employees named as insured. PRASA's premium for this policy is $1,000.

*Table 7-5 FY2022 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 |

| Coverage | Limit |
|---|---|
| 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 of the 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 renewal covers from July 1, 2021, until July 1, 2022. 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. The same applies to accidental medical expense reimbursement and to accident (travel).

## 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 that is 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 had an impact on 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 prior to purchasing the policy to help identify opportunities to strengthen controls prior to requesting quotations. Reports from third parties including security score card and Bitsight should be examined early in this time period to provide insights as to 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 provide a measure of protection for businesses and employees that are 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 purchase. 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, which can include forensic cleanup, public relations consulting, crisis management, medical services including psychiatric care, hiring of additional staff, and added 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, 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

PRASA maintains a builder's risk policy as part of its OCIP program. Chubb is the insurer. The policy period 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 as per the project schedule prepared by PRASA and included as part of the policy. The schedule date is 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 on an individual basis. 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 FY2022 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 | Sublimit |
|---|---|
| Maximum Physical Loss of or damage to insured Property per Insured Project | $27,822,490 in respect to 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. |

| Coverage | Sublimit |
|---|---|
| Property in Transit | $1,000,000 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 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 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 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 |
| Windstorm, 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 related to 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 due to the project's substantial completion.
2. PRASA should include wet works and any type of roads, ways, expressway works, overpasses and bridges, viaducts, and tunneling works. These are usually impacted during water mains and sewer pipes construction 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 at least negotiate a deviation from the time schedule of more than the current four weeks.
4. PRASA should delete the special conditions endorsement safety measures with respect to precipitation and flood.
5. The OCIP Manual limits and some of the sub-limits and deductibles are different from the policy and this 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 $541,662 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 June 23, 2021, until June 23, 2022.

*Table 7-8 FY2022 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 new OCIP Manual has to be issued to include the current producer’s information. The current Manual has still the previous producer’s, AON, contact information.

2. The completed operations coverage extension is for five years from the termination date of the policy or its renewal(s). The aggregate limit is for the extended period of five years and it is not an annual limit. It is recommended that PRASA extends 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.
3. The “Term of the Project” covers only from February 1, 2020, until February 1, 2021, and until each project completion date. PRASA should correct this oversight by endorsement to the policy. The OCIP policy only covers CIP projects.
4. PRASA should request a return premium adjustment of $38,966 from Chubb to indicate the correct minimum and deposit premium according to the composite rates scale and the estimated total costs submitted by the named insured. The minimum earned deposit premium shown in the Composite Rate Endorsement A is different from the premium charged and does not match the policy rates.
5. The premium is based on a composite rate of $3.80 per $1,000 of the total costs for the first $30,000,000. Then $3.61 for the next $31,000,000 and $3.42 in excess of $51,000,000. Based on the estimated total costs of $142,542,735 the minimum and deposit premium should have been $502,696 instead of $541,662.
6. 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, in the Deductible Liability Insurance Endorsement Form CG03 00 01 96 its is also written 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

The OCIP commercial umbrella liability policy is written by Chubb. A copy of the policy was not provided by PRASA. Only a renewal certificate for the policy period from June 23, 2021, through June 23, 2022, was provided and reviewed. 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. It does not show who the insurer is. The schedule of underlying Insurance only includes the commercial general liability policy and its limits of insurance. The OCIP Manual prepared by a previous producer indicates that the umbrella or excess policy has a limit of $25,000,000. The SIR is $10,000. The current annual premium is $285,085.

#### 7.4.3.1 Commercial Umbrella Liability Recommendations

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

1. It is recommended that the limit of the umbrella is confirmed by Chubb and that an endorsement or a revised renewal certificate be issued with the correct amount or excess liability limit and the correct underlying policies and limits of insurance. To avoid confusion and conflicts, it must be clear if the umbrella total limit is $25,000,000 or $50,000,000.
2. The Composite Rate Endorsement B has an identical language as the primary CGL policy Composite Rate “A” Endorsement. Only the policy number and the endorsement letter were changed. It is recommended that PRASA corrects the rates and the minimum premium earned to indicate the umbrella or excess policy rates and premium. The adequate premium was not able to be validated with the information provided.
3. The named insured in Endorsement C and the named insured in Endorsement D are different. Both should be identical to avoid possible interpretation conflicts. It is recommended that PRASA corrects the information on both endorsements.

4. The completed operations coverage extension is for five years from the policy's termination date or its 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 date of completion 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 policy period is from June 23, 2021, until June 23, 2022. The policy limits of insurance 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 $178,178. The adjustable rate is $1.25 per $1,000 of project costs and the estimated total cost is $142,542,735.

### 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 $25 million 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 policy has a September 21, 2004, retroactive date. The coverage applies to contract administration, design, engineering, consulting, inspection, and construction management, including planning, permitting, regulatory compliance services, land acquisition, assisting in construction, procurement assistance, start-up services, testing, and extended commissioning under the PRASA multi-year CIP as modified by the PRASA Governing Board from time to time. 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 to ensure that there is adequate risk transfer. Given the influx of funding for projects as a result of Hurricane María and other natural disasters, it is probable that PRASA is underinsured. In addition, note that in prior reviews, there was a $50 million aggregate. This has now been eliminated.
2. PRASA should consider amending the defense and claims expenses (Section I, B). The second paragraph of the defense and claims expenses agreement says the insurer is not obligated to investigate or defend a claim after the limit of liability has been exhausted, "*or after the Company (the insurer) has deposited the remaining available limit of liability into a court of competent jurisdiction.*" Defense costs can be high and can surpass the cost of damage or injury in the event of serious loss. A provision that allows the insurer to walk away from defending the insured by depositing the balance of the liability limit with a court means the insured can be left with the cost of defending itself from that point forward, and forced to finance defense costs it had expected the insurer to pay. It is recommended that the broker attempt to delete the phrase shown in italics above which allows the insurer to deposit the remaining liability limit with the court and avoid defense costs.

3. PRASA should consider amending Section IV Conditions, Item G Settlement. Item G says the insurer cannot settle any claim without the insured's permission. However, in the event the insurer recommends settlement and the insured is unwilling to settle, the insurer then has the right to cease its defense efforts. In that event, the limit of liability is then limited to the amount the claim could have been settled for at the time the insurer recommended settlement. This "hammer clause" is harsh compared to similar clauses in many policy settlement provisions.
   Most errors and omissions policy settlement provisions allow the insured to not settle upon the insurer's recommendation, and the insurer is then obligated to provide a defense and ultimately pay damages and defense costs. Some policies have a "soft hammer" clause where the Insured assumes part of the damages and defense costs in excess of the floor established when the carrier recommended the settlement recommendation. The percentage of damages and defense costs assumed by the Insured might vary from 50% to 25% of the damages and defense costs incurred above the settlement amount for which the claim could have been settled. It is recommended that an attempt be made to renegotiate this clause at the next renewal.
4. PRASA should consider amending Section III Definition, Item G Client, to mean any third party with whom the insured has a formal written contract in place eliminating "for the supply of the insured's professional services in return for a fee". Most claims under this policy are centered around contract disputes with contractors. The current policy definition does not accurately reflect the intent of an OCIP of this type.
5. There should be a consideration to amend Insuring Agreement E consultants, contractors and subcontractors to correctly reflect that services are provided to another insured, PRASA.
6. PRASA should consider amending Section III Definition, Item CC, Professional Services to mean those services specified in Item 5 of the declaration and performed by an insured or by any person or entity for whom the insured is liable. The current definition requires that the services be performed for others for a fee. The services provided by the contractors and subcontractors are for another insured, PRASA.
7. There should be a consideration to amend Section IV Conditions, Item J, Other Insurance Clause and Endorsement 15, to allow contractors and subcontractors to use their E&O policies as a primary policy to meet the $150K deductible requirement. Currently, Endorsement 15 stipulates that PRASA's policy shall be primary to any other policy.
8. PRASA should consider amending Section IV Condition, Item L Territory to eliminate the requirement that all claims be brought in the Government of Puerto Rico, thus covering claims filed against PRASA worldwide.
9. PRASA should consider amending Section V, Item M, Contractual Liability exclusion to add a clarification at the end of the exclusion as follows: "However, this exclusion will not apply to Professional Services as defined in Item 5." Many of the claims filed under the policy have to do with contract administration. This exclusion might preclude coverage for these claims.
10. There should be a consideration to amend Endorsement 3 to include the schedule of projects referenced in the endorsement for clarity purposes.
11. PRASA should clarify in Extended Reporting Period Amendment Endorsement (Endorsement 1) the intent to provide an extended reporting period for all projects. Endorsement 1 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 prior to the policy inception date as part of the CIP are covered or a schedule of projects specifically to be covered be included. The policy's September 21, 2004, retroactive date should be used as a starting point for any ongoing projects, and the endorsement 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

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 undertakes a new valorization of its assets.
2. Marsh's 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, therefore, corroborating if the current limits of insurance carried are adequate or 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 in a better position 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.

# 8 System Assets and Financial Analysis

## 8.1 Introduction

In accordance with the MAT (as amended), Arcadis hereby provides a statement of the estimated cost of all additions made to the System and of all the retirements of property made in FY2022. The statement relies on the most recent preliminary data provided by PRASA. Also, Arcadis evaluated PRASA's financial forecast as included in the 2022 PRASA Fiscal Plan and as certified by the Oversight Board on May 20, 2022, 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, 2021. 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 $5,631.7 million (net of accumulated depreciation). Note that PRASA is working on the fixed assets book value balance for FY2022 which will be included in the FY2023 report.

*Table 8-1 Preliminary Fixed Assets Balance through June 30, 2021 ($, Millions)*

| | Book Value | Accumulated Depreciation | Net Book Value[1] |
|---|---|---|---|
| Fixed Assets | $10,756.3 | ($5,633.6) | $5,122.7 |
| Construction (Work) in Progress | $433.8 | - | $433.8 |
| Land and other Non-Depreciable Assets | $75.2 | - | $75.2 |
| Total Capital (Fixed) Assets | $11,265.3 | ($5,633.6) | $5,631.7 |

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

Table 8-2 summarizes the fixed assets changes from FY2020 to FY2021.

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

| | FY2020 to FY2021[1] |
|---|---|
| Fixed Assets (Net of Accumulated Depreciation) | ($185.3) |
| Construction (Work) in Progress | $34.7 |
| Land and other Non-Depreciable Assets | $0.1 |
| Total Fixed Asset Changes | ($150.6) |

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

## 8.3 PRASA's Rate Structure

In order for PRASA to be able 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. In FY2021, PRASA hired a consultant to perform a rate study to determine if adjustments were necessary to continue to deliver reliable, affordable, and safe water and wastewater services to its customers. It was determined that rate adjustments were necessary and that the rate revision process needed to comply with Act 21 (which includes having public hearings). Act 21 also requires that an independent examiner reviews and evaluates the proposed rates and any public comments to then submit a report to PRASA's Governing Board.

During FY2022 a new rate structure was approved and included in the 2022 PRASA Fiscal Plan projections. For FY2023, the financial projections assume a 2% annual increase in consumption charges plus an adjustment of 4.95% to the base charge for all customer categories. For FY2024 and beyond, the financial projections assume a 2% annual rate adjustment across all customer categories. Implementing the rate adjustments will enable PRASA to generate nearly $370 million in incremental revenues between FY2023 to FY2027 and help meet its objectives of providing clean and reliable water and wastewater services.

Tables No. 8-3 through 8-12 include the water and wastewater rate structure adjustments starting on July 1, 2022, for the various customer types including base charge and volumetric rate, miscellaneous fees, and wholesale fees. Note that the new rate adjustment structure is simpler and provides more transparency to the customers. The Environmental Compliance and Regulatory Charges (ECRC) and the $2 fixed fee for all customers was eliminated and taken into account under the restructuring of the base and volumetric rate charges. For additional information on the rate study, the independent examiner review and the recommended rates refer to the officer examiner website at https://fquinon.wixsite.com/tarifas2022aaa.

*Table 8-3 Residential Monthly Base Charge per Account Starting July 1, 2022*

| Meter Size | Water | Wastewater | Water and Wastewater |
|---|---|---|---|
| 1/2" & 5/8" | $16.14 | $12.01 | $28.15 |
| 3/4" | $25.41 | $20.02 | $45.43 |
| 1" | $39.46 | $25.36 | $64.82 |
| 1-1/2" | $71.39 | $38.38 | $109.77 |
| 2" | $119.03 | $64.78 | $183.81 |
| 3" | $180.67 | $107.14 | $287.81 |
| 4" | $401.94 | $187.24 | $589.18 |
| 6" | $1,065.96 | $869.41 | $1,935.37 |
| 8" | $1,703.40 | $993.43 | $2,696.83 |
| 10" | $2,723.33 | $1,588.78 | $4,312.11 |

| Meter Size | Water | Wastewater | Water and Wastewater |
|---|---|---|---|
| 12” | $4,355.19 | $2,541.36 | $6,896.55 |

*Table 8-4 Residential Volumetric Rate per Cubic Meter Starting July 1, 2022*

| Use Block ($m^3$) | Water | Wastewater | Water and Wastewater |
|---|---|---|---|
| >10 – 15 | $2.86 | $2.48 | $5.34 |
| >15 – 25 | $3.14 | $2.73 | $5.87 |
| > 25 | $4.23 | $3.68 | $7.91 |

*Table 8-5 Commercial Monthly Base Charge per Account*

| Meter Size | Water | Wastewater | Water and Wastewater |
|---|---|---|---|
| 1/2" & 5/8" | $31.77 | $24.22 | $55.99 |
| 3/4” | $45.89 | $38.38 | $84.27 |
| 1” | $76.03 | $54.04 | $130.07 |
| 1-1/2” | $149.92 | $90.65 | $240.57 |
| 2” | $236.91 | $141.35 | $378.26 |
| 3” | $528.79 | $293.83 | $822.62 |
| 4” | $876.86 | $554.02 | $1,430.88 |
| 6” | $2,205.65 | $1,177.13 | $3,982.78 |
| 8” | $3,544.55 | $2,756.84 | $6,301.39 |
| 10” | $5,669.86 | $4,410.96 | $10,080.82 |
| 12” | $9,070.31 | $7,057.52 | $16,127.83 |

*Table 8-6 Commercial Volumetric Rate per Cubic Meter Starting July 1, 2022*

| Use Block ($m^3$) | Water | Wastewater | Water & Wastewater |
|---|---|---|---|
| **Water Meters Less or Equal To 2”** | | | |
| >0 – 100 | $3.42 | $2.83 | $6.25 |
| >100 – 200 | $3.96 | $3.21 | $7.17 |
| > 200 | $4.80 | $3.88 | $8.68 |

| Use Block ($m^3$) | Water | Wastewater | Water & Wastewater |
|---|---|---|---|
| **Water Meters Greater Than 2”** | | | |
| >0 – 100 | $2.38 | $2.06 | $4.44 |
| >100 – 200 | $2.95 | $2.48 | $5.43 |
| > 200 | $3.88 | $3.25 | $7.13 |

Tables 8-7 through 8-10 include the rate structure for government and industrial accounts. PRASA has four government client categories: 1) Central Government agencies, 2) public corporations, 3) municipalities, and 4) federal agencies.

*Table 8-7 Government Monthly Base Charge per Account Starting July 1, 2022*

| Meter Size | Water | Wastewater | Water & Wastewater |
|---|---|---|---|
| 1/2" & 5/8" | $34.49 | $26.29 | $60.78 |
| 3/4” | $49.82 | $41.65 | $91.47 |
| 1” | $82.53 | $58.66 | $141.19 |
| 1-1/2” | $162.73 | $98.40 | $261.13 |
| 2” | $257.15 | $153.44 | $410.59 |
| 3” | $573.98 | $318.93 | $892.92 |
| 4” | $951.80 | $601.37 | $1,553.17 |
| 6” | $2,394.16 | $1,929.01 | $4,323.17 |
| 8” | $3,847.49 | $2,992.45 | $6,839.94 |
| 10” | $6,154.43 | $4,787.93 | $10,942.36 |
| 12” | $9,845.581 | $7,660.69 | $17,506.20 |

*Table 8-8 Government Volumetric Rate per Cubic Meter Starting July 1, 2022*

| Use Block ($m^3$) | Water | Wastewater | Water & Wastewater |
|---|---|---|---|
| **Water Meters Less or Equal To 2”** | | | |
| >0 – 100 | $3.71 | $3.08 | $6.79 |
| >100 – 200 | $4.30 | $3.48 | $7.78 |
| > 200 | $5.21 | $4.21 | $9.42 |

| Use Block ($m^3$) | Water | Wastewater | Water & Wastewater |
|---|---|---|---|
| **Water Meters Greater Than 2”** | | | |
| >0 – 100 | $2.58 | $2.24 | $4.82 |
| >100 – 200 | $3.21 | $2.69 | $5.90 |
| > 200 | $4.21 | $3.53 | $7.74 |

*Table 8-9 Industrial Monthly Base Charge per Account Starting July 1, 2022*

| Meter Size | Water | Wastewater | Water & Wastewater |
|---|---|---|---|
| 1/2" & 5/8" | $32.87 | $25.05 | $57.92 |
| 3/4” | $47.48 | $39.70 | $87.18 |
| 1” | $78.65 | $55.90 | $134.55 |
| 1-1/2” | $155.10 | $93.77 | $248.87 |
| 2” | $245.08 | $146.24 | $391.32 |
| 3” | $547.04 | $303.97 | $851.01 |
| 4” | $907.12 | $573.14 | $1,480.26 |
| 6” | $2,281.78 | $1,838.47 | $4,120.45 |
| 8” | $3,666.89 | $2,851.99 | $6,518.88 |
| 10” | $5,865.55 | $4,563.19 | $10,428.74 |
| 12” | $9,383.37 | $7,301.10 | $16,684.47 |

*Table 8-10 Industrial Volumetric Rate per Cubic Meter Starting July 1, 2022*

| Use Block ($m^3$) | Water | Wastewater | Water & Wastewater |
|---|---|---|---|
| **Water Meters Less or Equal To 2”** | | | |
| >0 | $4.62 | $3.68 | $8.30 |
| **Water Meters Greater Than 2”** | | | |
| >0 | $2.96 | $2.44 | $5.40 |

Tables 8-11 and 8-12 include PRASA’s miscellaneous services fees and wholesale fees. PRASA maintains various miscellaneous charges to recover costs needed to serve specific customer needs. When applicable, PRASA can also charge wholesale customers for the volume of water and wastewater.

*Table 8-11 Miscellaneous Services Fees for FY 2023*

| Service Type/Activity | Fees (FY 2023) |
|---|---|
| Service Reconnection – Residential | $40.00 |
| Service Reconnection – Commercial | $75.00 |
| Service Reconnection – Industrial | $75.00 |
| Sprinkler System 1” | $38.17 |
| Sprinkler System 2” | $57.26 |
| Sprinkler System 3” | $85.90 |
| Sprinkler System 4” | $128.86 |
| Sprinkler System 6” | $193.29 |
| Sprinkler System 8” | $289.94 |
| Sprinkler System 10” | $434.91 |
| Sprinkler System 12” | $652.37 |
| New Water Service Connection ⅝” | $1,931.40 |
| New Wastewater Service Connection 4” | $1,797.00 |
| New Wastewater Service Connection 6” | $2,112.00 |
| Meter Testing In-Situ ½" up to 1½" | $30.00 |
| Meter Testing In-Situ Larger or Equal To 2” | $80.00 |
| Fire Hydrant Connection Fee | $39.95 |

*Table 8-12 Water and Wastewater Wholesale Fees Starting July 1, 2022*

| Service | Residential | Commercial | Government/Industrial |
|---|---|---|---|
| **Water** | | | |
| New Rate Cost per 10,000 gallons | $108.26 | $126.46 | $174.89 |
| **Wastewater** | | | |
| New Rate Cost per 2,000 gallons | N/A | $21.42 | $27.86 |

## 8.4 FY2022 Preliminary Results and FY2023-FY2027 Forecast Period

Arcadis reviewed the financial information provided by PRASA, the 2022 PRASA Fiscal Plan, and the FY2023 Annual Budget certified and approved on June 9, 2022, 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 FY2022 and the reasonableness of PRASA's assumptions in the preparation of the five-year financial projections from FY2023-FY2027 (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 FY2022
- Revenue and expense projections for FY2023
- The 2022 PRASA Fiscal Plan certified on May 20, 2022
- PRASA's FY2023 Annual Budget certified and approved on June 9, 2022
- Debt service schedules for currently outstanding debt service and 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, required to be deposited in the Rate Stabilization Account of the Surplus Fund
- The amount of Operating and Authority Revenues (as per amended MAT) that will be sufficient to meet the Rate Covenant for FY2023-FY2027
- The amount received and expected to be received from FEMA as a result of the impacts from the 2017 Hurricanes Irma and María and the 2020 earthquakes for expense reimbursement
- The amounts expected to be received from federal programs to fund PRASA's CIP such as the SRF and RD Programs, the FAASt, ARPA, HMGP, and CDBG

On June 15, 2022, PRASA completed the issuance of its 2022 Senior Bonds in a total principal amount of $565.2 million to refinance in the aggregate the 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 $22 million, total debt service savings to final maturity of approximately $569.7 million or approximately $361.5 million NPV savings, representing 20% of the refunded par amount. The financial forecast and information reflected in the financial section of this CER utilize the 2022 PRASA Fiscal Plan as certified by the FOMB on May 20, 2022, as its source. While the issuance was completed in June 2022, the 2022 Fiscal Plan includes the assumption that this issuance would be completed. Thus, any financial benefits or impacts experienced by PRASA as a result of the 2022 Series Bonds are reflected in the forecast evaluation presented in this section.

### 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 Section 8.5. Note that these amendments will only become effective upon the receipt of 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 FY2022 through FY2027, including the 2022 PRASA Fiscal Plan revenue-enhancing initiatives, presented on a cash basis in accordance with the MAT are summarized in Table 8-13.

*Table 8-13 PRASA Operating Revenues ($, Millions)*

| Fiscal Year | Operating Revenues |
|---|---|
| FY2022 Projection based on Preliminary Results | $1,056.4 |
| FY2023 Annual Budget[1] | $1,101.2 |
| FY2024 Projected | $1,106.5 |
| FY2025 Projected | $1,128.5 |
| FY2026 Projected | $1,158.0 |
| FY2027 Projected | $1,193.3 |

[1] As certified by the FOMB on June 9, 2022.

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 FY2022 PRASA Fiscal Plan Rate Adjustments (annual rate adjustment). Table 8-14 provides a breakdown of PRASA's Service Revenues (Net of Subsidies) for FY2022 through FY2027.

*Table 8-14 PRASA Service Revenues, Net of Subsidies ($, Millions)*

| Service Revenues Category | FY2022 Preliminary[1] | FY2023 Annual Budget | FY2024 Projected | FY2025 Projected | FY2026 Projected | FY2027 Projected |
|---|---|---|---|---|---|---|
| Base Fee and Volume Charges[2] | $1,053.4 | $1,069.3 | $1,049.6 | $1,041.9 | $1,035.9 | $1,032.7 |
| Rate Increases[3] | 0.0 | 29.4 | 54.4 | 84.1 | 119.6 | 158.1 |
| **Total (Net of Subsidies)[4]** | **$1,053.4** | **$1,098.7** | **$1,104.0** | **$1,126.0** | **$1,155.5** | **$1,190.8** |

[1] Preliminary projection as included in the 2022 PRASA Fiscal Plan.
[2] Includes accumulated revenues generated from rate adjustments implemented FY2018-2022 and electronic bill discount, and the adjustment for billings not collected (net of collections from prior years). Billing to collections adjustments are $(57.3), $(33.1), $(43.7), $(43.4), $(43.2), and $(43.0) million in FY 2022 through FY 2027, respectively.
[3] Includes the rate increase for FY2023 through FY2027 as presented in the 2022 PRASA Fiscal Plan.
[4] Numbers may not add up due to rounding.

Table 8-15 summarizes the number of residential customers that are provided a subsidy for water and wastewater bills as of June 30, 2022.

*Table 8-15 FY2022 Water and Wastewater Subsidized Customer Accounts*

| Subsidy | Number of Customers | Percent of Total Residential Customers[1] |
|---|---|---|
| PAN Subsidy | 80,619 | 6.7% |
| TANF Subsidy | 9,652 | 0.8% |

| Subsidy | Number of Customers | Percent of Total Residential Customers[1] |
|---|---|---|
| ASES Subsidy | 5,647 | 0.5% |
| Fixed Tariff (Public Housing) | 48,843 | 4.1% |

[1] Based on a total number of residential customers of 1,205,394 provided by PRASA as of June 30, 2022.

PRASA's Service Billings projections are based on certain assumptions, including growth and consumption assumptions that could be affected by numerous 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[6].
- While revenue adjustments were calculated using the best information PRASA has available at this time, the full extent of the impacts on the Service Revenues going forward due to the COVID-19 pandemic is unknown and subject to variability which may cause Service Billings to differ from projections.
- The timeliness or results of the revenue initiatives included in the 2022 PRASA Fiscal Plan may differ from projections.

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

**Growth and Consumption Assumptions**

As shown in Figure 8-1, PRASA experienced annual reductions in its customers or accounts by about 0.1% per year from FY2018 through FY2020. However, in FY2021 and FY2022, the number of customer accounts increased by approximately 1.3% per year beginning in FY2020. 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 on-going efforts by PRASA to reduce illicit accounts. This can also be seen in Table 8-18 where the growth in customers from FY2021 to FY2022 is 1.0%. In FY2022, the total average monthly billed consumption decreased by approximately 0.9% compared to FY2021 while the average monthly consumption per account decreased by 1.9% compared to FY2021 as shown in Tables 8-19 and 8-20, respectively. PRASA suspects the decrease observed is due to aging/faulty meters. One of the main initiatives in PRASA's 2022 Fiscal Plan is to modernize PRASA's metering system, improve billings and collections and reduce NRW. In addition, PRASA is working on its water meter replacement initiative utilizing advanced metering technology.

[6] 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 FY2018-2022*

*Table 8-16 PRASA Customer Accounts*

| Fiscal Year | Customer Class | | | | Total |
|---|---|---|---|---|---|
| | Residential | Commercial | Industrial | Government | |
| FY2021[1] | 1,193,544 | 48,459 | 743 | 8,760 | 1,251,506 |
| FY2022[2] | 1,205,394 | 49,539 | 734 | 8,654 | 1,264,321 |
| **% Difference** | **1.0%** | **2.2%** | **-1.2%** | **-1.2%** | **1.0%** |

[1] Number of accounts by customer class through June 30, 2021.
[2] Number of accounts by customer class through June 30, 2022.

In 2015 Puerto Rico experienced a drought that impacted islandwide water consumption trends. By FY2017, PRASA's average monthly billed consumption per account increased as customer consumption stabilized after the 2015 drought ended. Nevertheless, FY2021 and FY2022 consumption results were lower than those registered prior to the drought period. In FY2014, PRASA's average monthly consumption per account was 20.6 $m^3$. In contrast, in FY2021 and FY2022, it was 15.4 $m^3$ and 15.1 $m^3$, respectively, suggesting customer consumption has not reached pre-drought conditions and, further, may not reach pre-drought conditions in future years as meters continue to age and average monthly consumption seems to have leveled out at lower average monthly consumption levels in the years since the 2015 drought, as can be seen in Figure 8-1 above.

*Table 8-17 Average Monthly Billed Consumption by Class (1,000 Cubic Meters)*

| Fiscal Year | Customer Class | | | | Total |
|---|---|---|---|---|---|
| | Residential | Commercial | Industrial | Government | |
| FY2021[1] | 14,433 | 1,836 | 1,123 | 1,825 | 19,216 |
| FY2022[2] | 13,790 | 2,170 | 1,169 | 1,923 | 19,052 |
| **% Difference** | **-4.5%** | **18.2%** | **4.1%** | **5.4%** | **-0.9%** |

[1] Based on billed consumption through June 30, 2021.
[2] Based on billed consumption through June 30, 2022.

*Table 8-18 Average Monthly Consumption per Account (Cubic Meters)*

| Fiscal Year | Customer Class | | | | Equivalent Average |
|---|---|---|---|---|---|
| | Residential | Commercial | Industrial | Government | |
| FY2021[1] | 12.1 | 37.9 | 1,511.0 | 208.3 | 15.4 |
| FY2022[2] | 11.4 | 43.8 | 1,592.4 | 222.2 | 15.1 |
| **% Difference** | **-5.4%** | **15.7%** | **5.4%** | **6.7%** | **-1.9%** |

[1] Based on information through June 30, 2021.
[2] Based on information through June 30, 2022.

According to the U.S. Census Bureau, there was a 1.4% annual decline in Puerto Rico's population between 2012 and 2020.[7] After the publication of the Central Government's 2021 Fiscal Plan, the Census Bureau published 2020 Census data, which showed a population of approximately 3.3 million in Puerto Rico at the end of 2020, representing an increase of approximately 275,000 persons compared to the population projection within the Central Government's 2021 Fiscal Plan. The Central Government's 2022 Fiscal Plan includes an updated population forecast that reflects the 2020 Census.[8] The updated estimates project an average 1.05% annual population decline through FY2026, an approximate decline of 5.1% from FY2022 to FY2026. This trend in population decline is one of the reasons for the total water consumption reduction pattern experienced in recent years, which worsened in 2016 due to the drought that affected a large portion of the Island towards the end of FY2015 and the first half of FY2016; and declined even further as a result of the 2017 Hurricanes. However, this level of population decline is not reflected in PRASA's number of active accounts.

[7] 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).
[8] The Central Government's Revised New Fiscal Plan for Puerto Rico (January 27, 2022) estimates the population for FY2022 to be at approximately 3.27M.

Table 8-19 contains the projected macroeconomic indicators included in the 2022 Fiscal Plan. These indicators include annual population change and annual change in Gross National Product through FY2027 both of which are anticipated to decline.

*Table 8-19 Macroeconomic Indicators Assumption for Service Revenue Projection*

| FY | Population Change (Compared to previous year) | Gross National Product Change (Compared to previous year) |
|---|---|---|
| 2023 | -1.1% | 0.6% |
| 2024 | -1.0% | -1.6% |
| 2025 | -1.0% | -1.1% |
| 2026 | -0.8% | -0.5% |
| 2027 | -0.5% | 0.7% |

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 Assumptions***

From FY2018 through FY2022, PRASA implemented five rate adjustments for each customer class, the last rate adjustment was implemented on July 1, 2021, at the following levels:

- Residential: 2.5%
- Commercial: 2.8%
- Industrial: 3.5%
- Government: 4.5%

However, as explained in section 8.3, to continue delivering reliable, affordable, and safe water and wastewater services without reducing critical investments in its System through its CIP, PRASA revisited its rate structure. As an initial step, in 2021, PRASA engaged a third-party expert in utility rate design to recommend an optimal rate structure aligned with industry-standard cost allocation and rate design principles to be implemented by FY2023. Based on the recommendations from the independent examiner study, PRASA proposed a new rate structure that adhered to the public hearing and reporting processes conducted by an independent examiner as required by Act 21-1985. However, after conducting the public hearings, several factors, including the current inflationary environment, energy price volatility, supply-chain disruptions tied to geopolitical events, and other macroeconomic trends, pushed PRASA and the independent examiner to reevaluate the magnitude of the rate adjustments. As such, the preliminary recommendations from the independent examiner include (among others) the following:

- To adopt the simplified rate structure proposed by the third-party experts, incorporating only two charges (base and consumption charges);
- Based on current inflationary conditions, to increase the adjustment to the base charge from the previously projected 2% to 5% for FY2023 and to maintain a 2% increase in the consumption charges;

- Increase the maximum allowed rate increase “ceiling” from the current 4.5% to 5% and the cumulative rate increase cap from 25% to 30%; and
- Future rate adjustment of 4% for residential and 5% for non-residential accounts starting in FY2024.

PRASA’s Certified Fiscal Plan rate adjustments are based on the independent examiner’s preliminary recommendations. For FY2023, the Certified Fiscal Plan assumes 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, the Certified Fiscal Plan reflects a 2% annual rate adjustment across all customer segments. According to PRASA, implementing the periodic rate adjustments reflected in the Certified Fiscal Plan will generate nearly $370 million in incremental revenues between FY2023 to FY2027.

Arcadis believes that PRASA’s assumptions for Service Revenues are reasonable based on historical results and the assumptions listed above. 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.
- Required 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 2022 PRASA Fiscal Plan. With that being said, alternative revenue enhancing, and cost saving measures would be attempted prior to PRASA adjusting the currently planned rate increases.

**Adjustment for Billings Not Collected**

Adjustments for billings not collected are netted from PRASA’s FY2022 preliminary results and forecast period Service Billings as presented in Exhibit 1, Line 1.

PRASA experienced an increase in its outstanding residential receivables partially resulting from Act 39-2020 which prevented the disconnection of residential customers' water services due to non-payment during the global pandemic. In March 2022 PRASA recommenced the implementation of service disconnections and disconnection fees for overdue accounts that did not set up a payment plan projecting a 97% collection rate during FY2023 and returning to a 96% collections rate thereafter.

Arcadis finds PRASA’s forecasted amount reasonable. PRASA should closely monitor changes in economic indices, COVID-19 impacts, and collection results due to the uncertain economic and fiscal 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.

Additional items related to the adjustments for billings not collected are summarized below.

2. Transfers to/from the Rate Stabilization Account (Exhibit 1, Line 2) – In accordance with 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 FY must be made into the account equal to the balance set forth 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. The forecast period does not include any transfers (deposits) into the Rate Stabilization. The Rate Stabilization Account is discussed in further detail in Section 8.6.6.

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 paid by developers for construction projects or new development connections. These fees apply to new water and sewer connections to the System. The FY2022 fees were about $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 FY2022 preliminary projections totaled $2.5 million of which approximately $1.0 million are from Miscellaneous Income and $1.5 million from Special Assessments. PRASA is projecting $1.0 million from Miscellaneous Income and $1.5 million from Special Assessments annually during the forecast period. PRASA projects an average of approximately $2.5 million in additional revenues annually from Other Income during the forecast period.

Arcadis believes that PRASA's assumptions for Other Income are reasonable based on historical results and the above assumptions.

4. 2022 PRASA Fiscal Plan Revenue Enhancing Initiatives (Exhibit 1, Line 4) – In addition to the rate structure simplification and adjustments previously discussed above PRASA has also included the metering and customer service optimization benefits as a revenue-enhancing initiative in the 2022 PRASA Fiscal Plan. Additional revenues from these initiatives are expected to be obtained starting in FY 2024 through FY2027 as summarized in Table 8-20.

*Table 8-20 2022 PRASA Fiscal Plan Revenue Enhancing Initiatives ($, Millions)*

| | FY2024 | FY2025 | FY2026 | FY2027 |
|---|---|---|---|---|
| **Initiatives** | **Projected** | **Projected** | **Projected** | **Projected** |
| Metering Optimization | 2.5 | 10.3 | 23.6 | 39.5 |
| **Total Additional Revenues[1]** | **$2.5** | **$10.3** | **$23.6** | **$39.5** |

[1]No additional revenues included in FY 2022 and FY 2023 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 2022 PRASA Fiscal Plan, by increasing the accuracy of water meters, PRASA will be able to transition away from estimated commercial losses and achieve a greater level of 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.

In 2022 PRASA published an RFP for water meters AMI infrastructure, including a pilot phase as the first step. The results of the pilot will be evaluated and will be 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 FY2022 through FY2027.

### 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 further discussed in Section 8.5. Note that the amendments will only become effective upon the receipt of 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 FY2022 and operating expense projections for FY2023 to FY2027 net of (i) capitalized expenses, (ii) the 2022 PRASA Fiscal Plan expense reduction initiatives, and (iii) the September 2017 Hurricanes impact recoveries are presented in Table 8-21.

*Table 8-21 PRASA Operating Expenses ($, Millions)*

| Fiscal Year | Operating Expenses Without FEMA Reimbursements | Operating Expenses net of FEMA Reimbursements |
|---|---|---|
| FY2022 Preliminary | $758.9 | $738.9 |
| FY2023 Annual Budget | $818.9 | |
| FY2024 Projected | $822.3 | |
| FY2025 Projected | $833.3 | |
| FY2026 Projected | $838.1 | |
| FY2027 Projected | $853.4 | |

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 rate of inflation. Also, the 2022 PRASA Fiscal Plan incorporates the FOMB's inflation rates projections, averaging about 1.82% for the forecast period (FY2023 through FY2027), from 2.70% in FY2023 to 1.55% in FY2027. However, Puerto Rico's inflation rate during the last quarter of FY2022 was recorded at about 7.2% (June 2022) and projections show a projected decrease to approximately 4.0% by the end of FY2023[9] .

1. Payroll and Benefits (Exhibit 1, line 11) – Payroll and Benefits continue to be PRASA's largest expense category. Note that prior to capitalization:
   - PRASA's FY2022 Payroll and Benefits preliminary results amount to $320.3 million.
   - For FY2023, PRASA is projecting Payroll and Benefits in the amount of $340.2 million.
   - For the remainder of the forecast period, the 2022 PRASA Fiscal Plan is projecting the Payroll and Benefits expense to increase annually by approximately 2.12% as follows:
     - FY2024 = $346.8 million
     - FY2025 = $358.5 million
     - FY2026 = $361.1 million
     - FY2027 = $369.9 million

   The following main assumptions were applied to develop the Payroll and Benefits Costs:
   - Headcount of 4,700 employees for FY2022 increasing by 50 full-time employees (FTE) each year thereafter reaching 4,950 employees by FY2027.
   - Minimum salaries based on current legislation.
   - Implementation of new salary pay scales starting on July 1, 2022.
   - New incentives for critical operational positions to allow for retention.
   - Compliance with the Fiscal Plan Compliance Act (Act 26-2017) including a maximum overtime factor of 1.5x and a reduction of vacation days to 15 days maximum.

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

- 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 FY2022 and updated for FY2023 and FY2024 taking into consideration the latest Request for Proposal (RFP) process.
- Pension costs projected as a "PayGo" expense based on the projections provided by the Employees Retirement System (ERS).

**Headcount and Overtime Assumptions**

As of June 30, 2022, PRASA had a total headcount of 4,604 employees including 254 employees qualified under the Voluntary Pre-Retirement Program.

- The FY2023 Annual Budget, as presented to the FOMB, assumes a total of 4,750 employees or a net increase of 146 employees, increasing by 50 full-time employees (FTE) each year thereafter reaching 4,950 employees by FY2027.

Based on FY2022 preliminary results through June 30, 2022, the current overtime level is at approximately 8% of total payroll costs similar to what PRASA had estimated in its FY2022 Annual Budget. PRASA has assumed a rate of overtime of 7% (as a percentage of net payroll costs) in the FY2023 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. Act 26-2017 supersedes any previous act. Among other measures, Act 26-2017 requires all marginal benefits to be the same for all employees of the Government of Puerto Rico, 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.
- 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 1.5x the regular hourly rate.

The impact of Act 26-2017, as amended, was 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 offered incentives to certain eligible employees to voluntarily retire early and still 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 a term of 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 for the economy to undergo a transition process. 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 in the absence of these positions. The FOMB might authorize maintaining positions if certified to be essential and per the plan submitted by PRASA.

Some of the eligible PRASA employees occupied managerial or supervisory positions, which may create organizational challenges. As of June 30, 2022, over 254 employees are retired under the Voluntary Pre-Retirement Program.

**Collective Bargaining Agreements Assumptions**

On April 6, 2021, PRASA received a partial labor agreement proposal from *Unión Independiente Auténtica de la Autoridad de Acueductos y Alcantarillados* (UIA-AAA). UIA-AAA requested that PRASA provide financial information to develop a proposed comprehensive revision to PRASA's Collective Bargaining Agreement (CBA) with UIA-AAA incorporating amendments to clauses with economic impact. After further discussions by the parties, in February 2022, PRASA and UIA-AAA signed a Negotiation Agreement. The Negotiation Agreement, by which the parties are participating in mediation before the Puerto Rico Department of Labor (PRDOL), provides for the negotiation of revised pay scales, subject to compliance with PROMESA and the 2022 Fiscal Plan. Under the Negotiation Agreement, either party can notify the other of its intention to negotiate a revised CBA at least 90 days before each July 1, commencing on July 1, 2022. The CBA will be extended for an additional year if such notification is not received at least 90 days before July 1. As of June 30, 2022, no notification had been received within the 90-day notice period, resulting in the extension of the CBA through July 1, 2023.

The Negotiation Agreement also provides that the parties will promote the payment of wage incentives starting in FY2023 for certain difficult-to-recruit positions such as plant operators and electro-mechanics; payment of a $600 premium by June 30, 2022, to recognize UIA-AAA members' employment commitment; and payment of Christmas bonus balances for fiscal years 2015 (by July 31, 2022) and 2016 (by July 31, 2023), without interest or penalties to active UIA-AAA members.

Regarding the CBA with *Hermandad Independiente de Empleados Profesionales de la Autoridad de Acueductos y Alcantarillados* (HIEPAAA), neither party provided notice of its intention to negotiate a new collective bargaining agreement before the CBA would be deemed automatically extended for another year. Thus, as required by Act 9-2021, the HIEPAAA CBA has been deemed extended for an additional year to July 1, 2023.

On July 1, 2022, based on a comprehensive analysis by a third-party (as agreed with the UIA-AAA, HIEPAAA, and Managers Association), new pay scales were implemented for PRASA employees, providing

for a minimum salary increase. In addition, an incentive for licensed plant operators and electromechanics was also implemented as of such date.

**Pension Costs Assumptions**

The 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 FY2022 preliminary projections, FY2023 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 FY2022, PRASA preliminarily projects $91.3 million to cover employees' retirement benefits on a Pay-Go basis. In its FY2023 Annual Budget, PRASA forecasts $94 million in pension Pay-Go costs per the Oversight Board's projection. PRASA projects pension Pay-Go costs to be $93 million in FY2024, $92 million in FY2025, $91 million in FY2026, and $96 million in FY2027.

3. Electric Power (Exhibit 1, line 12) – PRASA's FY2022 preliminary projections for electric power total $149.4 million, which is $21.0 million more than the budgeted amount. The FY2023 Annual Budget assumes an electric power expense of $211.4 million for FY2023. The FY2023 Annual Budget is based on electric rates, as projected by the Oversight Board, of a standard PREPA/LUMA rate of $0.33 per kilowatt-hour (kWh) ($0.134 per kWh increase from the FY2022 rate) and a more consistent projected electric power consumption assuming a reduction in service interruptions. Per the 2022 PRASA Fiscal Plan, electricity consumption is expected to slightly increase in FY2024 and then hold steady for the remainder of the forecast period. PRASA's electricity cost is highly sensitive to PREPA/LUMA rates with an approximate $6.5 million 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 decrease to $0.31 in FY2024 and FY2025 and increase to $0.32 in FY2026, resulting in electric power expenses of $201.0 million, $201.8 million, and $207.4 million, respectively. By FY2027, the PREPA/LUMA rate is projected at $0.33 per kWh resulting in an electric power expense of $212.4 million (a total cost increase of $63 million from the FY2022 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 Comprehensive Energy Management Program.

   Arcadis finds PRASA's forecast period projection for Electric Power reasonable. However, based on current events, including the ongoing Russian invasion of Ukraine, 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 possible material change. As can be seen, by the large increase in electricity costs included in the FY2023 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 previously, PRASA's LUMA rate for FY2022 was $0.256 per kWh. LUMA's projected rate applicable to PRASA for FY2023 is $0.33 per kWh. In recent months, PRASA has indicated that the average PREPA (blended) rate cost has been between $0.293-$0.338 per kWh. For FY2024 through FY2027, PRASA is projecting PREPA (blended) rate costs of $0.312, $0.313, $0.322, and $0.330 per kWh, respectively. The resulting average PREPA (blended) rate cost during the forecast period is $0.319 per kWh.

**Purchase Power Agreements**

PRASA has included projected savings in costs because of its PPAs, and other internal measures. Since 2011 and 2012, PRASA has had ten facilities under a PPA mechanism using photovoltaic energy, producing approximately 11.3 million 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 FY2022 totaled 617 million kWh (compared to the 647 million kWh budgeted). For FY2023, PRASA is projecting that its total consumption will be 649 million kWh, of which 638 million kWh will be power consumption bought from PREPA. This PREPA consumption projection considers Regional Initiatives expected to be achieved in FY2023. For the forecast period, PRASA is projecting that its total consumption will be at an average of 650 million kWh, of which an average of 639 million kWh will be power consumption bought from PREPA.

4. Maintenance and Repair (Exhibit 1, line 13) – The FY2023 Annual Budget for Maintenance and Repair is $56.5 million, which is about $4.3 million less than the FY2022 preliminary projections. Maintenance and Repair is used to cover System needs from deferring required repair and maintenance of the assets due to: (1) availability of funds and (2) redirection of efforts and funding to address service recovery and continuity following natural disasters and the COVID-19 pandemic. The 2022 PRASA Fiscal Plan projects Maintenance and Repair expenses of $61.6 million, $62.5 million, $63.5 million, and $64.5 million for FY2024 through FY2027, 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 FY2022 preliminary projections for chemical costs amount to $56.8 million, $9.3 million 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 FY2023, PRASA is budgeting approximately $56.6 million in chemical expenses. For FY2024 through FY2027, PRASA has applied an annual increase based on the assumed inflation rate (1.6% average) on Chemical expenses, resulting in expenses of $59 million in FY2024, $59.9 million in FY2025, $60.9 million in FY2026, and $61.8 million in FY2027.

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 2022 PRASA Fiscal Plan, consumption increases due to new requirements from the regulatory agencies, or inefficient chemical dosing.

6. Insurance (Exhibit 1, line 15) – Preliminary projections for insurance expenses in FY2022 total $22.9 million, which is $0.7 million higher than was budgeted. PRASA has budgeted $21.6 million for insurance expenses in FY2023, which is $1.3 million lower than the FY2022 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 (1.6% average over the forecast period) on insurance expenses throughout the forecast period, resulting in insurance expenses of $22.0 million in FY2024, $22.3 million in FY2025, $22.6 million in FY2026, and $23.0 million in FY2027.

   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 by way of 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 of costs directly related to operations, including rentals, security services, billings, collections-related costs, water purchases, sludge disposal, and water transport, among others. FY2022 preliminary projections for Other Expenses total $158.9 million, $2.2 million less than included in the certified FY2022 Annual Budget. PRASA has included $167.6 million for Other Expenses in its FY2023 Annual Budget, which represents an increase of approximately 5.5% over FY2022 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 $175.7 million in FY2024, $178.4 million in FY2025, $181.2 million in FY2026, and $184 million in FY2027. 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. The 2022 PRASA Fiscal Plan Operating and Capital Expense Savings Initiatives (Exhibit 1, line 17) – The Operating and Capital Expense Savings initiatives included in the 2022 PRASA Fiscal Plan are the reduction of physical water losses, electricity cost reduction, and new financing for CIP.

   Table 8-24 presents the financial projection of these initiatives for the forecast period.

*Table 8-22 2022 PRASA Fiscal Plan Operating and Capital Expense Savings Initiatives ($, Millions)*

| 2022 PRASA Fiscal Plan Initiatives | FY2022 | FY2023 | FY2024 | FY2025 | FY2026 | FY2027 |
|---|---|---|---|---|---|---|
| | Preliminary | Annual Budget | Projected | Projected | Projected | Projected |
| Physical Water Losses | $0.0 | $1.4 | $3.6 | $5.9 | $8.7 | $11.5 |
| Electricity Cost Reduction | $0.0 | $2.1 | $6.8 | $10.8 | $15.8 | $16.9 |
| New Financing for CIP | $67.8 | $176.6 | $165.2 | $44.8 | $(2.6) | $10.6 |
| **Total Expense Savings[1]** | **$67.8** | **$180.1** | **$175.6** | **$61.5** | **$21.9** | **$39.0** |

[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 through the continuation of the water leak detection program, water pressure management and optimization, and installation of master meters at critical facilities. PRASA projects savings of $1.4 million in FY2023, $3.6 million in FY2024, $5.9 million in FY2025, $8.7 million in FY2026, and $11.5 million in FY2027. The total projected savings for the forecast period is $31 million.

**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 2022 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 $2.1 million in FY2023, $6.8 million in FY2024, $10.8 million in FY2025, $15.8 million in FY2026, and $16.9 million in FY2027. Total project savings during the forecast period equate to $52.4 million.

**New Financing for CIP**

After restructuring the Federal Debt, PRASA recovered access to future funding from USEPA SRF Loans and the USDA RD Program once again. As a result, the FY2022 preliminary projections expect new financing for

CIP through these two programs in the amount of $67.8 million and $176.6 million in the FY2023 Annual Budget. For the remainder of the forecast period, the 2022 PRASA Fiscal Plan projects to receive $165.2 million in FY2024, $44.8 million in FY2025, $(2.6) million in FY2026, and $10.6 million in FY2027 from these programs for their CIP.

9. Capitalized Expenses (Exhibit 1, line 18) – PRASA's external consultant, PJ Sun LLC, completed the most recent review of PRASA's capitalization rate in April 2017. The recommendations included in the updated report, as provided by PRASA, reduce PRASA's capitalization rate from 4.7% to 3.7%. FY2022 preliminary projections for capitalized expenses amount to $10.2 million. PRASA has included in its FY2023 Annual Budget $31.5 million for capitalized expenses based on the capitalization rate of 3.7% of operating expenses. For FY2024 through FY2027, PRASA is projecting capitalized expenses of $32.0 million, $32.7 million, $33.2 million, and $33.9 million, respectively.

   Arcadis assumes that the estimation for expense capitalization used by PRASA is reasonable given that, in previous years, it has been accepted by PRASA's independent auditors in the preparation of its financial statements. Arcadis has not reviewed this estimation in detail and, as such, is not providing an opinion on the reasonableness of the recommended capitalization percentage. However, it should be considered that to the extent that PRASA's financial situation places additional burden and budget constraints at the operational level, the actual amount of R&R and maintenance and repair expenditures that can be capitalized could be reduced (as in recent years), thereby reducing the amount of capitalized expenses.

   PRASA contracted Arcadis during FY2022 to review and update the amount of annual operating costs that are eligible to be capitalized for the CIP. Such analysis is currently under review by PRASA.

10. Hurricanes' Impact on Operating Expenses (Exhibit 1, line 20) – PRASA's total hurricane impact on operating expenses amounted to $212 million. 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 both insurance proceeds and FEMA reimbursements/grants to be obtained as a result of the impact of the September 2017 hurricanes, and 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. FEMA grants received for repairing, replacing, or reconstructing the damaged or destroyed property should be applied to the Capital Improvement Fund.

In its FY2022 projections, PRASA includes a net deposit of $20 million from FEMA funds to the credit of the Current Expense Fund for the reimbursement of PRASA's operating expenses. No additional deposits are included in the periods from FY2023 through FY2027.

# 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 set forth 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 of the 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 which 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 8-23.

*Table 8-23 2012 MAT DSC Requirements Summary, as amended*

| Lien Level | Debt Secured | DSC for Additional Bonds Tests (MADS)[1] | DSC for Covenant Test | In Default if DSC not Achieved? |
|---|---|---|---|---|
| Senior | 2008, 2012, 2020, 2021, 2022 & 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 | 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.

In accordance with the MAT, the flow of funds shall be as follows:

- Senior, Senior Subordinate and Subordinate debt (and any debt that is 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.
- All revenues shall be deposited by PRASA 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 Requirement 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, thereafter, 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 the receipt of 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 set forth 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 pursuant to 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 give any assurance 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 FY2022 through FY2027 are presented in Exhibit 1 and summarized in Tables 8-24 through 8-27. Estimated debt service amounts include projected payments on the 2008, 2012, 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.

Commonwealth Guaranteed Indebtedness (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 Environmental Quality Board (EQB), 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 with regard to 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 8-24 Renegotiated Terms for SRF and RD Debt*

| Debt Category | SRF | RD |
|---|---|---|
| Outstanding Debt<br>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% thereafter | 2.0% |
| Payment Terms | Biannual principal only payment of $5 million in Years 1-10; biannual principal and interest payments of $13.7 million in Years 11-30 | Biannual principal and interest payments of $5 million in Years 1-10; increasing to $8.5 million in Years 11-40 |
| Maturity Date | 7/1/2049 | 7/1/2059 |
| Debt Level | Senior | Senior |

As reported on the 2022 PRASA Fiscal Plan, on December 17, 2020, PRASA issued its 2020 Series A and Series B Revenue Refunding Bonds (the “2020 Senior Bonds”) in the amount of $1,351.3 million and $18.8 million, respectively, for the purpose of refunding a portion 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 $87.2 million 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 $1,427.6 million (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 $348.2 million 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 $13 million.

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.

As reported on the 2022 PRASA Fiscal Plan, on August 25, 2021, the Authority issued its 2021 Senior Bonds in a total principal amount of $1,089.8 million. In addition, on June 15, 2022, PRASA completed the issuance of its 2022 Senior Bonds in a total principal amount of $565.2 million 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 $22 million, total debt service savings to final maturity of approximately $569.7 million or approximately $361.5 million 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 to 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 of the 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 the PFC, entered into a Restructuring Support Agreement (the "PFC RSA") with majority holders of the Series 2011A, Series 2011B, and Series 2012A Commonwealth Appropriation Bonds (collectively, the "PFC Bonds"). The PFC RSA contemplates restructuring and discharging the PFC Bonds under a Qualifying Modification (the "PFC Qualifying Modification") under Title VI of PROMESA. The PFC RSA further contemplates that those promissory notes issued to the order of the PFC by certain Government instrumentalities, including PRASA, for the repayment of the PFC Bonds will be canceled and extinguished under the PFC Qualifying Modification. PRASA will be discharged from any liability related to such promissory notes. The PFC Qualifying Modification remains subject to various conditions, including obtaining Court approval of the PFC Qualifying Modification, which is still pending.

A summary of PRASA's debt service obligations and projections for FY2022 and the forecast period are presented in Tables 8-25 and 8-26, respectively. FY2022 debt service obligations, including CSO debt, totaled $272.9 million of which $256.8 million were Senior lien obligations. As shown, PRASA did not make payments for CSO debt.

*Table 8-25 FY2022 Debt Service Obligations and Preliminary Results ($, Thousands)*

| Debt Category | FY2022 Obligations[1] | FY2022 Preliminary Results[2] |
|---|---|---|
| Senior Debt | $248,536 | $248,536 |
| Senior Subordinated Debt | - | - |
| Subordinated Debt | - | - |
| Commonwealth Guaranteed Indebtedness (CGI) | - | - |
| Commonwealth Supported Obligations (CSO) | 8,999 | - |
| **Total** | **$257,535** | **$248,536** |

[1] Considers the full debt service obligations due in FY2022 per the amortization schedule.

[2] Considers no payment of CSO. 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 RSA further contemplates that those promissory notes that were issued to the order of PFC by certain Commonwealth

instrumentalities, including PRASA, for the repayment of the PFC Bonds will be canceled and extinguished under the PFC Qualifying Modification, and PRASA will be discharged from any liability arising from or related to such promissory notes. The PFC Qualifying Modification remains subject to various conditions including obtaining Court approval of the PFC Qualifying Modification, which is still pending.

*Table 8-26 FY2023-FY2027 Debt Service Obligations ($, Thousands)*

| Debt Category[1] | FY2023 Projection | FY2024 Projection | FY2025 Projection | FY2026 Projection | FY2027 Projection |
|---|---|---|---|---|---|
| Senior Debt | $254,376 | $263,200 | $264,700 | $268,200 | $267,700 |
| Senior Subordinated Debt | - | - | - | - | - |
| Subordinated Debt | - | - | - | - | - |
| Commonwealth Guaranteed Indebtedness (CGI) | - | - | - | - | - |
| Commonwealth Supported Obligations (CSO) | - | - | - | - | - |
| Total Debt | **$254,376** | **$263,200** | **$264,700** | **$268,200** | **$267,700** |

[1]Considers no payment of CSO or 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 RSA further contemplates that those promissory notes that were issued to the order of PFC by certain Commonwealth instrumentalities, including PRASA, for the repayment of the PFC Bonds will be canceled and extinguished under the PFC Qualifying Modification, and PRASA will be discharged from any liability arising from or related to such promissory notes. The PFC Qualifying Modification remains subject to various conditions, including obtaining Court approval of the PFC Qualifying Modification, which is still pending.

The DSC results presented in Table 8-27 for the forecast period have been calculated using the Rate Covenant requirements per the MAT, as amended, and debt service obligations.

*Table 8-27 FY2022 - FY2027 Debt Service Coverage*

| Debt Service Level | DSC Requirement | FY2022 Preliminary DSC | FY2023 DSC | FY2024 DSC | FY2025 DSC | FY2026 DSC | FY2027 DSC |
|---|---|---|---|---|---|---|---|
| Senior Debt[1] | **2.50** | 4.25 | 4.33 | 4.21 | 4.26 | 4.32 | 4.46 |
| Senior Subordinated Debt[1] | **2.00** | 4.25 | 4.33 | 4.21 | 4.26 | 4.32 | 4.46 |
| Subordinated Debt[1] | **1.50** | 4.25 | 4.33 | 4.21 | 4.26 | 4.32 | 4.46 |
| All Obligations[2] | **1.00** | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

[1] DSC calculated with respect to Operating Revenues.
[2] DSC calculated with respect to Authority Revenues.

As shown in Table 8-27, FY2022 preliminary DSC results consider that PRASA will not pay the CSO debt which is not an event of default under the MAT. 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 in every year of the forecast period. The final DSC for FY2022 will be recalculated after the issuance of the FY2022 Audited Financial Statements to determine if PRASA was able to meet Rate Covenant Requirements.

# 8.6 Reserves and Other Deposits Requirements

## 8.6.1 Debt Service Reserve Funds

In accordance with 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 set forth 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 Account calculated in accordance with 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 which were created and funded with 2008 bond proceeds. Should future bond issuances include required reserves, PRASA plans to contribute the additional funds in each of these reserves 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 in the amount of $150 million 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.*

Per the Sixth Supplemental Agreement to the MAT, PRASA is cash funding the reserve and deposited $14.6 million in the Operating Reserve Fund during FY2022. For FY2023, PRASA is projecting to deposit $14.8 million 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

In accordance with 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 $54.2 million from Operating Revenues in the Capital Improvement Fund during FY2022 to finance a portion of its projected CIP. This deposit is net from the FEMA/ARPA proceeds and other restricted funds, and the PRASA FY2022 Fiscal Plan New Federal Funds initiative is estimated at $69.2 million (excluding the costs related to such funds as they are already included as a part of the debt service) for FY2022.

In its FY2023 Annual Budget, PRASA projects to make a deposit to the Capital Improvement Fund of $13 million from Operating Revenues, net from FEMA/ARPA proceeds and net from the PRASA FY2022 Fiscal Plan New Federal Funds initiative estimated at $182.7 million (excluding the costs related to such funds as they are already included as a part of the debt service).

From FY2024 through FY2027, PRASA projects to make deposits in the Capital Improvement Fund in the amounts of $18.1 million, $26.1 million, $48.4 million, and $67.5 million from Operating Revenues, net from the PRASA FY2022 Fiscal Plan New Federal Funds initiative estimated at $178.1 million, $62.1 million, $16.0 million, and $29.8 million, 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

In accordance with 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, from July 2016 through July 2019 PRASA had entered into forbearance agreements for its SRF and RD debt (previously classified as CGI debt). After the Federal Debt modification in July 2019 and the issuance of the 2020 Senior Bonds, no CGI remains outstanding.

In addition, no funds have been deposited in the CSO Account during recent years, and accordingly, no funds were transferred by PRASA to the trustee of the PFC Bonds for the payment of debt service that was due on the PFC Bonds. Nevertheless, as per Section 5.02(c) of the MAT, any deficiency in the amounts required to be deposited into the Commonwealth Payments Fund to pay for the Commonwealth Guaranteed Indebtedness or the Commonwealth Supported Obligations shall not be cumulative and shall be deemed to be eliminated upon interest or principal payment date.

On January 20, 2022, AAFAF, on behalf of the PFC, entered into a Restructuring Support Agreement (the “PFC RSA”) with majority holders of the Series 2011A, Series 2011B, and Series 2012A Commonwealth Appropriation Bonds (collectively, the “PFC Bonds”). The PFC RSA contemplates restructuring and discharging the PFC Bonds under a Qualifying Modification (the “PFC Qualifying Modification”) under Title VI of PROMESA. The PFC RSA further contemplates that those promissory notes that were issued to the order of PFC by certain Commonwealth instrumentalities, including PRASA, for the repayment of the PFC Bonds will be canceled and extinguished under the PFC Qualifying Modification, and PRASA will be discharged from any liability arising from or related to such promissory notes. The PFC Qualifying Modification remains subject to various conditions, including obtaining Court approval of the PFC Qualifying Modification, which is still pending.

In its FY2023 Annual Budget, PRASA projects to not make any deposits to the Commonwealth Payment Fund related to CGI debt. For the remainder of the forecast period, the 2022 PRASA Fiscal Plan projects no more deposits will be made into this 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. The FY2022 projections and the FY2023 Annual Budget do not include any deposits to the Rate Stabilization. PRASA does not plan on making any deposits to the Rate Stabilization Account during the forecast period.

## 8.7 Conclusions

PRASA's forecast (Exhibit 1) reflects the financial projections included in the 2022 PRASA Fiscal Plan certified by the Oversight Board on May 20, 2022. With PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the forecast reflects a total surplus of $0.8 million.

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 currently 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 2022 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 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 2022 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.
3. **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 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

Over the past several years, the Government of Puerto Rico has faced significant economic, demographic, severe weather (Hurricanes in 2017 and earthquakes in 2020), and pandemic related-challenges that have adversely impacted PRASA. In addition to the economic downturn that has been experienced in Puerto Rico PRASA is also facing several System challenges, including service affordability, aging infrastructure, high volume of non-revenue water (NRW), regulatory mandates, and increasing R&R needs.

Note that the economic and financial condition of PRASA is also affected by complex factors as a result of actions taken or not taken by others for example:

1. COVID-19 economic effects on the global, United States, and Puerto Rico economies.
2. The amount of federal aid in response to COVID-19 and the speed of the disbursement from the federal government.
3. The amount and timing of distributions from FEMA, USDA, USEPA, among other entities to repair damages caused by Hurricanes Irma and Maria and the 2020 earthquakes.
4. Impacts due to Puerto Ricans migrating out of the island.
5. Financial impacts due to the high cost of electricity on the island.
6. Impacts of geopolitical events including the conflict between Russia and Ukraine.

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.

## 9.2 Staffing 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 FY2022 total headcount of 4,604 employees, PRASA will ideally need to hire 426 additional employees. 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.
- Evaluate the current pay scales among the different groups to align with the labor market levels and attempt to reduce the high personnel turnover from the past years.

Note that PRASA continues to face challenges in filling critical operational staff needs in its Operations Department (i.e., plant operators, electromechanical staff, System maintenance staff, and meter readers), which results in overtime hours, delayed repairs, or understaffed/deficient services.

## 9.3 System Asset Condition

Arcadis performed asset condition assessments of a selection of WTP and WWTP facilities corresponding to FY2022 and a sample of ancillary facilities. Arcadis visited a total of 184 facilities throughout PRASA's five Operational Regions between February and July of 2022 to conduct a condition assessment of PRASA's facilities. Of the inspected facilities, 72 (39%) 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. The data indicates that only 9% of the facilities inspected in FY2022 are in Good condition, and 71% are in Adequate condition. However, 33% 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.

Twenty-one percent of the facilities are in the Unacceptable to Poor range. The major concern is the facilities' physical condition. However, PRASA expects to address several deficiencies highlighted using 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 FY2022 condition assessment for treatment plants (WTPs and WWTPs) and FY2020 condition assessment for dams, positive changes were observed for WTPs, and negative changes were observed for dams and WWTPs. Also, the overall rating for ancillary facilities increased to different degrees for wells, WPS, WST, and WWPS.

PRASA's eight regulated dam conditions are rated as Poor to Adequate. Many of the recommendations from the 2020 and prior inspections saw little or no progress, resulting in the overall depreciation of ratings across the board and on all of the inspected dams. Four were rated as Poor, and four as Adequate. All dams appear to have deteriorated since the last inspection, although some improvements were observed but not well-documented.

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 FY2021 inspection results, the Staffing and Training criteria scores decreased, and the Regulatory Compliance and Operations and Process Control scores increased. The Equipment and Maintenance scores stayed the same. The recent score increase in the Operations and Process Control criteria can be attributed partly to the process control initiatives implemented at the WTPs as part of the compliance effort to control DBPs. The Equipment and Maintenance criteria rating scores have remained fairly constant for the past few years; this can be attributed to the same equipment being out of service or deteriorating, as previously reported. The score increase of the Regulatory Compliance criterion may be because several parameters had interim limits or were only being monitored, which do not negatively affect the compliance rating.

The WWTPs generally range from Poor to Adequate conditions in the overall rating. Out of the 24 facilities inspected, eight (33%) received a Poor overall rating, and 16 (67%) received an Adequate rating. Five of those

eight facilities had a Poor rating in terms of Equipment and Maintenance. Compared to the FY2021 inspection results, Regulatory Compliance stayed the same. The Operations and Process Control and Equipment and Maintenance scores increased 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. The Regulatory Compliance criterion was on the upper end of Poor despite some facilities having interim limits or monitoring only on certain parameters. Also, PRASA must plan and make the necessary improvements to both 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 but remained at the lower end of Adequate and, if left unattended, could continue to deteriorate. WWPSs facility criteria rating stayed the same rating (1.7). 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.

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 FY2022, chemicals-related expenses were one of the largest operating expenditures at nearly $60 million. 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 it is driven by supply and demand market factors.

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 three key focus areas of the 2022 PRASA Fiscal Plan and has established three main programs for reducing physical losses to achieve a reduction of 54 MGD by FY2027. These programs are:

- Master Meters – Accurately measure water production by installing water meters at critical facilities. The goal is to measure 93% of WTPs production by FY2023.
- 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 with the recently completed FEMA grant funding agreement in place, is now in the process of procuring advanced metering solutions, which is expected to commence with a pilot program as soon as the first quarter of 2023.

## 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 the end of the third quarter of FY2022, PRASA had over 266 active projects in the CIP at different stages for a total investment of $2,951 million.

PRASA's six-year CIP for FY2022 through FY2027, as included in the 2022 PRASA Fiscal Plan, amounts to $3.45 billion. The six-year CIP comprises Reconstruction & Recovery, R&R, and Compliance (mandatory and non-mandatory) projects, which account for 90% of the total forecasted expenditures. Reconstruction & Recovery, totaling 62.5% of the total CIP, increased by 16% compared to FY2021 to $2,157.8 million and is the largest category in terms of dollars throughout this CIP period. Mandatory and Non-Mandatory Compliance driven projects are the second largest expense, with an annual average expenditure of $98.3 million and a total of $589.6 million, increasing to 53.8%. The R&R category is now the third largest expense, with an annual average expenditure of $55 million and $329.8 million (9.5% of the total CIP) over six years.

Compared to the 2021 PRASA Fiscal Plan six-year CIP ($2,866.1 million), the 2022 PRASA Fiscal Plan CIP was increased by a total expenditure of $588.8 million, a 20.5% increase. The difference is mainly attributed to the increase in Recovery and Reconstruction and Mandatory/Non-Mandatory Compliance projects. Other categories increased as well. However, the FY2022 PRASA Fiscal Plan CIP did have some reductions in projects and

expenditures for the Quality and Emergencies and Contingencies categories at $19 million (26%) and $38.5 million (88%), respectively.

PRASA continues to work on the requirements of the Consent Decree with USEPA and the settlement agreement with PRDOH. In addition, PRASA, USEPA, and USDOJ are currently working towards a partial modification of the 2015 USEPA Consent Decree in court to address the effects of the force majeure events.

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 properly 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 is appropriate for the System. Several key recommendations for PRASA's insurance program are provided below and is recommended they get implemented in a timely manner.

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 undertakes a new valorization of its assets.
2. Marsh's 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, therefore, corroborating if the current limits of insurance carried are adequate or 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 in a better position 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 coverages and transfer additional risks by way of its insurance program. To the extent that PRASA adopts these recommendations, premium costs may increase and these additional costs should be taken into consideration in future financial forecasts.

## 9.8 Financial Analysis

PRASA's forecast reflects the financial projections included in the 2022 PRASA Fiscal Plan certified by the Oversight Board on May 20, 2022. With PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the forecast reflects a total surplus of $0.8 million.

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 currently 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 2022 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 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.

The probability of PRASA meeting its forecast is conditioned on the following:

- 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.
- PRASA's ability to successfully implement its Fiscal Plan initiatives – PRASA's 2022 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 System needs exceed the levels assumed by PRASA in its forecast, expenses could be materially affected.

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.

Note that Arcadis has made no determination as to 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 in accordance with their terms.

# Exhibit 1

## Financial Forecast FY 2022-2027

**EXHIBIT 1**

| | PRASA FINANCIAL FORECAST PRO FORMA[a] ($, Thousands) | FY2022 PRELIMINARY [b] | FY2023 ANNUAL BUDGET | FY2024 PROJECTION | FY2025 PROJECTION | FY2026 PROJECTION | FY2027 PROJECTION |
|---|---|---|---|---|---|---|---|
| | **OPERATING REVENUES** | | | | | | |
| 1. | Service Revenues (Base Fee and Service Charges, Net of Subsidies) [c] | $1,053,884 | $1,069,326 | $1,049,645 | $1,041,855 | $1,035,869 | $1,032,749 |
| 2. | Transfer from / (to) Rate Stabilization Account | 0 | 0 | 0 | 0 | 0 | 0 |
| 3. | Other Income (Miscelaneous/Special Assessments) | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 |
| 4. | Fiscal Plan - Revenue Enhancing Initiatives [d] | - | 29,402 | 54,406 | 84,127 | 119,566 | 158,059 |
| 5. | **Total Operating Revenues [Sum Lines 1-4]** | **$1,056,384** | **$1,101,228** | **$1,106,551** | **$1,128,482** | **$1,157,935** | **$1,193,308** |
| | **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]** | **$1,056,384** | **$1,101,228** | **$1,106,551** | **$1,128,482** | **$1,157,935** | **$1,193,308** |
| | **OPERATING EXPENSES** | | | | | | |
| 11. | Payroll and Benefits | $320,292 | $340,238 | $346,797 | $358,473 | $361,084 | $369,947 |
| 12. | Electric Power | $149,381 | $211,357 | 200,984 | 201,796 | 207,423 | 212,391 |
| 13. | Maintenance and Repair | $60,859 | $56,525 | 61,575 | 62,532 | 63,499 | 64,483 |
| 14. | Chemicals | $56,845 | $56,600 | 59,007 | 59,924 | 60,850 | 61,793 |
| 15. | Insurance | $22,899 | $21,576 | 21,950 | 22,291 | 22,636 | 22,987 |
| 16. | Other Expenses | $158,862 | $167,605 | 175,703 | 178,434 | 181,192 | 184,000 |
| 17. | Fiscal Plan - Cost Saving Initiatives [e] | - | (3,507) | (11,668) | (17,502) | (25,438) | (28,322) |
| | Impact in ORF and OH | | | (1,273) | (867) | (979) | 98 |
| 18. | Capitalized Operating Expenses | (10,219) | (31,465) | (32,043) | (32,688) | (33,177) | (33,877) |
| 19. | **Total Operating Expenses [Sum Lines 11-18]** | **$758,918** | **$818,930** | **$822,305** | **$833,260** | **$838,069** | **$853,402** |
| | **ADDITIONAL EXPENSES** | | | | | | |
| 20. | Expected FEMA Reimbursements[f] | (20,000) | - | 0 | 0 | 0 | 0 |
| 21. | **Total Additional Expenses [Line 20]** | **-$20,000** | **$0** | **$0** | **$0** | **$0** | **$0** |
| 22. | **Total Operating Expenses [Line 19 + Line 21]** | **$738,918** | **$818,930** | **$822,305** | **$833,260** | **$838,069** | **$853,402** |
| | **DEPOSITS** | | | | | | |
| 23. | Deposit to the Senior Bond Fund | $248,536 | $254,376 | $263,133 | $264,689 | $268,173 | $267,650 |
| 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 | 14,644 | 14,849 | 2,900 | 4,200 | 3,200 | 4,600 |
| 31. | Deposit to the Capital Improvement Fund (Net of Projected New Federal Funds and FEMA Reimbursement) | 54,169 | 12,976 | 18,086 | 26,099 | 48,368 | 67,451 |
| 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 |
| 35. | **Total Deposits, excluding existing deposits available in the Current Expense Fund [Sum Lines 23-28 and 30-34]** | **$317,350** | **$282,202** | **$284,119** | **$294,988** | **$319,741** | **$339,701** |
| 36. | **Net Authority Revenues After Obligations and Deposits [Line10-Line 22-Line 35-Line 30]** | **$115** | **$95** | **$127** | **$234** | **$125** | **$205** |
| | **DEBT SERVICE PAYMENTS DUE** | | | | | | |
| 37. | Senior (S)[g] | $248,536 | $254,376 | $263,133 | $264,689 | $268,173 | $267,650 |
| 38. | ***DS Coverage Required = 2.50*** | ***4.25*** | ***4.33*** | ***4.21*** | ***4.26*** | ***4.32*** | ***4.46*** |
| 39. | Senior Subordinated (SSUB) | 0 | 0 | 0 | 0 | 0 | 0 |
| 40. | ***DS Coverage Required = 2.00*** | ***4.25*** | ***4.33*** | ***4.21*** | ***4.26*** | ***4.32*** | ***4.46*** |
| 41. | Subordinated (SUB) | 0 | 0 | 0 | 0 | 0 | 0 |
| 42. | ***DS Coverage Required = 1.50*** | ***4.25*** | ***4.33*** | ***4.21*** | ***4.26*** | ***4.32*** | ***4.46*** |
| 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** | **$248,536** | **$254,376** | **$263,133** | **$264,689** | **$268,173** | **$267,650** |
| 47. | ***DS Coverage on All Obligations (Coverage Required = 1.00)*** | ***1.0001*** | ***1.0001*** | ***1.0001*** | ***1.0002*** | ***1.0001*** | ***1.0002*** |

[a] *Numbers may not add up due to rounding.*

[b] *Based on projected results as presented in PRASA's May 20th, 2022 Fiscal Plan.*

[c] *Includes additional revenues from rate increases implemented 2018-2022 and electronic bill discount, and the adjustment for billings not collected (net of collections from prior years).*

[d] *Projected additional revenues from initiatives included in 2022 PRASA Fiscal Plan.*

[e] *Projected operating and capital expense reductions from initiatives included in Fiscal Plan: reduction of physical water losse, and electricity cost reduction. Excludes New Financing for CIP initiative as it is included in line 31. In FY2023 through FY2027, net of initiative impact on Operating Reserve Fund and overhead.*

[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] *Includes expected future debt service for SRF and RD loans.*

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