ARCADIS

PUERTO RICO
AQUEDUCT AND
SEWER AUTHORITY

Fiscal Year 2021 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority

Final Report

December 2021

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 2021 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority

December 2021

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Acronyms and Abbreviations

ABT	Additional Bonds Test
ACA	Asset Condition Assessment
AAFAF	Puerto Rico Fiscal Agency and Financial Advisory Authority (Spanish Acronym)
AMR/AMI	Automatic Meter Reading and/or Advanced Metering Infrastructure
AOP	All Other Perils
ASG	General Services Administration of Puerto Rico (Spanish Acronym)
AWWA	American Water Works Association
B	Billion
BOD	Biological Oxygen Demand
BOR	Broker of Record
CAA	Coefficient of Annual Adjustment
CAGR	Compound Annual Growth Rate
CT	Contact Time
CBA	Collective Bargaining Agreement
CCL	Contaminant Candidate List
CCP	Corrosion Control Program
CER	Consulting Engineer’s Report
CGI	Commonwealth Guaranteed Indebtedness
CIP	Capital Improvements Program
CSO	Commonwealth Supported Obligations
CSWO	Combined Sewer Overflow
CWA	Clean Water Act
DBP	Disinfection Byproducts
DBPR	Disinfection Byproducts Rule
BPR	Biannual Progress Report
DSC	Debt Service Coverage
ECRC	Environmental Compliance and Regulatory Charge

DMR	Discharge Monitoring Report
EPC	Energy Performance Contract
EPL	Excess Employment Practices Liability
ERS	Employee Retirement System
ESCO	Energy Service Companies
FAASt	FEMA Accelerated Award Strategy
FEMA	Federal Emergency Management Agency
FOG	Fats, Oil and Grease
FY	Fiscal Year
GDB	Government Development Bank for Puerto Rico
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
ILI	Infrastructure Leakage Index
IMP	Integrated Maintenance Program
KPI	Key Performance Indicators
kWh	Kilowatt-Hour
LOC	Line of Credit
LTCP	Long-Term Control Plan
LTP2	Long-Term 3 Projects
LTP3	Long-Term 3 Projects
M	Million
M&V	Measurement and Verification
MAPFRE	MAPFRE PRAICO Insurance Company
MARSH	Marsh Saldaña
MAT	Master Agreement of Trust
MCC	Motor Control Center
MDT	Mobile Data Terminal
MG	Million Gallons

MGD	Million Gallons per Day
MRP	Materials Requirement Planning
N	Nitrogen
NMC	Nine Minimum Controls
NPDES	National Pollutant Discharge Elimination System
NPW	Non-Potable Water
NRW	Non-Revenue Water
OCIP	Owner Controlled Insurance Program
O&M	Operation and Maintenance
OMB	Office of Management and Budget of Puerto Rico
OSHA	Occupational Safety and Health Administration
OTC	Operator Training Center
P	Phosphorous
P3	Public Private Partnership
PAN	*Programa de Asistencia Nutricional*
PMC	Program Management Consultant
PML	Probable Maximum Loss
PO	Purchase Order
POGS	Petroleum, Oil, Gas and Sand
PPA	Power Purchase Agreement
PRASA	Puerto Rico Aqueduct and Sewer Authority
PRDOH	Puerto Rico Department of Health
PREPA	Puerto Rico Electric Power Authority
PROMESA	Puerto Rico Oversight, Management, and Economic Stability Act
PRPB	Puerto Rico Planning Board
PWS	Potable Water Systems
RBC	Rotating Biological Contactor
RD	Rural Development
RWI	Raw Water Intakes
R&R	Renewal and Replacement
RFP	Request for Proposal
SAP	Systems, Applications, and Products in Data Processing

SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SEC	Securities and Exchange Commission
SIR	Self-Insured Retention
SIRE	Sistema Integrado de Resultados
SRF	State Revolving Funds
SSO	Sanitary Sewer Overflow
SSOMP	Sewer System Operation & Maintenance Plan
SSSEP	Sanitary Sewer System Evaluation Plan
STS	Sludge Treatment System
SWTR	Surface Water Treatment Rule
TA	Trabajador Alcantarillado
TANF	Programa de Asistencia Temporal para Familias Necesitadas
TOC	Total Organic Carbon
TPL	Terminal Portátil de Lectura
TSO	Trabajador Servicio Operacional
TTHM	Total Tri-halomethane
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
VFD	Variable Frequency Drive
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) 2021 Certified Fiscal Plan dated May 27, 2021 (the 2021 PRASA Fiscal Plan), PRASA's FY2022 Annual Budget and certain restructured debt service obligations.

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Arcadis relied on assumptions, forecasts, data, and statistics provided by PRASA, its other consultants, and published industry references. Arcadis reviewed the PRASA-prepared forecast over a future six-year period of time and "forward-looking statements." These statements relate to Arcadis's expectations, beliefs, intentions, or strategies regarding the future. These statements may be identified by the use of words like "anticipate", "believe", "estimate", "expect", "intend", "may", "plan", "project", "will", "should", "seek", and similar expressions. The forward-looking statements reflect Arcadis's views and assumptions with respect to future events as of the date of this document and are subject to future economic conditions and other risks and uncertainties. Actual and future results and trends could differ materially from those set forth in such statements due to various factors, including,

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Unless otherwise stated, this FY2021 CER summarizes the work completed through June 30, 2021 with certain updates provided through **September 30, 2021**. Changed conditions occurring or becoming known after such date could affect the material presented and the conclusions reached herein to the extent of such changes. Arcadis has no responsibility for updating this report for changes that occur after the date of the report.

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

Executive Summary

E.1. Introduction

The Puerto Rico Aqueduct and Sewer Authority (PRASA) is a public utility responsible for the production and distribution of potable water and collection, treatment, and disposal of a large portion of domestic and industrial pretreated wastewater in Puerto Rico. PRASA serves a population of approximately 3.2 million residents[1] plus over 5.2 million visitors annually. PRASA owns a large variety of assets, including land, buildings, dams, wells, water and wastewater treatment facilities and pump stations, ocean outfalls, buried infrastructure, vehicles, equipment, and water meters.

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

As required by Section 7.07 of the MAT, unless the Senior Bonds have been rated investment grade by at least two Rating Agencies for 24 consecutive months, the Consulting Engineer shall prepare a CER to document the current condition and changes, if any, in PRASA's operation and the performance of the System. As a result of the credit downgrades of PRASA's bonds to non-investment grade level in FY2013 and FY2014 and on-going fiscal challenges affecting the Government of Puerto Rico, and in compliance with the MAT, Arcadis prepared this CER for FY2021 (2021 CER or the "Report"). PRASA's fiscal year begins on July 1st and ends June 30th. FY2021 is the fiscal year from July 1, 2020, through June 30, 2021.

E.2. Puerto Rico's Current Fiscal Situation

Over the past several years, the Government of Puerto Rico has faced a challenging financial situation. As a result, PRASA has also been adversely affected. 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 major challenges including service affordability, aging infrastructure, high volume of non-revenue water (NRW), regulatory mandates, and increasing renewal and replacement (R&R) needs.

The high costs of infrastructure repairs combined with the lack of customer understanding of the value of water services (as an essential service, the public resists paying for higher service rates), makes it very difficult for any water and wastewater utility to achieve a break-even operation while maintaining affordable service rates. Because of the complexity of the System, PRASA has inherently higher operating costs and capital investment needs than other utilities in North America.

The Government's on-going fiscal situation continued to impact PRASA. Except for a number of critical projects identified by PRASA, the Capital Improvement Program (CIP) had not been re-activated and important renewal work such as replacing inefficient meters and failed/leaking pipelines were mostly being deferred, with some renewal projects being executed utilizing operational funds. Also, there is a strong concern that the lack of capital investment will lead to short-term infrastructure degradation impacting the O&M expenses, which could lead to a critical infrastructure situation. However, PRASA was able to secure federal debt reprograming agreements with

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

the United States Environmental Protection Agency (USEPA) and the United States Department of Agriculture (USDA) which has once again opened access to the State Revolving Fund (SRF) Program ($241 Million) and the Rural Development (RD) Program ($52.2 Million), respectively. In addition, PRASA was able to secure an obligation of $3.7 Billion from the Federal Emergency Management Agency (FEMA) for the CIP program. Furthermore, during the 2021 fiscal year PRASA was able to restructure the debt and improve its rating thus gaining access to the Bond Market for additional funding. Moreover, PRASA is actively requesting and searching for additional federal funding, like ARPA.

Consequently, PRASA was able to commence the CIP program on September 2020 with one Consortium, and in late February 2021 negotiated the start of a second Consortium under the CIP Program. In May 2021 the CIP Program added another Consortium and lastly, in July 2021, the final Consortium was activated.

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.

Pursuant to the PROMESA's requirement for the submission of a Fiscal Plan, on May 27, 2021, the Oversight Board certified PRASA’s Fiscal Plan, pursuant to Section 201(d)(2) of PROMESA (the 2021 PRASA Fiscal Plan). The 2021 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. It provides for the required investment for the necessary infrastructure to restore the System after the impact of the September 2017 Hurricanes and to ensure compliance with required standards while promoting much-needed economic growth throughout the island, the timely execution and implementation of its measures, and PRASA’s long-term financial self-sustainability plan. The PRASA Fiscal Plan as the official fiscal plan, includes its CIP to cover a six-year period from FY2021 to FY2026 (the six-year CIP) as well as PRASA’s six-year forecast covering preliminary results for FY2021 and projections for FY2022 through FY2026.

The PRASA Fiscal Plan outlines cash management levers that PRASA will use to improve its liquidity, including but not limited to increasing revenues, decreasing expenses, increasing collections, and securing federal funding from disaster relief programs related to the 2017 Hurricanes recovery process. To do so, PRASA will rely on three main focus areas: (i) affordable safe supply and treatment of water, (ii) resilient, reliable, and efficient infrastructure and (iii) organizational and fiscal sustainability. PRASA’s management identified several new efforts and initiatives to achieve these goals and objectives, which could provide additional financial benefits. The initiatives in the FY2021 PRASA Fiscal Plan include, among others, rate adjustments, accurate metering and effective customer service, reduction of NRW, healthcare savings, electricity cost reduction, chemical expense reduction, Christmas bonus elimination, government accounts collections, and pension/labor reform.

In addition to the fiscal situation, along with the rest of the world, Puerto Rico was confronted with the COVID-19 global pandemic in late February of 2020, which required immediate and urgent action. On March 15, 2020, the Government enacted Executive Order 2020-023, which implemented temporary social distancing measures such as the closure of all businesses in Puerto Rico, a curfew for all residents, and penalties to enforce compliance. The Government issued several extensions on the March order with various modifications to Puerto Rico’s social distancing measures.

The COVID-19 pandemic, its associated mitigation policies, and the resulting economic impacts led to additional challenges for PRASA including reduced collections, increased costs, shortage of supplies and interruption to contracted services, workforce issues, and delayed implementation of the CIP.

However, during the first quarter of FY2021, conditions began to normalize to a degree and PRASA had sufficient preventive protocols that it was able to begin the implementation of the CIP program by September 2020 and welcome back the majority of staff

E.3. Organizational Updates and Changes

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

The current organization has been able to operate, manage and maintain the System, despite experiencing major operational and financial challenges. Key PRASA leadership includes its Executive President, Strategic and Corporate Planning Vice President, Operations Vice President, Administration Vice President, and Infrastructure Executive Director, as well as the five Regional Executive Directors and Department Directors.

The following material changes were reported by PRASA during FY2021 and the first quarter of FY2022 regarding its organization, leadership and management: Omar Rivera Rolón was named Executive Director of Finance; Eng. Arnaldo Jimenez was appointed as Strategic and Corporate Planning Vice-President replacing Eng. Ryan Arrieta, who resigned during FY2021; Eng. Erick Rosa Lugo replaced Eng. Joel Lugo Rosa as Interim Executive Director West Region, as Eng. Joel Lugo Rosa became the Interim Executive Director for Infrastructure in replacement of Eng. José Rivera, who resigned in June 2021; and lastly, Eng. Damaris Santini Martínez was named Interim Executive Director South Region.

PRASA's Governing Board, as restructured following Act 68-2016, is composed of eight members, which include:

- Four independent directors appointed by the Governor of Puerto Rico, comprised of:
  - One engineer licensed to practice in Puerto Rico with ten years of practice experience
  - One authorized legal advisor with at least ten years of experience in Puerto Rico and admitted to practice in the Government
  - One member with a wide knowledge and experience in the field of corporate finance
  - One professional with expertise in any field related functions delegated to PRASA
- One AAFAF representative as per Act 2-2017
- One private citizen representing the PRASA's customers, and
- Two ex-officio members, the Executive Director of the Association of Mayors, and the Executive Director of the Federation of Mayors.

Board members serve staggered terms: two members shall hold office for five years and two members for six years. As the terms of office of the four Board members appointed by the Governor expire, the Governor shall appoint their successors following the same candidate identification mechanism. None of the members appointed by the Governor may hold such office for more than three terms.

The following material change as it relates to PRASA's Governing Board was reported by PRASA during FY2021 and the first quarter of FY2022: the positions of Executive Director of the Mayors Association and Executive Director of the Mayors Federations, previously occupied, are now vacant; Independent Director with expertise in any field related functions delegated to PRASA remains vacant; and although Consumer Representative, Héctor Sánchez Cardona, PE completed his term he remains holding the Consumer Representative position.

In FY2021, PRASA's customer accounts per employee ratio (434) slightly decreased by 0.5% from FY2020 (436) but remained within the industry's range; this can be attributed to the slight reduction of staff and customer accounts. The PRASA staff levels remain below Management's optimum staffing (4,700) presented in the 2021 PRASA Fiscal Plan and the staffing mix is not adequate. For example, PRASA continues to struggle to fill key staffing needs in the Operations Department (i.e. operators for treatment facilities, system maintenance personnel, electromechanical and meter readers). PRASA must consider the impact of the employee retirement programs and population migration which will continue to affect not only its existing staff, but also its ability to recruit a capable replacement workforce. Filling certain vacant positions could help PRASA reduce overtime costs and address System Operation and Maintenance (O&M) needs. Lastly, PRASA has hired V2A to reevaluate the optimal staffing levels considering all recent events and the magnitude of the Capital Improvement Program. This evaluation should be completed by the end of FY2022.

E.4. Condition of System

During FY2021, Arcadis assessed the condition of PRASA's System through an inspection program that included a preselected sample of the major elements of the System. The purpose of these assessments was to identify the overall condition of the facilities to determine if they were being operated and maintained in a manner to achieve their operating goals, and to evaluate if PRASA's CIP is aligned with identified needs. Facilities were rated based on their condition as unacceptable, poor, adequate, or good.

Given the significant reduction in capital and renewal and replacement investment over the past five years, Arcadis performed asset condition assessments of a selection of WTP and WWTP facilities that were not inspected in the FY2020 ACA Report, as well as a different sample of ancillary facilities. Arcadis inspected facilities to assess the structural integrity and physical condition of structures and equipment; adequacy of operation and maintenance practices; as well as renewal and repair needs among other evaluation criteria. Arcadis also evaluated the compliance performance results for all PRASA's WTPs and WWTPs from January 1, 2020, through December 31, 2020. The facility inspections for WTPs, WWTPs, and ancillary facilities were performed between February 2021 and July 2021. There was some delay in completing the facility inspections due to the effects of the COVID-19 pandemic-protocol requirements and the availability of PRASA personnel to coordinate inspections. Inspected facilities included 57 WTPs (50% of total WTPs) and 23 WWTPs (45% of total WWTPs). Also, a smaller portion of the ancillary facilities, 16 wells (6% of total wells), 30 WPSs (3% of total WPSs), 34 WSTs (2% of total WSTs), and 20 WWPSs (2% of total WWPSs) were inspected considering the lower risk impact these assets have on the System. In total, 180 facilities were assessed out of the 3,881[2] facilities that comprise the System, excluding active raw water intakes (RWIs) and raw water pump stations.

[2] Data obtained from PRASA Geographical Information System (GIS), updated in June 2021. The total excludes active RWIs (137) and RWPSs (70).

PRASA operates approximately 167 water distribution systems[3], of which 111 are supplied by surface water systems and 56 by subsurface water systems. These supply sources can be divided into three types according to their water sources. The first type is large, regulated dams that impound or divert water, and which has or will have either: i) an impounding capacity (at normal water storage elevation) of 50 acre-feet or more, or ii) a measured dam height[4] of 25 feet or greater. Currently, only eight of PRASA's water supply systems are classified as regulated dams. The second type is weirs that create minor impoundments on active streams or rivers, but do not meet the regulatory criteria to be classified as dams. The third type is water systems supplied from wells. Regulated dam structures are under the jurisdiction of the Dam Safety Unit of the Puerto Rico Electric Power Authority (PREPA). PREPA administers the Dam Safety Program in association with the Department of Natural and Environmental Resources (DNER), Puerto Rico Planning Board, PRASA, and public-sector appointees by the Governor. A Dam Safety Committee, of which PRASA is a member as required by law, oversees the Dam Safety Program. Regulated Dams were not inspected this year.

PRASA operates 113 WTPs where it treats raw water from reservoirs, rivers, and groundwater, to produce potable water for its customers. The WTP facilities range in size from several thousand gallons per day up to 100 million gallons per day (MGD). The total potable water production from WTPs for FY2021 was approximately 494 MGD.

Overall, the WTPs inspected are mostly in adequate condition. To the extent that the physical structures and operational/process controls are maintained or improved, they are expected to continue to serve their intended purpose of providing a potable water supply in compliance with applicable regulations. Facility ratings increased in operations/ process control, Equipment/Maintenance, and staffing/training criterion compared to the 2020 inspections. Conversely, facility inspection decreased in overall rating compared to the 2020 inspections. The greatest concern is the physical condition of the facilities, which continue to deteriorate year over year, evidenced by the lack of capital improvement and R&R programs due to the fiscal situation and budget limitations. This is even further exacerbated by the damage caused to the treatment facilities by the 2017 Hurricanes. Regarding compliance, even though the rating was Good, PRASA acknowledges that it has some challenges ahead with the Stage 2 D/DBPR compliance and has performed water quality modeling to identify the root cause of these non-compliance events and establish corrective actions and control measures to improve compliance. PRASA has developed an action plan to address exceedances to TTHM and HAA, which consists of but is not limited to the combination of the following corrective measures: elimination/reduction of pre-chlorination; increasing frequency of process tanks/systems wash; WST oscillation monitoring; more frequent drainage of systems; change in coagulants; hydraulic modeling to reduce retention time in tanks; lowering pH; and increase of testing frequency in non-compliance areas to verify the progress of corrective measures, among others.

PRASA currently operates 51 WWTPs. The facilities range in size from several thousand gallons per day up to 80 MGD. The Islandwide design treatment capacity is approximately 378 MGD, and the treated wastewater for FY2021 was around 208 MGD. In addition, 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 only under the existing 301 (h) waivers with the United States Environmental Protection Agency (USEPA).

[3] The Metropolitano Urbano System includes Sergio Cuevas WTP, Enrique Ortega WTP, Los Filtros WTP, Canóvanas Nueva WTP, Guaynabo Superaqueduct transference and Bayamón Superaqueduct transference.
[4] height: distance in feet measured from the natural bed of the stream or water course at the downstream toe of the barrier to the low point in the top of the dam.

The WWTPs generally range from Poor to Adequate condition in overall rating, with the Equipment/Maintenance as the category of primary concern. 17 facilities had an overall score rating lower than 2.0 and should be considered for improvements. The average overall rating for this criterion was 1.6, which is barely Adequate. Of the 23 facilities inspected, six facilities (26%) received a Poor rating under this criterion, and the remaining facilities were rated as Adequate. These facilities include: Dorado WWTP, Caguas WWTP, Aguas Buenas WWTP, Río Grande Estates WWTP, Yabucoa WWTP, and Isabela WWTP. Despite 17 (57%) of the facilities being rated as Adequate at the time of inspection, 15 (65%) 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. Process control also continues to be a challenge in some of the facilities, even though plant operators indicated that standard operating procedures and control strategies are followed. Regarding the compliance criteria was in the lower range of adequate 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 treat to meet permanent limits.

PRASA owns and operates over 3,000 ancillary facilities. The facility criteria rating of WPS increased significantly to Adequate. At the same time, wells, WSTs, and WWPSs remain in the lower end of Adequate, and if left unattended, could continue to deteriorate. WSTs facility criteria rating did not materially change, remaining as Adequate; however, they do not have that much equipment, so they do not deteriorate at the same rate as wells or WPSs, but recently we have observed more signs of corrosion on the pipelines, air vents or float valves than previous years. Moreover, corrosion is also showing signs that WSTs need maintenance or improvements. Overall, most of the deficiencies noted in ancillary facilities can be addressed through PRASA's R&R program and may not require major capital improvements.

PRASA should address the shortcomings 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. 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. In addition, PRASA should consider operational improvements, including new process control equipment and system automation, since operators continue to depend on manual operation for several processes. Further, based on the ratings and interviews with the operational staff during the site visits, it is evident that the lack of treatment plant operators is a concern. Also, other staffing needs are identified for WTPs, WWTPs, and ancillary facilities.

In general, to reduce NRW, PRASA continues efforts to improve its leak detection, leak repair, and monitoring practices. By applying the established NRW reduction initiatives, PRASA has helped reduce water production, water losses, and NRW reported. Furthermore, the 2021 PRASA Fiscal Plan WRO 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. Moreover, the provision of meters or mechanisms to measure the water discarded as part of the System's programmed drains 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 U.S., 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.

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 not known at this time. 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. However, as the impact of future regulations becomes more defined, CIP modifications may be required to accommodate the resulting needs adequately. As negotiated or being negotiated with Regulatory Agencies these CIP needs will be prioritized, and implementation schedules will depend on PRASA's financial capacity. It is important to note that since the fiscal situation has been significantly prolonged and adversely impacted the implementation of PRASA's CIP, key initiatives, and reduced the R&R investments, the condition of the facilities has continued to deteriorate. Combining that with the detrimental impact caused by the 2017 Hurricanes, improvements are needed to repair, modernize or mitigate PRASA's Infrastructure and consequently protect public health, safeguard environmental quality, and allow continued economic development. If needed improvements continue to be postponed or remain unaddressed, operation of facility treatment will be hindered, thus, impacting the public and increasing capital needs. Notwithstanding, PRASA expects to begin addressing some of the issues within the recently started CIP and ongoing efforts in the R&R program.

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 2021 asset condition assessment effort previously described. Overall, Arcadis found PRASA's O&M practices to be adequate. However, staff mix optimization and process control continue to be challenges PRASA's operations.

Despite of all the challenges faced by PRASA since FY2017 due to the slow recovery from the impact of the hurricanes, the seismic events and COVID-19 in 2020, most of the facilities have been brought to operational status and, at least in the short term, continue to serve their intended purpose of providing potable water supply and treating used water. However, it becomes more imperative that projects necessary to address the damages and improve conditions are implemented to guarantee the production of safe drinking water and treatment of wastewater in compliance with applicable regulations. PRASA continues to address operational challenges resulting from intermittent power supply and budget constraints. Furthermore, PRASA's 2021-2025 Strategic Plan was completed and approved during FY2021.

PRASA's FY2021 O&M expenses preliminary projection for the water and wastewater system (combined) is approximately $673M, of which $616M are directly related to the O&M of the System. The other $57M are 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, amongst others. PRASA estimates that during FY2021 approximately 73% of its System's O&M budget ($450M) was allocated to the water system and the remaining 27% ($166M) to the wastewater system. As presented in Table ES-1, PRASA's FY2021 O&M budgets are within the industry standards, mostly around the median benchmark results published by the American Water Works Association in 2020.

Table ES-1. PRASA Metrics vs. Water/Wastewater Utilities Benchmarks

Benchmark Category	2020 Benchmarks[1]			PRASA[2]
	Top Quartile	Median	Bottom Quartile	
Water O&M Cost per Account	$323	$444	$673	FY2017: $319 FY2018: $461 FY2019: $411 FY2020: $379 FY2021: $360
Water O&M Cost per MG Processed	$1,972	$2,882	$3,726	FY2017: $2,100 FY2018: $3,074 FY2019: $2,561 FY2020: $2,379 FY2021: $2,238
Water O&M Cost per 100 miles of pipe	$2,132,159	$2,806,103	$4,466,388	FY2017: $2,652,680 FY2018: $3,855,281 FY2019: $3,404,467 FY2020: $3,144,527 FY2021: $2,968,338
Wastewater O&M Cost per Account	$284	$378	$551	FY2017: $194 FY2018: $275 FY2019: $246 FY2020: $227 FY2021: $215
Wastewater O&M Cost per MG Treated	$1,619	$2,447	$4,034	FY2017: $1,848 FY2018: $2,798 FY2019: $2,460 FY2020: $2,290 FY2021: $2,187

Benchmark Category	2020 Benchmarks[1]			PRASA[2]
	Top Quartile	Median	Bottom Quartile	
Wastewater O&M Cost per 100 miles of pipe	$1,915,907	$2,934,060	$4,435,528	FY2017: $2,745,356 FY2018: $3,509,624 FY2019: $3,130,358 FY2020: $2,886,220 FY2021: $2,868,498

[1] Source: 2020 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

[2] Includes total operation and maintenance costs, less depreciation and costs related to customer (commercial) services. PRASA reported values include payroll and related, power, chemicals, Superaqueduct O&M contract fee, insurance and other expenses, less capitalized operating expenses.

As per the strategic plan PRASA developed new Key Performance Indicators (KPIs) for FY2021. Table ES-2 presents a summary of PRASA's new KPIs goals and results.

Table ES-2. FY2021 PRASA KPI Goals and Results

Strategic Plan Initiative	Key Performance Indicator	FY2021 Goals	Results as of June 2021
Public Health & Environment Summary	Drinking Water Compliance	Increase to 100%	99.97%
	Sampling Compliance	Increase to 100%	100%
	Schedule Performance Index (SPI)	Reach 0.98 or Above	0.77
	NPDES Parameters Compliance	Maintain 97% or above	97.46%
	Average Lineal Feet Cleaned	100% (Reach 200,000 lineal feet per month)	78.86%
	Overflow Caused by FOG	Lower to 45%	61.92%
	People Reached per Campaign	100% (Reach 100,000 clients per month)	85.27%
Operational Efficiency Summary	Complaints in Customer Service (per 1000 Actives Accounts)	Reduce to 11.03 claims per month or Below	15.83 claims/month

Strategic Plan Initiative	Key Performance Indicator	FY2021 Goals	Results as of June 2021
	Average Time to Resolve Claims	Less than 15 min	19.16 min
	Service Interruptions	Reduce to 3.5% or Below	29.66%
	Cost Performance Index (CPI)	Reach 0.98 or Below	1.07
Leadership Development Summary	Training (Cumulative Hours per Employee)	More than 24.4 cumulative hrs per employee per year	15.36 hrs per employee
	Work Related Injuries	Reduce to 10 injuries per month	19.42 injuries per month
	Sickness absence days	Reduce to 4.81 days per FTE	2.61 days per FTE
	Employees per 1,000 Connection	3.07 or less Employees per 1,000 connections	2.78
Financial Sustainability Summary	Billing Adjustment	Less than 3%	5.67%
	Operating Expenses	100% (Spend $831,000 or Less per month)	96.03%[1]
	Self-Funded CIP	More than 25.00%	100%
Innovation & Accountability Summary	Process Digitalize	Reach 100%	94.26%
	Average Communication	Reach 100%	93.10%
	Employee Engagement Coverage	Reach 95%	75.08%[2]

[1]Results do not include the months of May or June 2021.
[2]Results do not include the month of November 2020.

E.6. Capital Improvement Program and Regulatory Compliance

PRASA has developed a multi-year CIP to improve and maintain their 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 and safeguard environmental quality, while enabling continued economic development and meeting all regulatory requirements. In addition, PRASA has included as part of the CIP objectives the restoration of damaged infrastructure to its condition prior to the 2017 Hurricanes and the 2020 Earthquakes.

The CIP is a dynamic program that evolves and undergoes revisions as needs and sources of funds are identified, and as projects transition from pre-construction to construction phases to finally reach start-up and commissioning. Historically, the program has been funded with external financing from bond issuances and federal assistance in accordance with standard utility financing practices. From 2006 to 2016, PRASA invested approximately $3.7B in its CIP, with the intention of bringing the System into compliance and supplement pre-existing capital needs from prior year funding shortfalls. The 2021 PRASA Fiscal Plan and public policies endorsed by PRASA's Governing Board include financing of the CIP with federals funds and self-financing via PRASA's Operating Revenues. The number and budget of projects are updated regularly, as the CIP is continuously evolving considering needs and as projects are completed. The CIP is subject to review and approval by PRASA's Governing Board.

During this fiscal year PRASA was able to secure federal debt reprograming agreements with United States Environmental Protection Agency (USEPA) and the United States Department of Agriculture (USDA) which has once again opened access to the State Revolving Fund (SRF) Program ($241 Million) and the Rural Development (RD) Program ($52.2 Million), respectively. In addition, PRASA was able to secure the obligation of $3.7 Billion from the Federal Emergency Management Agency (FEMA) for the CIP. Furthermore, PRASA was able to restructure the debt and improve its rating thus gaining access to the Bond Market for additional funding. Moreover, PRASA is actively requesting and searching for additional federal funding, like ARPA.

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

As previously mentioned, PRASA was able to start the CIP with one Consortium, and in late February 2021 negotiated the start of a second Consortium. In May 2021 the CIP added another Consortium and lastly in July 2021, the final Consortium approved was activated. PRASA envisions that the degradation of the facilities will begin to be address as projects are executed within the Program and the CIP is implemented at its full capacity.

The 2021 PRASA Fiscal Plan includes a modified six-year CIP covering the planning period from FY2021 through FY2026 which includes adjustments resulting from negotiations with Regulatory Agencies, Reconstruction & Recovery projects, and the necessary investment to address PRASA's infrastructure needs to ensure adequate operation and sustainability of the System. The six-year CIP for FY2021 through FY2026, as included in the 2021

PRASA Fiscal Plan, consists of a total of 495 projects totaling $2.87 Billion (B) and is mainly composed of Reconstruction & Recovery, Renewal & Replacement (R&R) and Compliance projects, which account for 89% of the total forecasted expenditures.

The planned CIP along with the O&M initiatives are generally in alignment with the System needs. The six-year CIP adequately addresses the requirements of existing consent decrees and agreements and considers proposed modifications to said consent decrees and agreements, as recently negotiated or in negotiations by and between PRASA and Regulatory Agencies. However, there are additional R&R and CIP needs to address: 1) buried infrastructure improvements including, but not limited to, additional wastewater collection system repairs or improvements that PRASA may be required to implement to bring these into compliance, and 2) future regulations that may impact PRASA's System. The impact of these future regulations may require significant operational and capital investments. As the impact of future regulations becomes more defined, CIP modifications will be required to adequately accommodate resulting needs. Furthermore, PRASA must establish a methodology for prioritizing all projects in the new PRASA's 10-year Master Plan, which has been awarded and it is expected to be completed during FY2022 or FY2023, contingent to the availability of the 2020 US Census data. Lastly, additional CIP needs identified during the 10-year Master Plan development or by other means, will need to be prioritized and implementation schedule developed depending on PRASA's available funding sources. PRASA will identify the funding for new projects and add to the current CIP and depending on its priority assign to the one of the Program Management Consultants (PMCs) overseeing the Program.

E.7. Insurance Program

To meet the requirements of the MAT as it relates to PRASA's insurance program, Arcadis reviewed PRASA's current insurance coverage, as provided by PRASA, and determined its adequacy considering the type and value of PRASA's fixed assets. Also, presented are some outstanding recommendations to PRASA's insurance coverage from previous evaluations. For FY2021, PRASA's Broker of Record (BOR) remained *Fedelta Insurance*.

The data, opinions, and comments included in this section have been based on PRASA's copies of policies and other documents provided by PRASA for this purpose.

PRASA's premium for coverage under the Property policy FY2021 was $15,000,000.00 for Primary coverage and $3M for 1st Layer coverage, with the same $100M deductible as FY2020. Commercial general liability coverage remained the same with the same premium of $920,550.00. Also, under the OCIP, there were several significant changes. The OCIP Builder's Risk FY2021 renewal Premium more than doubled to $317,382.00 with an increase to US$30M policy aggregate limits of liability for Earthquakes, Windstorm ensuing Flood and Storm Surge. However, the projects value under the Policy also doubled to $52,897,036.00. In addition, the OCIP Commercial General Liability policy FY2021 renewal Premium increased 102% to $201,009.00 for similar coverage and limits. Similarly, the OCIP Commercial Umbrella Liability policy FY2021 renewal Premium increased 102% to $201,009.00 for similar coverage but with a US$25M policy aggregate.

The insurance program covering PRASA's exposures to risks of accidental property and liability losses arising from on-going operations, pertaining to the received policies, provides reasonable coverage. However, several recommendations to PRASA's insurance program are provided.

E.8. System Assets and Financial Analysis

PRASA's capital assets include depreciable capital assets, "Construction (Work) in Progress", land, and easements. PRASA's ending book value of capital (fixed) assets as of June 30, 2020, net of accumulated depreciation, amounts to $5,782M.

PRASA's base and volumetric rate structures for Residential customers and Non-Residential customers (Commercial, Industrial, and certain Government customer classes) were approved on July 15, 2013. On December 18, 2013, PRASA further amended the rate structure for Non-Residential accounts. Furthermore, in order to cover all projected operating expenses, CIP needs, and debt service obligations (assuming debt restructuring, or new external financing is attained), the 2021 PRASA Fiscal Plan includes a series of moderate rate adjustments (as required by the Oversight Board), the first of which was implemented on January 1, 2018, followed by additional increases on July 1, 2018, 2019, and 2020. The latest rate adjustment was implemented on July 1,2021. The 2021 PRASA Fiscal Plan adjustments are calculated separate from the base and volumetric amounts, as compounded percentages of the total customer invoice amount. Additional adjustments are projected to be implemented annually on July 1st of each year through FY2026. Note, the 2021 PRASA Fiscal Plan assumes a 2.0% rate adjustment across all customer types starting in FY2023, a change from the individualized annual rate adjustments by customer type assumed in the projections for fiscal years 2020 through 2022.

Table ES-3. PRASA's Proposed Fiscal Plan Annual Rate Adjustments by Customer Type

Customer Type	Annual Rate Increase FY2020 – FY2022	Rate Increase FY2023 – FY2026
Residential	2.5%	2.0%
Commercial	2.8%	2.0%
Industrial	3.5%	2.0%
Government	4.5%	2.0%

Arcadis reviewed the financial information provided by PRASA and the 2021 PRASA Fiscal Plan. Arcadis further assessed financial preliminary results for FY2021 and the reasonableness of PRASA's assumptions in the preparation of the financial projections from FY2022-FY2026 (the forecast period or the Forecast); and the sufficiency of the revenues necessary to support the projected operations and capital costs as shown in Exhibit 1, including O&M expenses, debt service payments, and required deposits in compliance with the MAT, as amended. Additionally, the Forecast illustrates the anticipated debt service coverage (DSC) for the forecast period.

The financial forecast and information reflected in this CER utilizes the 2021 PRASA Fiscal Plan as certified by the Oversight Board on May 27, 2021 as its source. However, on August 25, 2021, PRASA closed on a series of bonds including the Series 2021A, 2021B, 2021C, and 2022A bonds (2021 Bonds). Thus, any financial benefits or impacts experienced by PRASA as a result of the 2021 Bonds are not reflected in the forecast evaluation herein presented.

PRASA's annual Operating Revenues are presented on a cash basis as required by the MAT. PRASA's preliminary Operating Revenues for FY2021 and Projected Operating Revenues for FY2022 through FY2026 net

of the 2021 PRASA Fiscal Plan revenue enhancing initiatives, on a cash basis, range from $1,048.1M in FY2021 to $1,084.6M in FY2026.

PRASA's Operating (Current) Expenses are presented on an accrual basis as required by the MAT. PRASA's preliminary Operational Expenses for FY2021 and operating expense projections for FY2022 to FY2026 net of (i) capitalized expenses, (ii) the 2021 PRASA Fiscal Plan expense reduction initiatives, and (iii) the September 2017 Hurricanes impact recoveries, range from $683.1M in FY2021 to $740.4M in FY2026.

Estimated debt service amounts include projected payments on the 2008, 2012, and 2020 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 Rural Development Loans starting in July 2019, after the federal debt modification.

Commonwealth Guaranteed Indebtedness (CGI) includes those of PRASA's existing obligations which are guaranteed by the Commonwealth of Puerto Rico. 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 as of 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 Stated 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 (new paragraph regarding Trustee notifications to each Fiduciary for, and Holder of (as applicable), 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 as of July 26, 2019, are summarized in Table ES-4.

Table ES-4. Finalized Renegotiated Terms for SRF and RD Debt

Debt Category	SRF	RD
Outstanding Debt Balances including future loans of $26M for SRF and accrued interests for RD	$595,777,017.21	$402,931,464.55
Term	30 years	40 years

Debt Category	SRF	RD
Rate	0% until year 10 and 1.0% thereafter	2.0%
Payment Terms	Bi-annual principal only payment of $5M in Years 1-10; bi-annual principal and interest payments of $13.7M in Years 11-30	Bi-annual principal and interest payments of $5M in Years 1-10; increasing to $8.5M in Years 11-40
Maturity Date	7/1/2049	7/1/2059
Debt Level	Senior	Senior

As reported in the 2021 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 $1,351.3M and $18.8M, respectively, for the purpose of refunding a portion of its outstanding senior bonds. The proceeds of the 2020 Senior Bonds were used to:

1. 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.
2. Refinance all of PRASA’s currently outstanding Revenue Refunding Bonds, 2008 Series A, and 2008 Series B, each guaranteed by the Commonwealth of Puerto Rico.
3. Pay costs of issuance of the 2020 Senior Bonds. The par amount of the refunded bonds amounted to $1,427.6M (the 2020 Senior Bonds were issued at a premium to par).

The issuance of the 2020 Senior Bonds to refund a portion of PRASA’s senior bonds resulted in a reduction in total debt service payments over the next 27 years of approximately $348.2 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 $13M.

The 2020 Senior Bonds are classified as Senior Debt and are not guaranteed by the Commonwealth. After the Federal Debt modification in July 2019 and the issuance of the 2020 Senior Bonds, no CGI remains outstanding.

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 Commonwealth Supported Obligation (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, in order 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, with regard to the CGI and 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, nevertheless, 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.

A summary of PRASA's debt service obligations and projections for FY2021 and the forecast period are presented in Tables ES-5 and ES-6, respectively.

Table ES-5. FY2021 Debt Service Obligations and Preliminary Results ($, Thousands)

Debt Category	FY2021 Obligations[1]	FY2021 Preliminary Results[2]
Senior Debt	$256,756	$256,756
Senior Subordinated Debt	-	-
Subordinated Debt	-	-
Commonwealth Guaranteed Indebtedness (CGI)	7,178	7,178
Commonwealth Supported Obligations (CSO)	8,999	-
Total	**$272,933**	**$263,934**

[1] Considers the full debt service obligations due in FY2021 per amortization schedule.

[2] Considers no payment of CSO (PFC Superaqueduct related debt, payable form Commonwealth appropriations). 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.

Table ES-6. FY2022-FY2026 Debt Service Obligations ($, Thousands)

Debt Category[1]	FY2022 Projection	FY2023 Projection	FY2024 Projection	FY2025 Projection	FY2026 Projection
Senior Debt	$270,633	$276,700	$284,300	$282,100	$282,800
Senior Subordinated Debt	-	-	-	-	-
Subordinated Debt	-	-	-	-	-
Commonwealth Guaranteed Indebtedness (CGI)	-	-	-	-	-
Commonwealth Supported Obligations (CSO)	-	-	-	-	-
Total Debt	**$270,633**	**$276,700**	**$284,300**	**$282,100**	**$282,800**

[1] Assume 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 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.

The debt service coverage (DSC) results presented in Table ES-7 for the forecast period have been calculated using the Rate Covenant requirements per the MAT, as amended, and debt service obligations.

Table ES-7. FY2021 - FY2026 Debt Service Coverage

Debt Service Level	DSC Requi-rement	FY2021 Preliminary DSC	FY2022 DSC	FY2023 DSC	FY2024 DSC	FY2025 DSC	FY2026 DSC
Senior Debt[1]	**2.50**	4.08	3.81	3.77	3.71	3.79	3.84
Senior Subordinated Debt[1]	**2.00**	4.08	3.81	3.77	3.71	3.79	3.84
Subordinated Debt [1]	**1.50**	4.08	3.81	3.77	3.71	3.79	3.84
All Obligations[2]	**1.00**	1.01	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.

FY2021 preliminary DSC results consider that PRASA will not pay the CSO debt. 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 forecast period. Final DSC for FY2021 will be recalculated after the issuance of the FY2021 Audited Financial Statement to determine if PRASA was able to comply with all its obligations.

E.9. Conclusions

In preparation of this Report and the conclusions contained herein, Arcadis has relied on certain assumptions and information provided by PRASA with respect to the conditions which may exist or events which may occur in the future. Arcadis believes the information and assumptions are reasonable but has not independently verified information provided by PRASA and others. To the extent that actual future conditions differ from those assumed herein or provided by others, the actual results will vary from those forecasts.

Arcadis has made several considerations and assumptions (as provided throughout this Report); some of the most notable are as follows:

1. 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. However, for purposes of this report, Arcadis has assumed that all such contracts, agreements, laws, rules, and regulations will be fully enforceable in accordance with their terms.
2. PRASA will continue the current policies of employing qualified and competent personnel; properly operating and maintaining the System in accordance with generally accepted industry practices; and of operating the System in a prudent and sound businesslike manner.
3. The proposed CIP reflects the general needs of the System, the CIP will be largely implemented as planned and reflected in this report, and PRASA will make modifications to the CIP investment forecast if the overall System condition is negatively affected by the investment levels projected in future years.

Set forth below are the most relevant opinions which Arcadis has reached regarding the review of PRASA's System, CIP, and financial projections as per the 2021 PRASA Fiscal Plan.

1. PRASA's headcount is below the optimum staffing level stipulated by the Executive Management Team and its staffing mix is not yet optimal as there are numerous vacant positions that must be filled to address O&M of the System. For example, 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. PRASA shall further assess its staff mix and implement a more targeted training and workforce development program to allow internal staff re-assignments thereby decreasing existing staffing needs. PRASA should also consider the impact of the employee retirement programs and workforce challenges on the island which will continue to affect not only its existing staff, but also their ability to recruit capable and experienced staff. Moreover, PRASA may need to reevaluate their compensation package to critical positions in need, such as plant operators and electromechanical, in order to compete with the market and retain personnel. Lastly, PRASA has hired V2A to reevaluate the optimal staffing levels considering all recent events and the magnitude of the Capital Improvement Program.
2. PRASA continues to assess administrative and operational performance, and to implement organizational and policy changes, focusing on customer service, System performance, and budget controls. New KPIs and metrics were established and are being measured, along with stronger management oversight continue to contribute to operational and organizational improvements.
3. Arcadis visited a total of 180 facilities throughout PRASA's five Operational Regions between February and July of 2021 to conduct a condition assessment of PRASA's facilities. Of the inspected facilities, 80 (44%) were treatment (WTP and WWTP) facilities. The data indicates that only 7% of the facilities inspected in FY2021 are in the Good range, and 66% are in the Adequate range. However, almost half of the facilities rated as Adequate (40 of 118, 34%) are rated 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. Moreover, it was observed that the physical condition continues to deteriorate as capital improvements and R&R actions are limited due to the fiscal situation and budget limitations.
    - Overall, the WTPs inspected are mostly in adequate condition. To the extent that the physical structures and operational/process controls are maintained or improved, they are expected to continue to serve their intended purpose of providing a potable water supply in compliance with applicable regulations. Facility ratings increased in operations/ process control, equipment/maintenance and staffing/training criterion compared to the 2020 inspections. Conversely, facility inspection decreased in overall rating compared to the 2020 inspections. The greatest concern continues to be the physical condition of the facilities, which continues to deteriorate year over year, evidenced by the lack of capital improvement and R&R programs due to the fiscal situation and budget limitations. This is even further exacerbated more so after the damage caused to the treatment facilities by the 2017 Hurricanes. Regarding compliance, even though the rating was Good, PRASA acknowledges that it has some challenges ahead with the Stage 2 D/DBPR compliance and has performed water quality modeling to identify the root cause of these non-compliance events and establish corrective actions and control measures to improve compliance. PRASA has developed an action plan to address exceedances to TTHM and HAA, which consists of but is not limited to the combination of the following corrective measures: elimination/reduction of pre-chlorination; increasing frequency of process tanks/systems wash; WST oscillation monitoring; more frequent drainage of systems; change in coagulants; hydraulic modeling to reduce retention time in tanks; lowering pH; and increase of testing frequency in non-compliance areas to verify the progress of corrective measures, among others. PRASA must continue to implement corrective measures to mitigate the production of disinfection by-products. Moreover, PRASA should address the shortcomings identified during

inspections to improve the physical condition of its facilities, achieve/maintain continuous and consistent compliance, and optimize O&M expenses.

- The WWTPs generally range from Poor to Adequate condition, with the equipment condition being the primary driver under this criterion. The average overall rating for this criterion was 1.6, which is barely Adequate. Of the 23 facilities inspected, six facilities (26%) received a Poor rating under this criterion, and the remaining facilities were rated as Adequate. These facilities include: Dorado WWTP, Caguas WWTP, Aguas Buenas WWTP, Río Grande Estates WWTP, Yabucoa WWTP, and Isabela WWTP. Despite 17 (57%) of the facilities being rated as Adequate at the time of inspection, 15 (65%) 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. Process control also continues to be a challenge in some of the facilities, even though plant operators indicated that standard operating procedures and control strategies are followed. Regarding the compliance criterion, it was 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 treat to meet permanent limits.
- The facility criteria rating of WPS increased significantly to Adequate. At the same time, wells, WSTs, and WWPSs remain in the lower end of Adequate, and if left unattended, could continue to deteriorate. WSTs facility criteria rating did not materially change, remaining as Adequate; however, they do not have that much equipment, so they do not deteriorate at the same rate as wells or WPSs, but recently we have observed more signs of corrosion on the pipelines, air vents or float valves than previous years. Moreover, corrosion is also showing a sign that WSTs need maintenance or improvements. Overall, most of the deficiencies noted in ancillary facilities can be addressed through PRASA's R&R program and may not require major capital. Lastly, future regulatory requirements may require either the implementation of significant capital improvements to include and achieve additional treatment capabilities at well facilities, or the closure of certain wells.

4. The number of water leaks and sanitary overflows continue to be high when compared to U.S. benchmarks. PRASA continues efforts to improve its leak detection, leak repair, and monitoring practices and continues to aggressively address leak occurrences. By applying the established NRW reduction initiatives, PRASA has helped reduce water production, water losses, and NRW reported. Furthermore, the 2021 PRASA Fiscal Plan WRO initiatives: pressure management and optimization; water leak reduction (reported and unreported); WST overflow avoidance; and data quality improvement (reduce estimation) will help reduce physical water losses. Moreover, the provision of meters or mechanisms to measure the water discarded as part of the System's programmed drains 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 U.S., 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. Additionally, adding pre-treatment (screens, comminutors) and preventive maintenance to facilities would help lessen overflows.
5. PRASA's O&M costs are within industry standards, as per the 2020 AWWA benchmarks. Reducing NRW is a high priority goal for PRASA, and it is one of the key focus areas of the 2021 PRASA Fiscal Plan. PRASA is redefining their NRW goals and metrics to phase out calculations that still use estimation methods, moving towards use of actual measurements. Furthermore, the provision of meters or other mechanisms to measure the water discarded as part of the programmed drainages will further improve accounting for the volume of

NRW in the System. Additionally, the Physical Losses Reduction initiatives, reduction of water production along with the Meter Replacement Program will further support PRASA's efforts to reduce NRW. Furthermore, the Water Recovery Office (WRO) has established an NRW team ("TeamORA") that integrates not only WRO staff, but also operations personnel for a more comprehensive approach to address the 2021 Fiscal Plan NRW initiatives in each Region. PRASA's WRO includes two contracts, one for oversight and project management and another for office and field personnel. The WRO also includes GIS personnel that support other departments within PRASA. However, significant capital investment and R&R funded budgets are required to accelerate the NRW program and address leak occurrences in both a corrective and preventive manner. PRASA activated the CIP during FY2021 and anticipates the implementation of projects will address some of the major System needs and issues. Also, the Strategic Plan was completed and approved during FY2021.

6. Except for buried infrastructure improvement needs not visible and not identified after the 2017 Hurricanes and 2020 Earthquakes, PRASA's six-year CIP along with the O&M initiatives are in alignment with the System needs and adequately addresses all mandated requirements of existing consent decrees and agreements with Regulatory Agencies. The six-year CIP also includes funding for minor and major repair projects and PRASA's R&R program, as well as funding for recovery efforts and for System resilience/strengthening. Most of the projected six-year CIP investment is related to Reconstruction & Recovery, R&R and Compliance projects. However, as noted in previous reports, given PRASA's high rate of leaks and overflows and continuing aging infrastructure, additional funds and acceleration of the R&R program are required to reduce/minimize these incidences. Furthermore, PRASA's six-year CIP includes funding for quality improvements, as well as for other necessary infrastructure projects (i.e., meters, fleet, technological improvements, safety and growth, emergencies and contingencies and others) essential to maintaining and preserving the utility assets.

   In addition, after extensive efforts PRASA was able to reach a debt restructuring agreement with the funding programs of USDA's Rural Development (RD) Program ($52.2 Million), and USEPA's State Revolving Fund (SRF) Program ($241 Million). Also, PRASA was able to secure obligation of $3.7 Billion from the Federal Emergency Management Agency (FEMA) for the CIP. Likewise, PRASA was able to restructure the debt and improve its rating thus gaining access to the Bond Market for additional funding. Currently, PRASA is actively requesting and searching for additional federal funding, like ARPA. This will allow PRASA to access these funding sources to execute compliance-driven projects. PRASA will need to perform additional assessments and implement operational changes or additional capital improvements to bring non-compliant facilities into compliance. Also, as the impact of future regulations becomes more defined, CIP modifications will be required to adequately accommodate resulting needs. Note that one of these future regulations is the Lead and Copper Rule, which is currently under revision to become more stringent. Lastly, the additional CIP needs identified during the 10-year Master Plan development or by other means, will need to be prioritized and implementation schedule developed depending on PRASA's available funding sources. PRASA will identify the funding for new projects and add to the current CIP and depending on its priority assign to the one of the Program Management Consultants (PMCs) overseeing the Program.

7. The insurance program covering PRASA's exposure to risks of accidental property and liability losses arising from on-going operations provides reasonable coverage. Also, the Owner Controlled Insurance Program (OCIP) covering PRASA's exposure to risks of accidental property and liability losses arising from construction activities provides reasonable coverage. PRASA should address the following key recommendations:

- Conduct a PML Study considering new CAT Modellings and parameters. Taking into consideration the lessons learned in the aftermath of the September 2017 Hurricanes, the 2020 earthquakes and more recently the COVID-19 pandemic.
- PRASA should consider establishing a fund to cover possible financial losses from any future catastrophic or any non-catastrophic, occurrences that might affect infrastructure and operations and, therefore, impose an unexpected financial burden.
- Consider Cyber Security Coverage, which is excluded under all current PRASA's Insurance Programs. Also, complete a self-assessment to determine potential areas of weakness as compared to international standards and to determine the potential frequency and severity of a breach.
- Consider Terrorism Coverage, which is excluded under all current PRASA's Insurance Programs.
- PRASA should consider including Fungi and/or Bacteria coverage, which is excluded under General liability and umbrella coverage, and other programs.
- PRASA should consider requesting an endorsement to include a "Partial Occupancy Provision" to grant permission for partial occupancy of project areas in the OCIP Builder's Risk Policy. Therefore, coverage will not cease or expire due to the partial occupation of any project area or due to the project's substantial completion.
- PRASA should consider changing the "Completed Operations" coverage extension to ten years to cover the full statutory limit (Statute of Limitations Law) in the OCIP Commercial General Liability Policy. Currently the coverage extension is for five years from the termination date of the policy or its renewal(s). PRASA should also consider the same action for the OCIP Commercial Umbrella Liability Policy.

8. PRASA's Forecast (Exhibit 1) reflects the financial plan certified by the Oversight Board on May 27, 2021: the FY2021 PRASA Fiscal Plan. With PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total surplus of $6.6M.

   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. In meeting these requirements, PRASA must consider the overall sustainability and affordability of its rates given the overall economic situation affecting Puerto Rico and recent trends affecting customer consumption profiles.

   The probability of PRASA meeting its Forecast is conditioned on the following key assumptions:

   - **PRASA's ability to maintain its Service Revenues, billings, and collections in a continued challenging economic environment** – A continued declining trend in customer accounts, uncertainty on the economic recovery of the island, population shifts, and unforeseeable changes in consumption patterns could cause further strain on PRASA's billings and collections.
   - **PRASA's ability to implement the necessary annual rate increases** – PRASA is projecting to implement annual modest rate increases that will generate about $909.9M between FY2021 and FY2026. The actual amount of the rate increases to be implemented by PRASA will depend on their financial results, planned CIP investments, customer base and consumption trends, among others.
   - **PRASA's ability to continue to successfully implement the 2021 PRASA Fiscal Plan initiatives** – The 2021 PRASA Fiscal Plan Forecast includes additional revenue enhancing and cost reduction initiatives. Any changes to the funding, framework and execution of these initiatives may significantly alter

PRASA's projected financial results. Although PRASA has made a commitment to implement the initiatives described in this Report (except for the ones proposed by the Oversight Board and noted throughout the 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. If System needs exceed the levels assumed by PRASA in its Forecast, expenses could be materially affected.
- **PRASA's ability to secure and receive expected funding for the execution of the forecasted CIP** – PRASA has forecasted capital investments of approximately $2.3 billion over the forecast period to be funded by federal funds, including FEMA, CDBG, SRF and RD. The implementation of the CIP, particularly of the recovery projects, depend on timely reimbursements and disbursements of funding sources (i.e., FEMA funds). Lower than anticipated FEMA/insurance or other expected federal funding, or the exclusion of these proceeds from PRASA's Authority Revenues, will impact PRASA's ability to meet DSC obligations.

EXHIBIT 1

	PRASA FINANCIAL FORECAST PRO FORMA[a] ($, Thousands)	FY2021 PRELIMINARY [b]	FY2022 ANNUAL BUDGET	FY2023 PROJECTION	FY2024 PROJECTION	FY2025 PROJECTION	FY2026 PROJECTION
	OPERATING REVENUES						
1.	Service Billings (Base Fee and Service Charges, Net of Subsidies) [c]	$1,033,625	$1,024,827	$1,034,600	$1,045,600	$1,057,500	$1,071,600
2.	Transfer from / (to) Rate Stabilization Account	0	0	0	0	0	0
3.	Other Income (Miscelaneous/Special Assessments)	2,000	2,500	2,500	2,500	2,500	2,500
4.	Fiscal Plan - Revenue Enhancing Initiatives [d]	12,444	2,916	5,700	7,200	8,800	10,500
5.	**Total Operating Revenues [Sum Lines 1-4]**	**$1,048,069**	**$1,030,243**	**$1,042,800**	**$1,055,300**	**$1,068,800**	**$1,084,600**
	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]**	**$1,048,069**	**$1,030,243**	**$1,042,800**	**$1,055,300**	**$1,068,800**	**$1,084,600**
	OPERATING EXPENSES						
11.	Payroll and Benefits	$324,952	$327,259	$327,100	$327,300	$327,300	$327,300
12.	Electric Power	$126,730	$128,405	156,300	161,000	164,000	169,600
13.	Maintenance and Repair	$54,179	$58,237	59,000	59,900	60,700	61,700
14.	Chemicals	$44,833	$47,541	48,200	48,900	49,600	50,300
15.	Insurance	$21,181	$22,199	22,491	22,816	23,156	23,507
16.	Other Expenses	$155,091	$161,043	159,109	161,384	163,744	166,293
17.	Fiscal Plan - Cost Saving Initiatives [e]	($9,100)	($12,381)	(22,900)	(23,400)	(25,600)	(28,800)
18.	Capitalized Operating Expenses	($6,769)	($26,355)	(28,600)	(28,900)	(29,200)	(29,500)
19.	**Total Operating Expenses [Sum Lines 11-18]**	**$711,097**	**$705,948**	**$720,700**	**$729,000**	**$733,700**	**$740,400**
	ADDITIONAL EXPENSES						
20.	Expected FEMA Reimbursements [f]	(28,000)	(20,000)	0	0	0	0
21.	**Total Additional Expenses [Line 20]**	**-$28,000**	**($20,000)**	**$0**	**$0**	**$0**	**$0**
22.	**Total Operating Expenses [Line 19 + Line 21]**	**$683,098**	**$685,948**	**$720,700**	**$729,000**	**$733,700**	**$740,400**
	DEPOSITS						
23.	Deposit to the Senior Bond Fund	$256,756	$270,633	$276,700	$284,300	$282,100	$282,800
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	34,155 [g]	1,402 [g]	6,400	2,200	1,700	2,400
31.	Deposit to the Capital Improvement Fund (Net of Projected New Federal Funds and FEMA Reimbursement)	60,629	72,225	38,900	39,700	51,200	59,000
32.	Deposit to the Construction Fund	0	0	0	0	0	0
33.	Deposit to the Commonwealth Payments Fund	7,178	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]**	**$358,718**	**$344,260**	**$322,000**	**$326,200**	**$335,000**	**$344,200**
36.	**Net Authority Revenues After Obligations and Deposits [Line10-Line 22-Line 35-Line 30]**	**$6,253**	**$34**	**$100**	**$100**	**$100**	**$0**
	DEBT SERVICE PAYMENTS DUE						
37.	Senior (S)[h]	$256,756	$270,633	$276,700	$284,300	$282,100	$282,800
38.	***DS Coverage Required = 2.50***	***4.08***	***3.81***	***3.77***	***3.71***	***3.79***	***3.84***
39.	Senior Subordinated (SSUB)	0	0	0	0	0	0
40.	***DS Coverage Required = 2.00***	***4.08***	***3.81***	***3.77***	***3.71***	***3.79***	***3.84***
41.	Subordinated (SUB)	0	0	0	0	0	0
42.	***DS Coverage Required = 1.50***	***4.08***	***3.81***	***3.77***	***3.71***	***3.79***	***3.84***
43.	Commonwealth Guranteed Indebtedness (CGI)	7,178	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**	**$263,934**	**$270,633**	**$276,700**	**$284,300**	**$282,100**	**$282,800**
47.	***DS Coverage on All Obligations (Coverage Required = 1.00)***	***1.006***	***1.000***	***1.000***	***1.000***	***1.000***	***1.000***

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

[b] Based on projected results as presented in PRASA's May 27th, 2021 Fiscal Plan.

[c] Includes additional revenues from rate increases and elecronic bill discount, net additional billings from on-going intitiatives, and the adjustment for billings not collected (net of collections from prior years).

[d] Projected additional revenues from initiatives included in 2021 PRASA Fiscal Plan.

[e] Projected operating and capital expense reductions from initiatives included in Fiscal Plan: reduction of physical water losses, organization optimization, elimination of the Christmas bonus, health plan savings, chemical expense reduction, pension reform, electricity cost reduction, and pre-retirement program. Excludes New Financing for CIP initiative as it is included in line 32. In FY2022 through FY2026, 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] Net of initiative impact on Operating Reserve Fund.

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

1 Introduction

1.1 Introduction

The Puerto Rico Aqueduct and Sewer Authority (PRASA) is a public utility responsible for producing and distributing potable water and collecting, treating, and disposing of a large portion of domestic and industrial pretreated wastewater in Puerto Rico. PRASA serves approximately 3.2 million residents[5] plus over 5.2 million visitors annually. PRASA can be considered a monopoly since it is the only water and wastewater utility in Puerto Rico, providing water and wastewater service to about 96% and 59% of Puerto Rico's population, respectively. While this is positive in terms of sales of services, it also makes PRASA a critical entity for the wellbeing of Puerto Rico. The effective operation of this vital public service is essential to the health and economic prosperity of Puerto Rico and its citizens.

PRASA provides water and wastewater services throughout the island, with an approximate area of 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 delivery 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 data obtained from PRASA's water and wastewater infrastructure geodatabase latest update (June 26, 2020), PRASA owns and operates: eight dams; 113 Water Treatment plants (WTPs); 138 active Raw Water Intakes (RWIs); 51 Wastewater Treatment Plants (WWTPs); 249 wells; 1,130 Water Pump Stations (WPSs), of which 70 are raw water pump stations; 1,557 Water Storage Tanks (WSTs); 846 Wastewater Pump Stations (WWPSs); and more than 20,000 miles of water and wastewater pipelines island-wide.

1.2 Consulting Engineer's Report Purpose and Requirement

PRASA has retained Arcadis Caribe, PSC (Arcadis) as its Consulting Engineer to assist in the preparation of a Consulting Engineer's Report (CER) to satisfy the reporting requirements specified in Section 7.07 of the Master Agreement of Trust, 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 current condition and changes, if any, in PRASA's operation and the performance of the System. Accordingly, as a result of the credit downgrades of PRASA's bonds to non-investment grade level in FY2013 and FY2014 and

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

on-going fiscal challenges affecting the Government of Puerto Rico, and in compliance with the MAT, Arcadis prepared this CER for FY2021 (2021 CER or the “Report”).

1.3 Conventions

PRASA’s fiscal year begins on July 1 and ends on June 30. Therefore, throughout this 2021 CER, the fiscal year is identified as “FY” followed by the calendar year in which the fiscal year ends, i.e., FY2021 is the fiscal year from July 1, 2020, through June 30, 2021.

1.4 Acronyms

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

2 Overview of PRASA's Current Fiscal Situation

2.1 Overview

Over the past several years, the Commonwealth of Puerto Rico has faced a challenging financial situation. As a result, PRASA has also been adversely affected. 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.

The high costs of infrastructure repair combined with a lack of customer understanding of the value and cost of water services (as an essential service, the public resists paying for higher service rates) makes it very difficult for any water and wastewater utility to achieve a break-even operation while maintaining affordable service rates. In addition, because of the System's complexity, PRASA has inherently higher operating costs and capital investments needs than other utilities in North America.

The Government's ongoing fiscal situation has continued to impact PRASA. Except for several critical projects identified by PRASA, the CIP had not been re-activated. As a result, important renewal work such as replacing inefficient meters and failed/leaking pipelines was deferred, with some renewal projects executed utilizing operational funds. Also, there is a strong concern that the lack of capital investment will lead to short-term infrastructure degradation impacting the O&M expenses, leading to a critical infrastructure failure. However, PRASA was able to secure federal debt reprograming agreements with the United States Environmental Protection Agency (USEPA) and the United States Department of Agriculture (USDA), which has once again opened access to the State Revolving Fund (SRF) Program ($241 Million) and the Rural Development (RD) Program ($52.2 Million), respectively. In addition, PRASA was able to secure an obligation of $3.7 Billion from the Federal Emergency Management Agency (FEMA) for the CIP program. Furthermore, PRASA was able to restructure the debt and improve its rating, thus gaining access to the Bond Market for additional funding. PRASA is also actively requesting and searching for additional federal funding, like ARPA.

Consequently, PRASA was able to commence the CIP program in September 2020 with one Consortium, and in late February 2021, negotiated the start of a second Consortium under the CIP Program. Then, in May 2021, the CIP Program added another Consortium, and lastly, in July 2021, the final Consortium was activated.

2.2 COVID-19 Pandemic

Like the rest of the world, Puerto Rico was confronted with the COVID-19 global pandemic in late February of 2020, which required immediate and urgent action. Accordingly, on March 15, 2020, the Government enacted Executive Order 2020-023, which implemented temporary social distancing measures such as the closure of all businesses in Puerto Rico, a curfew for all residents, and penalties to enforce compliance. In addition, the Government issued several extensions on the March order with various modifications to Puerto Rico's social distancing measures. Finally, on April 9, the Government approved Act 39-2020, preventing PRASA from disconnecting residential customers' water services due to non-payment. This prohibition will extend as long as the public emergency concerning COVID-19 continues in Puerto Rico, as determined by the Government of Puerto Rico through executive order, plus two additional billing cycles.

The COVID-19 pandemic, its associated mitigation policies, and the resulting economic impacts led to additional challenges for PRASA, including reduced collections, increased costs, shortage of supplies and interruption to contracted services, workforce issues, and delayed implementation of the CIP.

As stated in the FY2020 CER, PRASA took proactive actions to address operational challenges (PPEs, promoting remote work when warranted, return to work strategies, etc.) and to support its liquidity, such as promoting alternative payment options to improve collections, drawing down on previously collected insurance proceeds, temporarily pausing funding of its Capital Improvement Fund, and further delaying implementation of the CIP until FY2021.

However, during the first quarter of FY2021, things normalized to a certain degree. PRASA had sufficient preventive protocols that it was able to begin implementing the CIP program by September 2020 and welcome back the majority of staff.

Notwithstanding, we must remain vigilant on the health community's advice and the Government of Puerto Rico's actions regarding the COVID-19 virus and other potential variants to enable quick response and keep everyone safe.

2.3 Puerto Rico Oversight, Management and Economic Stability Act (PROMESA) and PRASA's Fiscal Plan

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. 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

PROMESA also provides Puerto Rico's Government and its instrumentalities two distinct restructuring tools to address the island's fiscal crisis known as Title III and Title VI. Title VI of PROMESA focuses exclusively on restructuring the financial debt and relies on a voluntary group action mechanism to bind dissenting creditors to the debtor's agreement and requires a supermajority of its creditors to restructure the debt. In contrast, Title III of PROMESA is an in-court proceeding that follows a similar framework as a municipality bankruptcy under Chapter 9 of the Bankruptcy Code but is broader in scope. Title III incorporates the bankruptcy cramdown power, which allows for an adjustment plan (to be approved by only a single impaired class) for nonconsenting types of claims. PRASA currently has not filed for either of these restructuring tools nor has there been a request to file by the Oversight Board or the Central Government.

Pursuant to the PROMESA's requirement for the submission of a Fiscal Plan, on May 27, 2021, the Oversight Board certified PRASA's Fiscal Plan, pursuant to Section 201(d)(2) of PROMESA (the 2020 PRASA Fiscal Plan). The 2021 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. It provides for the required investment for the necessary infrastructure to restore the System after the impact of the September 2017 Hurricanes and to ensure compliance with required standards while promoting much-needed economic growth throughout the island, the timely execution and implementation of its measures, and PRASA's long-term financial self-sustainability plan.

PRASA's 2021 Fiscal Plan includes the implementation of the following steps:

- Enhance revenues;
- Reduce expenses;
- Improve operational performance;
- Improve customer satisfaction and reduce non-revenue water;
- Increase water availability and reduce service rationing potential; and
- Execute a Capital Improvement Program (CIP) on time and budget, maximizing federal funding.

Successful completion of these steps will place PRASA on a path to achieve financial and operational sustainability and establish the foundation to become a well-performing utility with access to short-term and long-term capital markets at reasonable rates.

For this Report and the analysis included herein, Arcadis used the certified 2021 PRASA Fiscal Plan as the official fiscal plan, which provides for its CIP to cover a six-year period from FY2021 to FY2026 (the six-year CIP) as well as PRASA's six-year Forecast covering preliminary results for FY2021 and projections for FY2022 through FY2026 (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 2021 PRASA Fiscal Plan is discussed in more detail in Section 8.

3 Organizational Updates And Changes

3.1 Introduction

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

Figure 3-1. PRASA Regions

PRASA's Executive Management Team (EMT) provides daily management oversight and coordination for all institutional activities. Several departments offer support to the EMT including, but not limited to, finance, compliance, human resources, customer services, and information systems. Figure 3-2 shows PRASA's current organization.

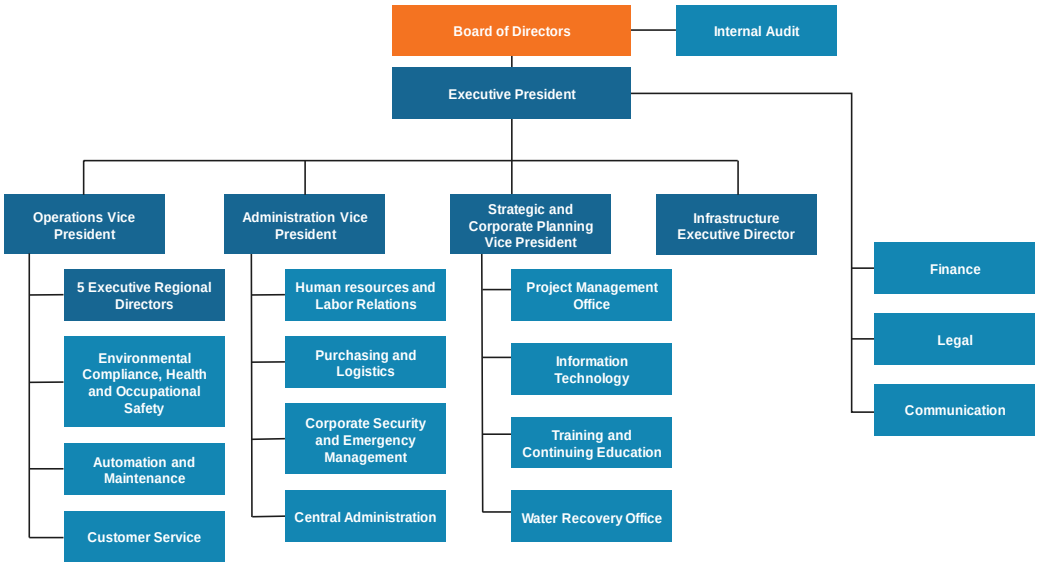

Figure 3-1. PRASA's current Legislated and Executive Management Structure

3.2 Updates and Changes in PRASA's Organization and Management

3.2.1 Board of Directors

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

- Four independent directors appointed by the Governor of Puerto Rico, comprised of:
  a. One engineer licensed to practice in Puerto Rico with ten years of experience,
  b. One authorized legal advisor with at least ten years of experience in Puerto Rico and admitted to practice in the Government
  c. One member with a broad knowledge and experience in the field of corporate finance,
  d. One professional with expertise in any field related functions delegated to PRASA
- One AAFAF representative as per Act 2-2017.
- One Consumer Representative, a private citizen representing the Authority's customers, and
- 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 September 30, 2021

Name	Board Position	Position Description	Term Ends
Héctor J. del Río Jiménez, Esq.	President	Independent Director/Finance	November 20, 2021
Alberto Castañer Padró, Esq.	Vice-President	Independent Director/Legal	December 14, 2021
Memphis Cabán Rodríguez, PE	Director	Independent Director/ Engineering	December 14, 2021
Vacant	Director	Independent Director	
Gerardo Lorán Butrón, Esq.	Director	AAFAF Representative	Ex Officio
Vacant	Director	Executive Director of the Mayors Association	Ex Officio
Vacant	Director	Executive Director of the Mayors Federation	Ex Officio
Héctor Sánchez Cardona, PE	Director	Consumer Representative	June 19, 2020[1]

[1] Mr. Sánchez's term expired on June 20, 2020. Therefore, based on Act 15-2013 and Regulation No. 8390 of the Department of Consumer Affairs adopted October 15, 2013, applicable at the time of his election, he has been holding over in his 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 that include the candidates' 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. Finally, 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.

PRASA reported the following material change as it relates to PRASA's Governing Board during FY2021 and the first quarter of FY2022: the positions of Executive Director of the Mayors Association and Executive Director of the Mayors' Federations, previously occupied, are now vacant; Independent Director with expertise in any fields related functions delegated to PRASA remains vacant; and although Consumer Representative, Héctor Sánchez Cardona, PE completed his term he remains at the Consumer Representative position.

3.2.2 Executive Management Team

Since enacting Act 92-2004, PRASA has gone through some management changes at many levels of its organization, including the executive level. A summary of PRASA's key Executive Management Team as of the date of this Report, including previous positions held and years of experience, is presented in Table 3-2.

Table 3-2. PRASA's Executive Management (as of September 30, 2021)

Name	Current Role	Term Ends	Prior Role	Experience Total/PRASA
Eng. Doriel Pagán	Executive President	February 2025	Operations Vice President	30 years / 28 years
Eng. Luis González	Operations Vice President	Indefinite[2]	Director Infrastructure – Metro Region	21 years / 11 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

Name	Current Role	Term Ends	Prior Role	Experience Total/PRASA
Omar Rivera Rolón	Executive Director of Finance	Indefinite[2]	PRASA Treasurer	23 years / 15 years
Eng. Joel Lugo Rosa	Interim Executive Director for Infrastructure[1]	Indefinite[2]	Interim Executive Director West Region	22 years / 22 years
Eng. Roberto Martínez	Executive Director Metro Region[1]	Indefinite[2]	Deputy Exec. 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. Damaris Santini Martínez	Interim Executive Director South Region[1]	Indefinite[2]	Executive Advisor, Presidency	27 years / 16 years
Eng. Enrique Rosario	Interim Executive Director East Region[1]	Indefinite[2]	Deputy Exec. Director East Region	23 years / 13 years
Eng. Erick Rosa Lugo	Interim Executive Director West Region[1]	Indefinite[2]	Deputy Exec. Director West Region	23 years / 12 years

[1]Legislated positions.
[2]Indefinite, as per amended Act 40-1945 (Ley 68-2016), allows Executive Management members to be named Interim, with no definite term of service.

PRASA reported the following material changes during FY2021 and the first quarter of FY2022 regarding its organization and changes in leadership and management: Omar Rivera Rolón was appointed as Executive Director of Finance; Eng. Arnaldo Jiménez was appointed as Strategic and Corporate Planning Vice-President in replacement of Eng. Ryan Arrieta, who resigned during FY2021; Eng. Erick Rosa Lugo was appointed as Interim Executive Director West Region replacing Eng. Joel Lugo Rosa, who became the Interim Executive Director for Infrastructure in replacement of Eng. José Rivera, who resigned in June 2021; and lastly, Eng. Damaris Santini Martínez was named Interim Executive Director South Region.

3.2.3 Staffing Profile

PRASA's existing staff is categorized into 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*): These employees are the unionized plant and system operators, maintenance, and 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 the probationary period, they either become full-time employees or renew their temporary employment contract.

At the end of FY2021, PRASA had a total staff of 4,670, of which 292 are pre-retired under Act 211-2015, as further discussed below. Overall, staff increased by 1.9% from FY2020 to FY2021. Based on the total number of employees for FY2021, the ratios of service accounts (counting the water service and sanitary sewer service for the same client, as two separate accounts) to employees was 434, which represents a slight decrease of 0.5% compared to FY2020 which was 436. Current industry for combined utility's operations averages range from 356 to 616, with a median of approximately 476 customer accounts per employee[6]. PRASA's customer account per employee ratio falls within the range for the industry.

Table 3-3 shows the staff levels by staff category over the last five fiscal years. Since FY2010, PRASA has implemented staff reduction initiatives, such as early retirement, re-training existing staff from overstaffed positions to reduce the need for new hires and using staff attrition to reduce staff levels.

Table 3-3. Staff Levels

End of FY	Appointed Employees	Management Employees	HIEPAAA Employees	UIA-AAA	Temporary Employees	Pre-Retired Employees	Total Employees
2017	163	1,195	141	3,146	9 (UIA)	-	4,654
2018	154	1,058	117	2,952	9 (UIA)	335	4,625
2019	162	1,058	123	2,915	8 (UIA)	327	4,593
2020	164	1,089	118	2,883	7 (UIA)	321	4,582
2021	164	1,138	120	2,956	0 (UIA)	292	4,670
5-year CAGR	**0.15%**	**-1.21%**	**-3.95%**	**-1.55%**	**-100%**	**N/A**	**0.09%**

Source: PRASA Human Resources Department

PRASA reported a net growth of staff close to 2% from FY2020 to FY2021, including an increase of 73 UIA-AAA employees, two HIEPAA Employees, and 49 management employees.

[6]Source: 2020 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

Although there has been some staff increase in needed areas, PRASA has still not recovered entirely from the loss of employees due to the 2017 Hurricanes and the current pandemic. Also, plant operators and electromechanics staff are still needed.

The Voluntary Pre-Retirement Program seeks to reduce the workforce progressively and voluntarily, thus allowing the economy to undergo a transition process. It may reduce expenses such as payroll and benefits but requires that the Office of Management and Budget (OMB) evaluate and certify that employees eligible for the program and under consideration result in savings for PRASA. Besides reducing expenses, Act 211-2015 stipulates that positions that become vacant upon implementation of the retirement program be eliminated and that agencies take administrative or operational measures to accommodate these eliminated positions. However, if the positions are determined to be critical and follow the agency's 2021 PRASA Fiscal Plan, OMB may authorize PRASA to re-staff the position. Some of the eligible employees currently occupy positions that are managerial or supervisory, which may result in organizational challenges.

PRASA's optimal staffing level to operate and maintain the System, and effectively manage the utility, as presented in the 2021 PRASA Fiscal Plan, stands at approximately 4,700 employees. As shown in Table 3-3, at the end of FY2021, PRASA's staff totaled 4,670 employees (292 are pre-retired), which is slightly under PRASA's goal. However, this does not translate into PRASA achieving an optimum staff mix. Critical staff needs must be addressed, such as treatment facilities operators, managers, and electromechanical staff. Furthermore, PRASA has hired V2A to reevaluate the optimal staffing levels considering all recent events and the magnitude of the Capital Improvement Program. This evaluation should be completed by the end of FY2022.

Lastly, PRASA's current hiring plan focuses mainly on employing personnel for the departments impacted the most by the Voluntary Pre-Retirement and general employee resignations. Also, identified needs for running an extensive Capital Improvement program, which started FY2021. These affected departments include Maintenance, Customer Service, Infrastructure, and Operations Departments. Staff position needs identified include but are not limited to field workers; supervisors, and electromechanics for the Maintenance Department; and wastewater treatment plant (WWTP) operators, WWTP, and water treatment plant (WTP) supervisors, services coordinators, assistant directors, laboratory assistants, and sanitary sewer workers for Operations Department and Licensed Engineers in the Infrastructure Department. 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 to further optimize its staff and address needs in critical areas.

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. 3 of January 23, 2017 (Act 3-2017) and Act No. 26 of April 27, 2017 (Act 26-2017). These laws have supremacy over any other law or agreement regarding the same matters. The aspects of these laws that affect PRASA are discussed in the following sections.

3.2.4.1 Act 3 of 2017 – "Ley para Atender la Crisis Económica, Fiscal y Presupuestaria para Garantizar el Funcionamiento del Gobierno de Puerto Rico"

The Government of Puerto Rico, through the enactment of Act 3-2017, declared a fiscal emergency and required that its instrumentalities (i.e., utilities, government agencies, and public corporations such as PRASA) implement

certain measures to reduce its expenses. Act 3-2017 has precedence over any previous law and will remain in place until June 30, 2021, or until certain economic and financial conditions are met. Act 3-2017 requires, among others, the following measures (note that not all of these measures apply to PRASA as a public corporation of the Government of Puerto Rico):

1. No increase in economic benefits to employees (except minor exceptions).
2. No monetary liquidation of vacation days over 60 days.
3. No liquidation of sickness days[7].
4. Suspension of non-economic clauses under previous agreements has an economic impact on the operations budget of the entity.
5. No negotiation of labor union agreements during the tenure of this Act.
6. No creation or renovation of career positions.
7. Appointed positions will be reduced by 20% unless previously approved by the Executive Director of OMB.
8. There is no funding for traveling outside Puerto Rico unless approved by the Secretary of Government.
9. No cellular phones or technological services will be provided.
10. Reduction of energy consumption by 5% each year.
11. Reduction of potable water consumption by 5% each year, from FY2017 until FY2019, which shall reflect a 15% total reduction in the three years.
12. Reduction of 10% of Contracted services compared to expenses incurred in FY2015-2016 and maintained within that level unless previously approved by the Executive Director of OMB.

According to this Act, any agreement between PRASA and both UIA-AAA and HIEPAAA unionized personnel that has expired or expires during the active period of this law shall be extended until June 30, 2021, in terms of its non-economic clauses and those clauses not affected by Act 3-2017. As per Article 14 of Act 3-2017, those non-economic clauses that have a direct or non-direct economic impact on PRASA's operational budget shall be suspended. Two explanatory letters from OMB, CC 144-17 and 145-17 were circulated clarifying Article 14 and stating that benefits and economic compensation for employees shall be maintained from the date of ratification of Act 66-2014.

Although these measures represent operational savings for PRASA, some of them affect PRASA's revenues, such as Measure 11 listed above. This measure requires that all agencies, instrumentalities, and public corporations under the executive branch reduce their potable water consumption by 5%, which would, in turn, result in a reduction of revenues for PRASA. This Act also requires that PRASA comply with certain progress reporting requirements to the House of Representatives, the Senate of Puerto Rico, and the Office of the Governor of Puerto Rico. The report shall list all implemented measures and the results obtained. In addition, stricter measures are stipulated in the later approved Act 26-2017 and discussed in further detail in the next section

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. This law covers several aspects of the Government of Puerto Rico in general; however, the clauses that affect PRASA are listed below:

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).

[7] Refer to Table 3-4 for more detail.

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 1 in the list above standardized the marginal benefits of all government employees. Article 2.04 of Act 26-2017 affects the following marginal benefits:

Vacation License: accumulation rate and maximum accumulation (depending on the applicability of Act 8-2017: Human Resources of the Government of Puerto Rico Transformation and Administration Act)

Sickness License: accumulation rate and maximum accumulation (depending on the applicability of Act 8-2017: Human Resources of the Government of Puerto Rico Transformation and Administration Act).

- 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)

This measure reduces operational costs in terms of payroll and benefits, specifically in the vacation, sickness, and overtime compensations, and in the Christmas Bonus.

Measures 3 and 4, as listed above, may also impact fleet operational cost since they represent a potential increase in the payment of the mandatory vehicle insurance. The amount of increases is not known yet but is already approved by law. Table 3-4 below compares and summarizes Acts 3 and 26 of 2017 in terms of the effects these enacted laws have on PRASA.

Table 3-4. Impacts of Acts 3 and 26 of 2017 on PRASA

Category	Act 3-2017	Act 26-2017
Economic Benefits	There will be no increase in economic benefits and no extraordinary monetary compensations as per Act 66-2014. Collective Agreements that have not expired to the date of approval of this law will be extended as stipulated on Article 8 of Act 66-2014	Marginal benefits will be the same for all employees of the Executive Branch, including all agencies, instrumentalities, and public corporations of the Government of Puerto Rico, except for the University of Puerto Rico.

Category	Act 3-2017	Act 26-2017
	Vacations accumulated in excess of 60 days shall be used within 6 months after the end of the natural year, otherwise the excess will be lost. Vacation accumulated days up to the date of approval of this law shall be retained by the unionized and non-unionized employee, but accumulated excess shall not be liquidated monetarily.	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 10 days shall be enjoyed consecutively. If deemed necessary, a public corporation shall concede vacations up to a maximum of 50 days in a year to those employees that have accumulated vacation days.
Economic Benefits	Sickness day accumulation in excess prior to the approval of this act and during the approval of this act will be frozen to the salary of June 30, 2014. Monetary liquidation will only be performed when the employee leaves public service. After approval of this law, accumulation of excess days by December 31 of each year shall be used by June 30 of the next year. After the latter excess accumulation balance will be lost.	Accumulation of sickness days will be at a rate of 1.25 days per month of service for those employees contracted prior to Act 8-2017. For those contracted after Act 8-2017 the accumulation rate will be 1 day per month. Sickness days shall be accumulated up to a maximum of 90 days per natural year and no monetary liquidation is accepted.
	Christmas bonus will be of $600 each year for all employees of the Central Government and Public Corporations.	The Christmas bonus will be of $600 each year for all employees of the Central Government and Public Corporations.
	All public corporations shall suspend, during the effectiveness of this act, all non-economic clauses under the labor agreements that have a direct or indirect economic impact in the operation of the public corporation. Non-economic clauses with economic impact are defined under Act 66-2014.	
Negotiation of Collective Agreements	Those agreements that expire before the approval of this act or that expire during the term of this act will only be extended in terms of non-economic clauses that are not affected by this act until June 30, 2021.	This law has supremacy over any collective agreement or contractual letter that interferes with the dispositions in this law.

Category	Act 3-2017	Act 26-2017
	At the end of the term of this law the labor unions that by July 1, 2014 were represented in the Executive Branch of the Government will be able to negotiate new collective agreements.	
Employment Positions	All vacant positions that were generated prior or during the effectiveness of this act will remain vacant until June 30, 2017. Vacant positions cannot be filled without the previous authorization of the OMB Director.	
	No new career, regular, and transitory or irregular positions will be created or renewed, unless previously approved by the OMB Director.	
	Appointed positions will be reduced by 20%.	
Operational Costs	The use of public funds for travelling out of Puerto Rico is prohibited unless such travels are necessary for the adequate performance of such entity or that was previously approved by the Secretary of Government.	Mandatory Vehicle Insurance Fee will potentially increase, due to additional service fee and fee revision every two years. This will be reflected in the operation and maintenance costs of PRASA's fleet.
	No public funds will be used for the payment of cellphones or technological services.	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.
	Energy consumption shall be reduced at least by 5% each year. The energy consumption of FY 2015-2016 shall be used as baseline for the calculation of the annual reduction.	

Category	Act 3-2017	Act 26-2017
	Potable Water Consumption shall be reduced by 5% each year. The potable water consumption of FY 2015-2016 shall be used as baseline for the calculation of the annual reduction.	
Operational Costs	Contract Agreements of Professional or Bought Services shall be reduced by at least 10% compared to FY 2015-2016	
	Contract Agreements of professional services of more than $10,000 in the same FY shall be previously authorized by the Governor or a representative.	
Purchase Costs	All purchase costs shall be reduced by 5% for FY 2016-2017.	
Quarterly Report	All entities of the Executive Branch shall prepare a report that lists and details all the taken measures and the corresponding results. The first report shall be submitted 90 days after the approval of this act.	

3.2.5 Training

PRASA offers varied training programs to its employees to improve work management and productivity. During FY2021, PRASA provided over 62,547 training hours to its employees; this represents an average of approximately 13 hours per employee for FY2021. As a brief return to normality allowed (after the COVID-19 Pandemic), during FY2021, for training with the use of virtual tools and more remote courses, the number of training hours showed a significant increase by also leveraging the contract with *Oficina de Administración y Transformación de los Recursos Humanos* (OATRH) for training courses. Training topics range from technical-oriented seminars to conflict resolution and team-building sessions. Also, PRASA is developing an internet-based training program called Moodle; they have developed various courses and continue to develop others. To aid in creating these training programs, the department invested in a recording room at the Central Building. For FY2022, they expect to contract the management of the Moodle program and continue its development. PRASA's goal is to continue offering diverse training programs to its employees to improve work management and productivity.

Overall, about 88% (4,107) of the total employees participated in training activities offered by PRASA during FY2021. In addition, PRASA continues to invest in personnel training to increase work ownership and productivity levels. Lastly, PRASA continues 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. Operator Licensing FY 2021

Facility	In Training	Type I	Type II	Type III	Type IV	Total
Water	70	19	41	76	233	439
Wastewater	19	2	10	22	87	140
Total	89	21	51	98	320	579

3.3 Conclusion

PRASA continues to operate and manage the System, despite the complex challenges in the past fiscal years. PRASA staff levels are under the Executive Management Team's established target level. However, the staffing mix is not optimal as many critical technical and operations positions are vacant. Therefore, PRASA must align employees with required skill sets through recruitment or further workforce development to fill technical and operator needs while maintaining optimal staffing levels. Also, while staffing, PRASA should consider the impact of the employee retirement programs and the most efficient way to cover those losses.

Furthermore, the commencement of the CIP will require building up the Infrastructure Department staff to allow for effective overseeing of a Program that size. In addition, PRASA should consider the current workforce challenges on the island, which will continue to affect its existing staff and their ability to recruit capable and experienced staff. As the federal funds have been allocated to the Government of Puerto Rico and other agencies, PRASA must consider their salary scales to enable competition in the hiring market with the private sector and other governmental agencies. Lastly, PRASA continues to assess organizational and operational performance and implement corporate and policy changes focusing on customer service, System performance, and budget controls.

4 Condition of System

4.1 Introduction

In FY2021, 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) to assess the current physical state of the facilities inspected; 2) to determine if the facilities are being operated and maintained in a manner to achieve their operational goals, and 3) to evaluate if PRASA's CIP is aligned with the System's identified needs. Given the significant reduction in capital and renewal and replacement investment over the past five years, Arcadis performed asset condition assessments of a selection of WTP and WWTP facilities that were not inspected in the FY2020 ACA Report, as well as a different sample of ancillary facilities. Arcadis inspected facilities to assess the structural integrity and physical condition of structures, equipment adequacy of operation and maintenance practices, renewal and repair needs, among other evaluation criteria. Arcadis also evaluated the compliance performance results for all PRASA's WTPs and WWTPs from January 1, 2020, through December 31, 2020. The facility inspections for WTPs, WWTPs, and ancillary facilities were performed between February 2021 and July 2021. There was some delay in completing the facility inspections due to the effects of the COVID-19 pandemic-protocol requirements and the availability of PRASA personnel to coordinate inspections.

This section summarizes Arcadis's inspection results, findings, and recommendations regarding PRASA's System based on the condition of the assets inspected during FY2021 and detailed in the FY2021 ACA Report.

4.2 Facility Inspections

A summary of the facilities inspected during 2021 is presented in Table 4-1. In total, 180[8] facility inspections were performed out of 3,881 facilities that comprise the System, excluding active 137 Raw RWIs and the 70 RWPSs. Inspected facilities include 57 WTPs (50% of total WTPs) and 23 WWTPs (45% of total WWTPs). Also, a small portion of the ancillary facilities, 16 wells (6% of total wells), 30 WPSs (3% of total WPSs), 34 WSTs (2% of total WSTs), and 20 WWPSs (2% of total WWPSs) were inspected considering the lower risk impact these assets have on the System. Dams were not included in this round of inspections since they were inspected in January 2020 and included in the FY2020 ACA report. It should be noted that no inspections were performed on the following assets: small dams and weirs, buried infrastructure, meters, ocean outfalls, buildings, land, and other ancillary facilities. Nevertheless, based on data provided by PRASA, a discussion of the buried infrastructure condition data has been included in a later sub-section.

Table 4-1. Percent of Assets Inspected by Asset Category

Asset Category	Total PRASA Facilities[1]	Inspections Performed	
		Quantity	Percent
Regulated Dams	8	-	-
Water Treatment Plants	113	57	50
Wastewater Treatment Plants	51	23	45
Wells	249	16	6

[8] This does not include the AWIA facilities inspected and included in the ACA Report in CD/DVD format.

Asset Category	Total PRASA Facilities[1]	Inspections Performed	
		Quantity	Percent
Water Pump Stations	1,061	30	3
Water Storage Tanks	1,557	34	2
Wastewater Pump Stations	842	20	2
Total	**3,881**	**180**	**5**

[1]Data obtained from PRASA Geographical Information System (GIS), updated in June 2021. The total excludes active RWIs (137) and RWPSs (70).

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. Nevertheless, the Metro Region assets were inspected consistently with the other Regions.

Table 4-2. Summary of Inspections by Region

Asset Category	East	Metro	North	South	West	Total
Regulated Dams	-	-	-	-	-	0
Water Treatment Plants	17	4	14	14	8	57
Wastewater Treatment Plants	6	3	6	4	4	23
Wells	4	0	4	4	4	16
Water Pump Stations	7	6	5	6	6	30
Water Storage Tanks	9	6	7	6	6	34
Wastewater Pump Stations	4	4	4	4	4	20
Total	**47**	**23**	**40**	**38**	**32**	**180**

Following the same 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 (ancillary facilities) by inspecting several facilities within several specific Operational Areas across the island, rather than inspecting a uniform number of minor facilities within each Operational Area. As the specific assets to be inspected were not pre-determined, this approach provided some assurance that not only the best assets were inspected in each Operational Area. The Operational Areas visited were Toa Alta and Manatí (North Region), Ponce and Yauco (South Region), Caguas and Fajardo (East Region), San Germán and Mayagüez (West Region), and San Juan and Guaynabo (Metro Region). Since the Metro Operational Areas visited did not have wells available, we visited additional wells at other Operational Areas.

Each facility was inspected using an asset management mobile application named Fulcrum, which was programmed to include a scoring and weighting criteria developed by Arcadis. It was customized for each specific asset category to determine the current state of repair and operation of the asset 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. It supports a full range of condition assessment activities. In addition, it supports electronic data entry, including digital photos and GPS coordinates attached to the asset.

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.

These criteria are described in more detail in each of the asset category sections of this report.

Within each evaluation criteria, 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 the Fulcrum App. 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 and in more detail in each of the different asset category sections of this report:

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 results of the inspections for each asset category is discussed in the following sections. Detail results are documented in the FY2021 ACA Report.

4.2.2 Inspection Results

According to the facilities inspections performed between February and July 2021, an overall condition rating for each asset category was determined. The condition of each of the facilities varied mostly from adequate to those requiring capital upgrades, operational/process control improvements, and/or staff/training deficiencies. The inspection rankings and results per facility type are summarized in the following subsections.

4.2.2.1 Water Treatment Plants

PRASA operates 113 WTPs where it treats raw water to produce potable water for its customers. The Islandwide design production capacity of WTPs is approximately 621 million gallons per day (MGD). For FY2021, PRASA reported a total water production of 551 MGD, of which approximately 494 MGD came from WTPs.

As previously mentioned, 57 WTPs were inspected as part of this assessment. Each assessment consisted of a thorough site inspection and an interview with the operator, plant supervisor, or designated personnel. Therefore, the information obtained was at least in part based on the understanding of the person that was being interviewed. Table 4 4 compares the average rating results of the facilities inspected by each category evaluated. In addition, the overall average rating of each evaluation criteria for 2010 through 2021 inspections is also provided. In general, the WTPs were rated as adequate, with an overall rating score of 2.2. Two of the inspected WTPs, Enrique Ortega – La Plata WTP and Aguadilla (Montaña WTP), were rated as Poor, six (Matrullas WTP, Hogares Seguros WTP, Tibes WTP, Rucio WTP, Las Marías WTP, and Miradero WTP) were rated as Good and the rest were rated as Adequate. No WTPs were rated as Unacceptable. Even though 86% of the WTPs were classified as Adequate, ten of the 49 WTPs received a low-end rating that could deteriorate to a Poor rating if not addressed.

Table 4-3. WTPs – Comparison of Average Inspections Results for 2010-2021

Criteria	2010	2012	2014	2015	2017	2019	2020	2021	Change 2021 vs. 2020
Regulatory Compliance	2.1	2.5	2.3	2.0	2.5	2.6	2.6	2.6	0.0
Operations/Process Control	2.6	2.7	2.2	2.2	1.9	1.6	1.9	2.0	0.1
Equipment/Maintenance	2.3	2.3	2.4	2.1	1.8	1.7	1.8	1.9	0.1
Staffing/Training	2.4	2.9	2.7	2.1	2.1	1.9	1.7	1.9	0.2
Overall Rating	**2.3**	**2.5**	**2.3**	**2.1**	**2.1**	**2.0**	**2.1**	**2.2**	**0.1**

Compared to the 2020 inspection results, the Staffing/Training, Operations/Process Control and Equipment/Maintenance criterions slightly improved, the regulatory compliance stayed the same. The recent increase in the Operations/Process Control criterion can be attributed in part to the process control initiatives that have been implemented in WTPs as part of the compliance effort to control DBPs. The Equipment/Maintenance criterion rating has been slightly increasing since 2019. This improvement can be attributed to the replacement and/or repair of equipment that was previously reported as out of service or deteriorated. Notwithstanding, the CIP was recently reactivated, projects are being executed and the expectation is to see additional improvements in the following years.

Regarding the Staffing/Training criterion improvement, it may be related to some of the unfilled positions being staffed when the inspections were performed. However, this assumption cannot be validated by Arcadis as personnel turnover is still an ongoing issue for PRASA along with the need for certified operators for treatment facilities. PRASA is striving to invest in the training of its staff, focusing on achieving greater job understanding, productivity, and ownership. However, the ongoing financial situation has adversely affected PRASA's efforts concerning staff development and the provision of adequate staff in their treatment facilities.

The regulatory compliance criterion having a high rating may be due to the fact that several parameters had interim limits or were only being monitored. Regardless of the high rating in regulatory compliance, two facilities were rated as Unacceptable, Enrique Ortega - La Plata WTP and Sergio Cuevas WTP (Metro Region). Enrique Ortega - La Plata WTP (Metro Region) reported exceedances in disinfectant byproducts (TTHM, HAA5) for SDWA parameters and turbidity, residual chlorine, and lead for NPDES parameters. Sergio Cuevas WTP (Metro

Region) reported exceedances in disinfectant byproducts (TTHM, HAA5) for SDWA parameters and residual chlorine, dissolved oxygen, and copper for NPDES parameters. In addition, two facilities were rated as Poor, Canóvanas Nueva WTP (Metro Region) and Aguadilla (Montaña) WTP (West Region). Canóvanas Nueva WTP (Metro Region) reported exceedances in disinfectant byproducts (TTHM, HAA5) and turbidity for SDWA parameters and residual chlorine for NPDES parameters. Aguadilla (Montaña) WTP (West Region) has reported exceedances in disinfectant byproducts (TTHM, HAA5), TOC, and turbidity for SDWA parameters and residual chlorine for NPDES parameters.

The Operations/Process Controls category in the majority of WTPs inspected were Adequate. However, ten facilities (17% of inspected WTPs) were rated as Poor, and one (2% of inspected WTPs) was rated as Unacceptable. The common factors in these facilities are the lack of essential process control procedures, training to communicate strategies and support documents. These facilities lack updated operation and maintenance (O&M) manuals, equipment manuals, and Emergency Response Plans (ERP). Process control strategies were not clearly communicated between plant staff, making it difficult to obtain a good process control. In addition, jar tests were not being performed regularly or at all; of the 57 WTPs visited, approximately 14 facilities (25%) were not performing jar tests, 11 facilities (19%) were only performing jar tests weekly, and three facilities (5%) occasionally performing jar test. Also, almost all facilities lacked a potable water flow meter, and a significant number lacked remote monitoring, control room, and proper security and housekeeping. Some had inadequate laboratory equipment and poor lighting.

Furthermore, one of the key deficiencies is the absence of auxiliary power. From 2020 to the present, PRASA has provided all WTPs and intakes with new EGUs. This problem is not as severe as previous years, yet several facilities, such as Lajas WTP, Canalizo WTP, and Jaguas Pesas (Pozas) WTP, did not have a permanent working EGU. Additionally, Canalizo WTP, Cayey Urbano WTP, Yabucoa (La Pica) WTP, Enrique Ortega (La Plata) WTP, Guzmán Arriba WTP, Guaynabo-Los Filtros WTP, and Esperanza WTP did not have a working permanent EGU at their intakes. La Boca WTP has an Intermediate Tank - Pump Station from their intake that has its EGU out of service. In Aibonito (La Plata) WTP and El Yunque WTP, the EGUs do not have capacity to operate the entire plant and Lajas WTP is using a rental EGU. Lastly, six treatment facilities had issues with the EGU’s transfer switch and manually operated their EGU.

Regarding the Equipment/Maintenance criterion, no facility was rated as Unacceptable. Out of the 57 facilities inspected, only one (2%) of the facilities inspected was rated as Good, two (4%) were rated as Poor, and the rest were rated as Adequate. Of the facilities rated as Adequate, 46 (81%) had a rating under 2.0 and should be closely monitored. Note that several of these facilities have planned future projects (as funding allocation is identified) to address some of the issues identified during the inspections. In addition, some of these plants are included in the CIP Program that recently restarted activities. Several facilities lack STS or have an STS that has been out of service for an extended period. It is recommended that STS be repaired or constructed to comply with the NPDES parameters.

Pertaining to the Staffing/Training criterion‘s slight improvement in the overall rating, it may be related to the fact that some of the previously unfilled positions were staffed when the inspections were performed. However, this assumption cannot be validated by Arcadis as personnel turnover is still an ongoing issue for PRASA, along with non-certified operators or lack of training, and the need for more certified WTP operators. Besides licensed operators, the findings showed multiple needs in STS operators, maintenance staff, supervisors, electromechanics, filter assistants, operational service workers (TSOs for its Spanish Acronym), and laboratory personnel. Nevertheless, PRASA has certain controls in place for continuing the operation of facilities which include but are not limited to allowing current staff/operators to work overtime, reducing facility operation shifts.

Most water operators are licensed as per PRDOH requirements, but some still need to complete the licensing process.

Although PRASA offers adequate training to its staff and the Human Resources department assists with the tracking, as noted during the inspections, the operator staff in many facilities need additional process controls training. Also, some of the staff need refreshers in key training courses such as maintenance data, confined spaces, and HAZWOPER.

The facilities with the lowest overall score of the 57 WTPs inspected are summarized in Table 4 5. As shown below, one is rated as Poor, and the other seven facilities were rated as barely Adequate or received a score in the lower end of the Adequate scoring range. Therefore, PRASA should address the shortcomings identified during inspections to improve the physical condition of these facilities in order to achieve/maintain continuous and consistent compliance.

Table 4-4. WTPs – Lowest Rated Facilities and Observations

WTP	2021 Score	Observations
Aguadilla (Montaña) (West Region)	1.4 (Poor)	During the evaluation period the facility Compliance was rated as Poor (rating 0.5). This criterion significantly worsened compared to the previous inspection. There were several SNC in SDWA compliance parameters, with TTHMs and HAAs, Combined Filtered Effluent (CFE) turbidity and TOCs. Regarding, NPDES parameters there were several exceedances of residual chlorine (Res Cl). The facility Operations/Process Control was rated as Adequate. The operators perform the necessary sampling for adjustments to process. Additional sampling is implemented throughout the process for Contact Time (CT) compliance. The Facility ERP was updated in 2020. The EGU was in working order and has enough capacity to operate the facility. The facility needs security improvements; cameras are malfunctioning and the gate motor is out of service. Some improvements were recently made to the main building. Illumination and fencing are in good condition. The overall appearance is adequate. The facility Equipment/Maintenance evaluation category was rated as Adequate (rating 1.8). There is major equipment that need repairs or replacement to optimize plant operations and compliance. One raw water intake pump and the two intake screening systems were out of service. Also, tube settlers need replacement and filter surface wash pumps were out of service. The distribution tank screen vent shows significant corrosion. Distribution tanks inspection and cleaning is recommended regularly. The STS system is not working and waste is discharged from the holding into the outfall 001. Overall, the facility piping shows signs of corrosion. This facility serves as storage and distributor of chlorine (150 pounds {lbs}) cylinders to smaller plants and wells in the area. The facility has corrective maintenance and procurement process challenges due to extended delays due to funding availability. The facility has an assigned CIP project and the as-built drawings are on site. The Staffing/Training category overall rating was Poor (rating 1.3). The facility needs at least one certified operator and an “At large” operator to operate the plant efficiently. In addition, due to COVID-19 the completion of some training and refreshers were pending at the time of the inspection.

WTP	2021 Score	Observations
El Duque (East Region)	1.5	During the evaluation period, the facility Compliance was rated in the lower end of Adequate. A minor exceedance was reported for the SDWA compliance for turbidity and various exceedances in TTHM and HAA5 in the water distribution system. Also, in NPDES compliance there were minor exceedances in Res Cl. The Operations/Process Control was rated as Poor. At the time of the inspection, the WTP had been three days without power service and the EGU was being repaired. The operators perform routine sampling at different locations during the day, following SOPs, and perform the necessary process control adjustments. The available version for the O&M manual was not updated. The jar test is used for process control and the current streaming monitor is used to verify results. The Jar test is performed once a day. There is no calibration plan for chemical feed pumps, but they do calibrate the pumps using the calibration column. The operator samples for process control. The pipes are color coded but in poor condition. The facility's overall appearance is deficient. The Equipment/Maintenance was rated as Adequate. Some of filter media is missing and not leveled, also mudballs were observed. The actuators at the filters are under repair and all filters are washed manually. For the chlorine application system, Sodium Hypochlorite, the tank has no chemical labeling. The pipeline to the sludge drying beds (SDBs) from the thickener is clogged, therefore the whole STS is out of service. The roof of the sludge drying bed is new but not translucent. The Region hires a private company to perform routine maintenance at the plant. The facility lacks as-built drawings. The Staffing/Training was rated Adequate for this facility and its operating hours. Since the WTP is operated 24 hours a day, the operators are working 12-hour shifts. Need at least one licensed operator and one "At-large" operator to operate the plant efficiently during its operating hours. All operators have their certifications and training up to date. Lastly, the facility is planned for possible elimination and it has an assigned CIP
Canóvanas Nueva (Metro Region)	1.5	During the evaluation period the facility Compliance was rated as Good. No exceedances were reported under SDWA, however there was SNC of Biological Oxygen Demand (BOD) under NPDES. The facility Operations/Process Control was rated as borderline Adequate. The operators perform the necessary sampling to adjust the process. However, O&M manual and ERP plans have not been updated. The major strategy has been to maintain the chlorine residual leaving the plant at 2.0 parts per million (ppm). Jar testing is not performed and staff is currently waiting on the refresher training. Dosing and chemical adjustments are made based on streaming current monitor and water quality testing. Also, no additional security is provided, there is poor exterior illumination, the gate motor is not working and housekeeping needs improvement. Communications tools are deficient, but EGU is in working order and has enough capacity to run the entire plant. Overall Equipment/Maintenance was rated as Adequate. The equipment component although adequate is below 2.0 and needs significant improvements, as some of the major equipment have issues. The influent raw water channel has several breaks and the receiving tank is leaking. Also, various valves at the sedimentation tank are broken and the tank structure needs improvement. The baffling system needs improvement. Filter media assessment and improvements are needed. The air scouring system has no redundancy. Filters and backwash tank level sensors are out of service. One distribution pump is out of service. There is no STS system. The overall appearance of the facility is adequate. The facility has corrective maintenance challenges, parts procurement challenges and there are no As-built drawings available. The Training is adequate for this facility and its operating hours. The Staffing is poor for the facility operating hours as two operators are not licensed. Also, the facility needs at least one licensed operator to cover the facility operating hours effectively. Lastly, the WTP compliance monitor remote is not operating adequately.
Sergio Cuevas (Metro Region)	1.5	During the evaluation period the facility Compliance was rated as Unacceptable. Also, it had several parameters with interim limits or only monitoring. SDWA violations in TTHM and HAA5 parameters with SDWA compliance. There was SNC in copper (Cu), Res Cl and dissolved oxygen (DO) parameter with regard to NPDES. In Addition, there are some issues in the treatment of water with iron & manganese, algae and color that are mitigated with the application of sodium permanganate and frequent cleaning. The facility Operations/Process Control was rated as Good. The operators perform the necessary sampling following the SOP's for adjustments to process and ERP was updated. The available version for the O&M manual was not updated. The Jar test and raw water parameters sampling results are used to determine and apply the appropriate chemical dose. The Jar test is performed once every day (Monday to Saturday by the technician laboratory). The facility has a good EGU's and a good laboratories process control. The EGU's are tested (AAA-500C) once a biweekly. General safety is not

WTP	2021 Score	Observations
		adequate because the handrails on filters area do not comply with 42" height of the handrails and tripping hazards. The facility Equipment/Maintenance was rated as Adequate. Several pieces of equipment were out of service, these were: one influent flow meter; one pump at the water intake; two slow mixers of flocculation tanks; the automatic sludge removal system from sedimentation tanks; one contact tank; one distribution pump; one thickener tank; one SDB tile; and four gates for the vacuum SDBs. In addition, four multimedia filters' with valve problems in filters # 14, # 18, # 22 and # 23. The aeration system needs to be cleaned. The distribution and thickener tanks need to be re-coated. The holding/EQ tanks need maintenance. The thickener tanks and vacuum SDBs need improvements, including the addition of roofs. The thickener tanks could not be accessed during the inspection due to sludge and silt spilled on the floor caused by overflows. The plant staff performs routine maintenance. The corrective maintenance crew lacks staff. The facility has an assigned CIP project and does not have as-built drawings available. The staffing is poor for the facility operating hours. One operator has an expired license. The facility needs at least two supervisors (maintenance and operator's), one licensed operator, two TSOs, one laboratory technician, four filter assistants, one STS operator, two “At-large” licensed operators, and one purification mechanic to cover the facility operating hours effectively.
Gurabo Nueva (East Region)	1.7	During the evaluation period the facility Compliance was rated as Adequate. However, it had several parameters with interim limits or only monitoring. SDWA violations with SNC in TTHM and MNC in TOC. Poor process control is performed considering use of manuals, with exception of new chlorine system (no procedures are available). The operators perform routine sampling at different locations during the day, following SOPs, and perform the necessary process control adjustments. The Jar test is not performed; however, they use a Coagulant Charge Analyzer (CCA). The EGU is capable of energizing the entire WTP. The EGU is tested (AAA-500C) every Monday. Chemicals are not stored properly because the outside of the laboratory room is stored in plastic. The pipes for water intake do not meet color code. Operator’s office is in the same room with the Motor Control Center (MCC), which is not safe. The Equipment/Maintenance evaluation criterion was rated as Adequate. The influent monitoring equipment and influent flow meter have the accessibility compromised. The surrounding area around the turbidimeter is not sturdy. Flow control was not achieved as splitter box is currently being by-passed. In the flocculation tanks, one of the paddle mixers collapsed to the tank floor. Several pieces of equipment were out of service, these were: one influent pressure monitor; one vacuum blower at superpulsator; one valve for sludge removal; one distribution pump; high level alarm and control system for the holding tank; and the thickener tank were out of service. Pre-chlorine injection was eliminated this year. The dewatering system has only one dosing pump (Magnafloc E38) and no spare, and no containment in building. Regional staff performs routine maintenance at the plant. Frequent floods have caused damage to the pavement. The fence (serpentine) wire is missing in some areas. Housekeeping is acceptable in some areas, but poor in others, such as in the filter press building. General appearance is poor (landscaping and painting). There is a safety issue due to a manhole without cover in open space. The facility does not have as-built drawings available. Training is adequate for this facility and its operating hours. However, staffing needs at least one licensed operator, one “At large” operator, and one TSO to operate the plant efficiently during its operating hours. All operators have their certifications and training up to date. The facility has an assigned CIP.
Canalizo (North Region)	1.7	During the evaluation period the facility Compliance was rated as Good. PRASA has done some improvements since the last inspection conducted at this facility. There was MNC with turbidity for SDWA compliance and minor exceedances of BOD for the NPDES compliance. The Operations/Process Control of the WTP was rated as Poor. There is no EGU for either the raw water intake or the WTP. The operators perform routine sampling at different locations during the day, follow SOPs, and perform the necessary process control adjustments. The jar test is performed once a week. The facility appearance is not adequate due to deficient housekeeping and lack of maintenance to green areas. The treatment module and pressure filters are rusted inside. The facility does not have security or TSO assigned to the WTP. The Equipment/Maintenance of the WTP was rated as Poor. Access to the raw water intake is not safe. The treatment module and pressure filters are rusted inside. The mechanical mixer of the flocculation tank is out of service and a piece of wood has been placed in the entrance to cause turbulence. The filter media was inspected less than five (5) years ago and is in good condition. The hydraulic wash for filter tanks is in good condition. The distribution tank is small for the demand. There is no STS at the facility, everything is discharged directly into the outfall 001. The overall appearance for the facility is poor and does not have as-built drawings available. The

WTP	2021 Score	Observations
		facility has an assigned CIP project. The Training was rated as Adequate. Currently, there are only two licensed operators to cover two shifts seven days a week. If they need to operate more hours to comply with water demands they are constantly working two extra hours during their shifts. The facility is understaffed to operate the facility efficiently. Need at least one licensed operator, one licensed "At large" operator, and a TSO.
Barrio Nuevo (Metro Region)	1.8	During the evaluation period the facility compliance was rated as Good. There were no exceedances reported for NPDES and SDWA compliance. The facility Operation/Process Control was rated as Unacceptable. The O&M manuals have not been updated since 2010. ERP is currently under review. The Jar test is not performed, dosing is performed utilizing a CCA. The EGU was out of service. The laboratory equipment and reagents are adequate and in fair condition. Several sections of the security fence need replacement. The facility Equipment/Maintenance was rated as Adequate. The intake has a working EGU and telemetry for monitoring and control of raw water pumps is available. The sedimentation basins need cleaning and algae control, the filter's troughs have significant corrosion and some actuators are not working. The chlorine application system was in good condition, including the safety equipment. The thickener has corrosion and needs maintenance. The STS system area had experienced significant erosion to the extent that one SDBs was taken out of service for safety reasons. The facility has corrective maintenance and procurement process challenges due to extended delays. The facility does not have as-built drawings available on site. Overall, the Staffing/Training criterion was rated as Poor (rating 1.3). The training is adequate for this facility; however, staffing needs at least one certified operator and one "At large" operator to operate the plant efficiently during its operating hours.
El Yunque (East Region)	1.9	During the evaluation period the facility compliance was rated as Good. However, it had several parameters with interim limits or monitoring only. There was a MNC for turbidity under SDWA compliance. The facility Operations/Process Control of the WTP was rated as Poor. The available version for the Operation & Manual is from April 2013. The operators perform routine sampling, following SOPs, and perform the necessary process control adjustments. The process lab data is reported to supervisor on a daily basis. The Jar test, streaming current monitor, charge analyzer, and raw water parameters sampling results are used to determine and apply appropriate chemical dose. The facility has four EGUs, however three of them are out of service. The EGU available does not have enough capacity to energize the entire facility. In addition, automatic transfer switch (ATS) is not working. The EGU is tested biweekly. The facility lacks a potable water meter and security cameras. General maintenance is needed due to the bad condition of the perimeter fence service streets, the amount of scattered debris through the facility grounds, and several corroded ladders and broken handrails. The overall facility appearance is not adequate. The facility Equipment/Maintenance was rated as Adequate. Half of the aeration system is on standby and there are safety issues with the handrails. Several of the equipment was out of service, such as: one rapid mixer; one slow mixer; two vacuum pumps for vacuum assisted SDBs; and one filtrate pump. The sedimentation basin sludge removal equipment is defective and the chemical application system (primary and secondary polymer) are not located in a proper area and lack secondary containment. The filter media #1 it was replaced in 2020. Roof and piping of backwash tank needs to be repaired. It is recommended to replace an exhaust fan (for personnel safety), and the gate and spangle metals at the disinfection area. The distribution tank needs cleaning and painting. The facility has the ability for water recycling, however, currently it is discharging into the outfall 001. The corrective maintenance is a challenge due to limitations of staff. The two main outstanding maintenance corrective works are improvements to thickener #3 and replacement/repair of the sludge removal system in the sedimentation tanks. The facility has as-built drawings available on site. The Staffing/Training criterion was rated as Poor. Training is considered adequate, however there is limited staff to operate the facility efficiently during its operating hours. The facility needs at least two additional licensed operators and one licensed operator "At Large". The facility has an assigned CIP.

As mentioned, compliance results show that facilities are, in general, performing better regarding compliance with limits of SDWA and NPDES parameters. Except for El Duque WTP, for which active monitoring is recommended for SDWA parameters compliance. Furthermore, results might be misleading for several NPDES parameters since they have interim limits or only monitoring. At this point, whether the facility can meet the actual (permanent) limits when the interim/monitoring expires is unknown. It is safe to say that interim limits are likely to continue until

PRASA can perform System improvements, whether capital or non-capital, to improve the facilities' equipment to enable them to meet compliance requirements.

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 NPDES permit, PRASA continues to request interim limits, as determined by the Compliance Department, until the capital project for a said facility is executed and completed. The project completion term would be subject to the Prioritization System. PRASA is vigilant of potential future regulations such as the new Lead and Copper Rule and the Per-and Polyfluoroalkyl Substances (PFAS) groups that may impact the Systems and the compliance with regulatory agencies' requirements.

The effects of these future regulations will not be known until PRASA performs data collection and studies to determine what, if any, additional capital improvements will be needed to comply. Regardless of the impact of future regulations, capital improvements are required to modernize PRASA's infrastructure, prevent further deterioration, protect public health, safeguard environmental quality, allow continued economic development, and help bring the System into compliance with regulatory requirements.

4.2.2.2 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 FY2021 was around 208 MGD. In addition, 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 23 WWTPs (45% of total WWTPs) 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. Therefore, the information was at least in part based on the understanding of the person that was being interviewed. Also, for the Equipment/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 (NPW, Back-up Power, Septage). Table 4-6 compares the average rating results of the facilities inspected by each category evaluated. In addition, the overall average rating of each evaluation criteria from 2010 through 2021 is also provided. Overall, the WWTP facilities were rated as borderline Adequate with an average score of 1.6. Ten (43%) of the facilities inspected were rated as Poor in the overall rating and 13 (57%) WWTPs were rated as Adequate in overall rating. However, seven of the 13 WWTPs rated as Adequate in the overall rating are in the lower end, close to being rated as Poor.

Table 4-5. WWTPs – Comparison of Average Inspection Results for 2010-2021

Criteria	2010	2012	2014	2015	2017	2019	2020	2021	Change 2020 vs. 2021
Regulatory Compliance	1.5[1]	1.4	1.5	1.8	2.3	1.3	1.7	1.3	-0.4

Criteria	2010	2012	2014	2015	2017	2019	2020	2021	Change 2020 vs. 2021
Operations/Process Control	2.3	2.4	2.3	2.0	1.9	1.8	1.7	1.9	0.2
Equipment/Maintenance	2.4	2.2	2.3	2.0	1.8	1.6	1.6	1.6	0.0
Staffing/Training	1.8	2.3	3.0	2.0	2.4	1.8	1.8	2.1	0.3
Overall Rating	**2.0**	**2.0**	**2.0**	**1.9**	**2.0**	**1.6**	**1.7**	**1.6**	**-0.1**

[1] One WWTP (Playa Santa) that discharged to a deep injection well was not evaluated under this criterion because it did not have an approved NPDES Permit.

Compared with the 2020 inspections results, the regulatory compliance scores decreased even though there were interim limits or monitoring only parameters due to waivers requested that did not negatively impact their compliance. On the other hand, Operations/Process Control and Staffing/Training scores increased while the Equipment/Maintenance criteria score remained the same as barely Adequate. The facilities' physical condition is the main concern, and we understand the situation is critical to warrant investments for improvement projects to all facilities. Furthermore, these will also help improve the compliance as several parameters' exceedances can be attributed to existing damage or ill-performing equipment.

The downward trend in the Equipment/Maintenance criterion could be attributed to projects not being executed or postponed in the last couple of years due to PRASA's financial situation, the 2017 Hurricanes, the 2020 earthquakes, and the COVID-19 pandemic. However, the CIP has finally started, and projects are being developed and executed. PRASA needs qualified personnel (particularly WWTP and STS operators) and other support staff but has not yet been able to fill in those vacancies. PRASA is striving to train its present and future staff, focusing on achieving greater job understanding, productivity, and ownership.

The WWTPs received an overall combined score of 1.3 in Regulatory Compliance, a Poor rating. The conditions 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 of the NPDES parameters have interim limits or are for monitoring only. Despite this, the results show that there were still exceedances. Of the 23 facilities that were inspected, six (26%) were rated as Unacceptable, and five (22%) received a Poor rating under the regulatory compliance criterion. The rest were rated as Adequate, except for Ponce RWWTP, San Sebastián (Old) WWTP, and Puerto Nuevo RWWTP, which were rated as Good. The facilities that were rated as Unacceptable/Poor in this criterion include: Utuado WWTP, Ciales WWTP, Barceloneta RWWTP, Dorado WWTP, Guayama RWWTP, and Isabela WWTP as Unacceptable; and Río Grande Estates WWTP, Caguas WWTP, Aguas Buenas WWTP, Aibonito WWTP, and San Sebastián (New) WWTP. In addition, five (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 suspended solids (TSS), TSS Concentration (monthly & Weekly), TSS Removal %, TSS Load, BOD Concentration (Monthly & Weekly), BOD Removal %, BOD Load, DO, and some ammonia (NH3) and residual chlorine. Although PRASA intends to address requirements stipulated under the USEPA Consent Decree to achieve compliance objectives, including new, more restrictive permit limits, and major improvements 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.

Operations/Process Control in most WWTPs inspected was rated as Adequate, with a 1.9 overall rating. Of the 23 facilities, one (4%) received an Unacceptable rating, and one (4%) received a Poor rating under this criterion. These facilities were: San Sebastián (Old) WWTP (Unacceptable) and Dorado WWTP (Poor). Process control continues to be a challenge in some of the facilities, even though the plant operators indicated that standard operating procedures and control strategies are being followed for the most part. Some of the most significant deficiencies encountered during the inspections revealed the following: lack or outdated versions of O&M manuals, equipment manuals, and ERPs; no calibration plan for chemical feed pumps; laboratory equipment or chemicals not adequate; not performing jar test; no control room; no additional security available; lack of NPW system; no potable water meters available; excess equipment debris and need of better grounds upkeeping; security fence, access road, and illumination need improvements; the presence of floating solids in effluent; and condition and overall appearance not adequate, among others. In addition, plants are still experiencing problems with process control of phosphorous, nitrogen, metals, and residual chlorine, among some parameters with interim limits. Another issue that may impact operations is that several WWTPs were only treating half or less of the plant's capacity. During 2020 and 2021, PRASA has provided new EGUs to facilities in need. All the facilities inspected this fiscal year had EGUs and automatic transfer switches. However, it was discovered that five WWTPs had solids or sediments in the effluent. Humacao RWWTP has substantial solids, while Caguas WWTP, Yabucoa WWTP, Dorado WWTP, and Guayama RWWTP had only traces of it. Lastly, Dorado WWTP, Arecibo RWWTP, and Puerto Nuevo RWWTP, located near residential or commercial areas, do not have proper odor control measures.

The WWTPs generally range from Poor to Adequate conditions, with the equipment condition being the primary driver under this criterion. The average overall rating for this criterion was 1.6, which is barely Adequate. Of the 23 facilities inspected, six facilities (26%) received a Poor rating under this criterion, and the remaining facilities were rated as Adequate. These facilities include: Dorado WWTP, Caguas WWTP, Aguas Buenas WWTP, Río Grande Estates WWTP, Yabucoa WWTP, and Isabela WWTP. Despite 17 (57%) of the facilities being rated as Adequate at the time of inspection, 15 (65%) 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. Some of the most significant deficiencies encountered during the inspections revealed the following: entire treatment units/process out of service; major process equipment was out of service, such as lift station pumps, treatment units pumps, blowers, valves, etc.; extreme level of corrosion and concrete deterioration presence; lack of redundancy on several processes' equipment; lack of grounds upkeeping and maintenance; corrective maintenance and procurement challenges; no as-builts drawings available; overall appearance not adequate, and among others. As with WTPs, several of these facilities have future projects planned (as funding allocation becomes available) to address the issues identified during the inspections. In addition, some of these plants are included in the CIP Program that started recently.

About the Staffing/Training criterion, out of the facilities inspected, three (13%) facilities were rated as Poor, eight (35%) as Good, and the remaining 52% received an Adequate rating in this category. The facilities rated as Poor: Bayamón RWWTP, San Sebastián (New) WWTP, and Isabela WWTP. It has certainly been evident that qualified operators have migrated to the mainland, as shown by the WWTP's lack of licensed operators to effectively cover the facilities operating hours, including vacations and absenteeism.

Besides licensed operators, the findings showed multiple vacancies in sludge dewatering operators, maintenance and housekeeping staff, and wastewater workers (TA, by its Spanish acronym). Although some facilities had non-licensed operators, most operators are licensed as required by USEPA. 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 of the 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. In addition, most WWTP staff had the required minimum training level; however, continuing education and training courses are needed.

In summary of overall rating, ten received a Poor overall rating, and 13 received an Adequate rating. Furthermore, 17 (74%) were rated below 2.0 in overall rating and, if unattended, could fall to a Poor or Unacceptable rating in the future. These 17 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.

Table 4-6. WWTPs – Lowest Rated Facilities and Observations

WWTP	2021 Score	Observations
Dorado (North Region)	1.0	During the evaluation period, the facility Compliance was rated as Unacceptable. There were significant exceedances in NPDES parameters of TSS and BOD. The WWTP operator cites deficiencies in process due to some damaged equipment and possible laboratory results and handling errors. Also, there was a bypass of the pretreatment process during the months of July and August 2020 due to a malfunction of the influent pumps. The facility has adequate process control laboratory equipment and procedures. All equipment manuals were lost during the 2017 Hurricane Maria flooding. There are some floating debris at the effluent. The facility Equipment/Maintenance was rated as Poor. The significant delays in repair and replacement of damaged equipment resulted in operational difficulties. Having the Rotating Biological Contactors (RBCs) train out of operation has the WWTP operating near its treatment capacity. Also, delays in completing the repairs of the Anaerobic/Aerobic Clarifiers train is reducing the WWTP treatment capacity even more. In addition, the delays in repair of the influent pump with Variable Frequency Drive (VFD) has caused an overflow in the grit removal system; however, overflow is contained. Staffing and training is acceptable to cover the facility's operating hours effectively.
Barceloneta (North Region)	1.1	During the evaluation period the facility Compliance was rated as Unacceptable. There were some exceedances of NPDES parameters in BOD, TSS and DO. These exceedances could be a result of major equipment being out of service, specifically the aeration blowers. The facility Operation/Process Control category was rated as Adequate. Sufficient sampling is performed for process control with good laboratory equipment and procedures. The EGUs were missing an operating transfer switch, but a short-term project is expected to address that issue. The facility Equipment/Maintenance category was rated as Adequate. However, the WWTP had only one mechanical bar screen operating, with significant degree of corrosion in chains; the grit removal system is out of service; all the high efficiency blowers are out of service, which also provide air to sludge holding tanks; the STS (thickeners and centrifuge) operating with no backup; and the NPW has three out of the four pumps out of service. Staffing and Training are reasonable for treatment operations and process control (laboratory).
Isabela (West Region)	1.1	During the evaluation period the facility Compliance was rated as Unacceptable. There were significant NPDES exceedances of BOD, TSS, DO, and Res Cl. These exceedances could be a result of both comminutors and degritters being out of service or for poor aeration in the treatment process. The facility Operations/Process Control category was rated as Adequate. The WWTP

WWTP	2021 Score	Observations
		operators perform the necessary sampling following the SOPs for adjustment in process. The EGU provides power for the entire plant. Standardized files were very organized. There was some lighting missing and the facility needs better housekeeping. There are some unsafe access areas, such as the chlorine storage building. The facility Equipment/Maintenance category was rated as Poor. The influent pit needs improvement for a higher flow capacity and better screening system. One of the comminutors and both grit removal system were out of service. It was observed that the biological reactors (BR) and the aerated digester tank were full of floating solids. Also, out of service were several of the floating aerators of the BR, the VFD control and three reactors. Corrosion was observed on the EGU and two secondary clarifiers. The SDBs are missing a roof. However, two projects under the CIP program will address some of the major issues. The training and staffing are not adequate. Need at least one licensed operator for effectively attending the facility's operating hours.
Río Grande Estates (East Region)	1.2	During the evaluation period the facility Compliance was rated as Poor. Many exceedances related to DO and BOD Concentration Weekly, five months of violations. Also, NPDES exceedances in TSS Removal, BOD Concentration Monthly and BOD Load Weekly. The facility Operations/Process Control category was rated as Adequate. The WWTP operators perform the necessary sampling to adjust the process. However, the O&M manual was not updated and the equipment manuals were not available. The chemical dosing modification determined and conducted by the operator's experience and sampling results. No odor control system or control room. Operator's office in the same room as the MCC, which is a safety hazard. Some pipes not colored adequately. No additional security. Deteriorated appearance. The facility has a brand-new EGU but the automatic transfer switch is out of service. The facility Equipment/Maintenance category was rated as Poor. Most of the major equipment has some type of issue. The pretreatment process is limited as there is no comminutor nor degritter, they were removed from the facility. The structures of most processes are in bad condition, with cracks, corrosion, and deteriorated concrete. The mixers at the stabilization tank are out of service as well as the mixers at both digesters. The clarifier's scrapper is unable to rake solids effectively since it is circular in a rectangular tank. Scum handling system, one pump for the Plant A is out of service. There is only one blower for air supply for all processes that require aeration and no back-up. The belt filter press is old and corroded and the SDBs are deteriorated. The safety shower for the disinfection system is located too far. The regional staff performs the routine maintenance at the WWTP. The physical appearance of the facility is poor and there are no as-built drawings on site. The staffing and training are adequate for this facility and its operating hours effectively. However, the operators do not have the certifications for maintenance data. Note that the facility has an assigned CIP project with a scope of work to close this WWTP and divert the flow to the Fajardo RWWTP.
Ciales (North Region)	1.2	During the evaluation period, the facility Compliance was rated as Unacceptable. There were significant exceedances in NPDES parameters of TSS and BOD. The exceedances could be due to the plant operating below its design capacity. The facility Operations/Process Control category was rated as Adequate. The staff performs sampling following SOPs. The adjustment for sludge dewatering polymer dosing are performed after sludge is processed, however, performing the tests prior to processing could improve the sludge quality. The facility's control room has the capability to view status of the process but not to control them. The facility processes are controlled locally at each equipment's outside controls. The facility Equipment/Maintenance category was rated as Adequate. Several pieces of equipment was out of service with replacement parts on site. The drum screen and diffusers are pending installation. The WWTP is currently hauling the sludge produced because the centrifuge is out of service and the SDBs have excessive vegetation (unusable) and no roof. The biological treatment system has uneven air

WWTP	2021 Score	Observations
		distribution and the mixing at the anoxic and degasification zones is not operating. The chlorine contact chamber needs maintenance. The staffing and training are considered acceptable to cover the facility operating hours effectively.
Caguas (East Region)	1.3	During the evaluation period the facility Compliance was rated as Unacceptable. There were continuous non-compliances of BOD, TSS, and P. The facility Operations/Process Control category was rated as Adequate. The operators perform the necessary sampling to make adjustment to the process and the laboratory equipment and calibration was good. However, the O&M manual was not updated; staff not performing Jar tests; some of the odor control units are out of service; and a significant amount of floating debris at the discharge point was observed. In addition, housekeeping needs attention for equipment and debris laying around green areas. The facility Equipment/Maintenance category was rated as Poor. Most of the major equipment for the primary and secondary treatment has some type of issues. Two of the three mechanical screens, the extractors, two conical degritter units, two primary clarifiers, one BNR unit and 18 mixers, two secondary clarifiers, and all tertiary filters are out of service. Also, one of the sludge holding tanks and the centrifuge are out of service. The aeration blowers of the BNR were under replacement. The facility is not using the septage receiving unit and two of the four NPW pumps are out of service. Upcoming CIP project will address some of the major issues. The training and staffing are adequate for this facility and its staffed during the operating hours.
Utuado (North Region)	1.3	During the evaluation period, the facility Compliance was rated as Unacceptable. There were significant exceedances in NPDES parameters of TSS, fecal Coliforms, P, Res Cl, total nitrates (TN), and BOD. Some of the exceedances could be due to more strict parameters regarding nutrients removal, and a lack of treatment optimization. The facility Operations/Process Control category was rated as Adequate. The O&M manual and SOPs were misplaced. The access to the site is not in good conditions. The facility Equipment/Maintenance category was rated as Adequate. Most equipment in good condition, but more maintenance should be performed regarding vegetation in motors (i.e., SBR tanks), cleaning of algae in structures and bird droppings inside filter press building. The staffing and training are considered adequate to cover the facility operating hours effectively. Note that the facility operator assigned to the inspection was recently hired and had limited knowledge of the plant's equipment and operation.
Guayama (South Region)	1.3	During the evaluation period the Compliance was rated as Unacceptable. The WWTP had significant NPDES exceedances on TSS and DO. The facility Operations/Process Control category was rated as Adequate. The operators perform the necessary sampling following SOP's for adjustment to process. The EGU provides power to the entire plant. However, the O&M manual was not updated and facility lacks a control room, everything is controlled manually. The facility Equipment/Maintenance was rated as Adequate. However, the equipment was below a score of 2.0 as several equipment is not operating. The equipment out of service is one mechanical bar screen; two lift pumps; two sump pump from the degritter system; one primary clarifier; one biofilter; one secondary clarifier; one NPW pump; one septage screening system; and one anaerobic digester. The WWTP needs significant repairs. Staff needs confined spaces and continuing training and the facility needs one guard for the safety security of the plant. An upcoming CIP project will address some of the major issues.
Aguas Buenas (East Region)	1.4	During the evaluation period the facility Compliance was rated as Poor. It had several NPDES exceedances in TSS and BOD, and one violation in P. The facility Operations/Process Control category was rated as Adequate. The operator performs the necessary sampling to adjust the process. However, the O&M manual and ERP are not updated and the equipment manuals are incomplete. Also, staff is not performing jar tests. The lab location is not adequate, needs

WWTP	2021 Score	Observations
		relocation and the chemicals storage needs a door. The WWTP lacks a potable water meter and has no additional security. In addition, the access road needs improvement, and the facility needs general maintenance and repairs to the fence and lighting. The facility Equipment/Maintenance category was rated as Poor. Note that half of the facility is out of service (Package Plant A). The Pretreatment area shows structural cracks and deterioration. The dosing pumps for coagulation at clarifier do not have redundancy and the dechlorination chemical storage is not adequate (need roof). The EGU's fuel storage has with corrosion. Also, the effluent area of discharge needs maintenance and there is corrosion on the NPW system. The overall physical appearance is not adequate. Facility has an assigned CIP project that could address most of the major issues. training is adequate for this facility. Staff needs at least an additional license operator to operate efficiently.
San Sebastián (New) (West Region)	1.4	During the evaluation period the facility Compliance was rated as Poor. Many NPDES exceedances related to TSS Removal (7 months of violations). Also, exceedances in BOD Removal, BOD Load Monthly, BOD Load Weekly, BOD Concentration Monthly, and BOD Concentration Weekly. The facility Operations/Process Control was rated as Adequate. The operators perform the necessary sampling following SOPs for adjustment to process. However, the O&M manual was not updated, the emergency numbers were not posted, there is no calibration plan for chemical feed pumps, there is no NPW system, no odor control system, and no additional security in the WWTP. Also, poor interior and exterior lighting. The facility has an adequate EGU that provides capacity of the entire plant. The facility physical appearance a bit deteriorated. Lastly, facility located in flood zone. The facility Equipment/Maintenance category was rated as Adequate. Most of the major equipment has some type of issue. The primary and secondary clarifier were working as holding tanks due to problems with pipelines of sludge and scum distribution; green grime floating in tanks. There were several pieces of equipment out of service like one lift pump, one primary clarifiers its scum collector; the scrappers (#2) and (#3) for the primary and secondary clarifiers; two scum collector and one Waste Activated Sludge (WAS) pump at the secondary clarifiers; one digester tank; the exhaust fans at the disinfection building; and the EGU's fuel day tank. In addition, the structures for the trickling filter (primary bio-filters and secondary bio-filters) need re-coating and the inlet valves and pipes are corroded. The regional staff performs routine maintenance at the WWTP. The facility does not have a computerized maintenance management system. The facility does not have as-built drawings available. The staffing and training were deficient. The staff needs at least two licensed operators to cover the facility operating hours effectively. Also, the operators do not have the certifications for HAZWOPER and OSHA. The facility has a CIP assigned.
Yabucoa (East Region)	1.5	The facility Compliance was rated as Adequate. There were some NPDES exceedances of TSS, DO and P. These exceedances could be due to the state of the equipment, specifically screening & pretreatment system. The Operations/Process Control category was rated as Adequate. The facility has limited laboratory area to conduct the process control parameters; however, the samples are taken to the Humacao WWTP laboratory. The package plant weirs had a trace of solids at the discharge. The facility lacks a EGU but is currently using a temporary one. The facility has a deteriorated physical appearance and needs significant housekeeping. The facility Equipment/Maintenance was rated as Poor. The facility needs to improve its pretreatment, as the screens, one lift pump, comminutors and degritters are out of service. The influent building structure needs rehabilitation due to cracks and deteriorated appearance. Other structures are affected as well and need maintenance. Also, the dry pit ventilation needs improvement. The Old plant not in use at site should be demolished and removed, as well as the abandoned equipment. The overall physical appearance of the facility is poor. Training is adequate for the operation of

WWTP	2021 Score	Observations
		this facility and its operating hours. Staff needs at least one supervisor and one Licensed Operator to effectively cover the facility's operating hours.
Aibonito (East Region)	1.6	During the period of the evaluation, the Compliance was rated as Poor. There were significant non-compliance in Res Cl and Total Nitrogen. The Operation/Process Control category was rated as Adequate. However, the O&M manual was not updated and the general safety was not adequate due to the corrosion located in the biofilters stairs. The Equipment/Maintenance category was rated as Adequate. However, the degritter system is deteriorated with corrosion and leaks, and one of the primary clarifier has a leak in the transmission. Also, a secondary clarifier unit, the tertiary treatment system, one lift pump, one clarifier transfer pump, one belt filter press, and one NPW pump were out of service. According to the supervisor, there were some problems with the digester Floating Aerators. The training was adequate. The WWTP staff needs at least one more Operator and two TA to cover shifts.
San Sebastián (Old) (West Region)	1.7	During the evaluation period the facility Compliance was rated as Good. However, there was an exceedance related to Res Cl. The WWTP currently operates at overcapacity until diverting the flow to the San Sebastián New WWTP. The facility Operations/Process Control category was rated as Unacceptable. The O&M manual was not updated and the equipment manuals, SOPs, SDS, and chemicals storage were not available. The emergency numbers were not posted and there is no calibration plan for chemical feed pumps. The is no odor control system, no control room no additional security and access road needs improvement. Also, some of the perimeter fence sections are damaged, facility has inadequate lighting, the entrance gate motor operates manually only, there is no internet and the two EGUs on site are not installed or operating. Staff reports frequent break-ins from nearby housing project. The equipment aspect of the Equipment/Maintenance category was rated as borderline Adequate. One lift pump, the effluent autosampler and the package plant scum handling system are out of service. The chlorine building exhaust fan needs improvement and its missing the windsock. The facility has some roof leaks. The area around the discharge needs maintenance (safety hazard). The regional staff performs routine maintenance at the WWTP. The facility does not have a computerized maintenance management system. The physical appearance of the facility is not adequate. The facility does not have as-built drawings available. The facility has an assigned CIP project. The training is adequate for this facility and its operating hours effectively, but the operators do not have the certifications for HAZWOPER and OSHA. Staff needs at least a TA to handle chlorine secure and one more licensed operator.
Toa Alta (North Region)	1.8	During the evaluation period the facility Compliance was rated as Adequate. There was one NPDES exceedance in BOD percentage removal and two in DO and TSS removal. The facility Operations/Process Control was rated as Adequate. The operators perform the necessary sampling, following SOP's for adjustment in the process. Currently, the plant operates at a quarter of the design capacity, which creates problems for equipment maintenance and operations. The O&M manual was not updated, and the facility lacks internet. The WWTP has adequate EGU that covers the entire plant. The facility Equipment/Maintenance category was rated as Adequate. Much equipment in acceptable to good condition. However, the degritter system was out of service, but currently under repair. The SDBs are being used for placing geotubes. The facility training is adequate. Staff needs at least an additional licensed operator to operate efficiently.
Maunabo (South Region)	1.8	During the evaluation period the facility Compliance was rated as Adequate. There was one exceedance of TSS. According to the manager, during this period there were several equipment out of service or were operating with problems such as the STM. The facility Operations/Process Control category was rated as Adequate. The operators perform the necessary sampling to adjust

WWTP	2021 Score	Observations
		the process. The EGU has the capacity for entire plant. However, there is no security available in the facility and perimeter fence is damaged and needs repairs. The facility operates below half of design capacity, which could create process control or operational issues. The facility Equipment/Maintenance category was rated as Adequate. There are major pieces of equipment out of service or operating in bad condition such as one STM unit, one secondary clarifier, one disk filters, the BFP unit and the screened compactor from the septage receiving system. The staffing and training are adequate for the operation of this facility and its operating hours. The facility has an assigned CIP project that could address some of the major issues.
Bayamón (Metro Region)	1.9	The facility Compliance was rated as Adequate. However, there were two violations in BOD (% Removal and Concentration) and one in Res Cl. The facility Operations/Process Control category was rated as Adequate. The operators perform the necessary sampling, following SOP's for adjustment to process. The EGUs have the capacity to operate entire plant, however one EGU is not working properly. Also, the access roads, fence (including gate), and lighting need improvements The facility Equipment/Maintenance was rated as Adequate. However, one lift pump, one blower, one degritter unit and two primary clarifiers unit are out of service, the influent wet pit needs to be repaired and there is one mechanical screen with a damaged drive. Also, the following deficiencies were observed: the primary clarifiers concrete structure has cracks; the traveling bridges in primary clarifiers are heavily corroded; heavy corrosion on pipelines; and the effluent PS has cracks on concrete structure and its control panel is in bad condition. The training is poor for this facility operation. Staff needs at least four licensed operator and a TA for effectively attending the facility's operating hours.
Arecibo (North Region)	1.9	During the evaluation period, the facility Compliance was rated as Adequate. It had major NPDES exceedances of fecal coliforms. The fecal coliform violations have been observed in previous inspections. The facility Operations/Process Control category was rated as Adequate. The operators perform the necessary sampling following SOP's for adjustment to process. The WWTP has emergency power for entire plant. However, equipment manuals are not available, there is no calibration plan for chemical feed pumps and facility lacks an odor control system. The facility Equipment/Maintenance category was rated as Adequate. Several pieces of equipment were found to be in poor conditions or out of service. One of the three influent pumps, the degritter system and one sludge pump are out of service. The primary clarifier underground structure and the influent building structure have exposed rebars and damaged concrete and spalling. Most building concrete structures are deteriorated and pipelines in every unit are heavily corroded. The septic tank is damaged; when septage is receive it is connected directly to the thickeners. The facility has corrective maintenance and procurement process challenges due to extended delays and funding. The facility does not have as-built drawings available. The training is adequate, and the staff is reasonable for this facility and its operating hours. The facility has an assigned CIP project.

4.2.2.3 Wells

PRASA has reported that it owns and operates 249 water wells[9], 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 16 wells (equivalent to 6% of total wells) from the Operational Areas of Toa Alta, Manatí, Caguas, Fajardo, Ponce, Yauco, and San Germán were inspected in

[9] Source: PRASA Geographical Information System (GIS), updated June 2021.

FY2021. Since the Metro Operational Areas visited (San Juan and Guaynabo) did not have wells, Arcadis inspected additional wells at other Operational Areas. Likewise, Arcadis did not inspect wells in the Mayagüez Operational Area and instead inspected four wells in the San Germán Operational Area. Each assessment consisted of a site visit inspection and an interview with the designated personnel. The results of the evaluation of those wells are described below. 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/Process Control/Equipment) criterion was assigned a weighting factor of 75%, while the regional-specific (Maintenance/Training/Staffing) criterion was 25%.

The inspection results for previous years were compared to the inspection results from the 2021 inspection to analyze condition changes. Table 4-8 compares the average overall rating from 2014 through 2021 of the wells inspected for the combined Equipment/Operations/Process Control criterion. This merged criterion was performed using the same deductions and weighted score as previous asset condition assessment reports. As shown in Table 4-8, all categories evaluated yielded a borderline Adequate average result, which remained the same as the 2020 results. Maguayo 2, from the Toa Alta Operational Area; Arjona, from the Ponce Operational Area; and Pugnado 1 and Pugnado 2, from the Manatí Operational Area, wells were found in Poor condition.

Table 4-7. Wells – Comparison of Average Rating Results for 2014-2021

Criteria	2014	2015	2017	2018	2019	2020	2021	Change 2021 vs. 2020
Overall Rating	2.2	1.9	1.8	1.7	1.9	1.6	1.6	0.0

In general, the facility-specific deficiencies noted were partly due to deterioration in equipment conditions. For example, according to the inspection performed for the wells selected, 69% of the wells are not remotely monitored; 38% of the wells have corroded pipelines, valves, and fittings; 44% of the wells were not sealed with a vent screen; 31% of the wells do not have waste line properly color-coded; 19% of the wells have leaks, and 63% of the inspected wells do not have an EGU.

The observed deficiencies in terms of the Regional evaluations for Caguas, Ponce, Toa Alta, and Manatí Operational Areas for potable water systems, which were rated as Poor, were the following:

- Unavailability of as-built drawings
- Insufficient staff
- Inadequate maintenance parts inventory
- Lack of training

The Fajardo and San Germán Operational Areas were rated as adequate with fewer deficiencies. However, in the Yauco Operational Area, one deficiency was observed, lack of training.

The average overall rating of the evaluated wells was borderline adequate and, if unattended, could fall to a Poor or Unacceptable rating in the future. As much as 31% of the wells inspected were rated as Poor or Unacceptable in the facility criteria, and deterioration has been observed through the years. The regional evaluation average overall rating was Adequate. PRASA should look into mitigation initiatives to address some of the deficiencies

cited herein. For the time being, these wells are expected to continue to serve their intended function of supplemental water supply. One of the main concerns is the lack of backup power at most of the wells inspected. This lack of backup power compromises the quality of service to PRASA's clients, making the potable water supply intermittent during electrical power problems. Also, corrosion was a repeated observation in several wells.

Most of the deficiencies noted can be addressed through PRASA's R&R program and may not require major capital improvements. However, the financing of PRASA's R&R program has also been negatively affected by PRASA's fiscal situation. In terms of operational deficiencies, the lack of remote monitoring of 69% of the wells evaluated in this year's assessment is a concern since the quality of the product (safe potable water) may be compromised.

PRASA expects to begin addressing some of the issues with the recently started activities of the CIP and with ongoing efforts in the R&R program as funding becomes available.

Future regulatory requirements may require either implementing significant capital improvements to include and achieve additional treatment capabilities at wells or the closure of certain wells. The latter will be based upon the Microscopic Particulate Analysis (MPA) sampling results of wells. PRASA Groundwater Under Direct Influence (GWUDI) program of MPA sampling is currently on hold until the inactive or out-of-service wells become available (active) for sampling. The GWUDI evaluations could prove beneficial to identify additional needs in these facilities. For additional information regarding the GWUDI program, please refer to the Compliance Department summary in Section 5 of this report.

4.2.2.4 Water Pump Stations

PRASA has reported that it owns and operates 1,060 WPSs and an additional 70 RWPs . 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 (these are not inspected). PRASA's WPSs vary in pumping capability from less than 100 gpm to over 9,000 gpm. A total of 30 above-ground WPSs (3% of total WPSs) were inspected. Each assessment consisted of a site inspection and an interview with the designated personnel. The results of the evaluations of those stations are described below. Similar to wells, the facilities were evaluated using facility-specific and regional-specific criteria to better understand the facility's conditions and obtain an overview of the Regions Operational Areas. The facility-specific criterion considers operations, process control, and equipment aspects related to a particular facility. The other criterion considers maintenance aspects, which are carried out either 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.

The average WPSs overall rating is Adequate, with a score of 1.6. 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 WPSs. One (3%) facility, Los Tamarindos (East Region, Caguas), was rated Unacceptable. Furthermore, 12 (40%) facilities were rated as Poor under this category, which include: Buena Vista Carrion 2da Etapa, Buena Vista 3era Etapa, and Cuesta del Tigre, all from the Fajardo Operational Area (East Region); Fullana, El Coquí, and Campamento, all from the Manatí Operational Area (North Region); Relevo Villa Paraíso y La Yuca and El Monte, both from the Ponce Operational Area (South Region); Monte Real and Parcelas Lavadero; both from the San Germán Operational Area (West Region); Booster San Juan (Metro Region, San Juan); and Palmarito (North Region, Toa Alta). Note that 13 WPSs were rated as Unacceptable or Poor in the overall rating, and ten facilities 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 were rated as Poor, Adequate, and Good.

The inspection results for previous years were compared to the inspection results from the 2021 inspection to analyze performance changes since the previous inspections. Table 4-9 compares the average overall rating from 2014 through 2021 of the facilities inspected for the combined Equipment/Operations/Process Control criterion.

Table 4-8. WPSs – Comparison of Average Rating Results for 2014-2021

Criteria	2014	2015	2017	2018	2019	2020	2021	Change 2021 vs. 2020
Overall Rating	2.2	2.2	2.3	1.7	1.7	1.2	1.6	0.4

As demonstrated in the above table, the overall rating significantly increased by 0.4 to an Adequate condition compared to the 2020 results (poor condition), which continues the improvement trend as capital investments or R&R investments have been implemented in the last few years.

Several factors contributed to 43% of the WPSs being generally observed in Poor or Unacceptable condition. According to the inspections performed, some of the most notable deficiencies include the following: 30% of the facilities were observed to have leakage with severity ranging from minor to severe; 27% of the facilities were observed to have corrosion ranging from minor to severe; 60% of the facilities visited did not have an EGU, or it was out of service; 30% of facilities visited had at least one pump out of service; 53% of the facilities visited lacked remote monitoring; 80% of the facilities visited did not have a flow meter; 50% of the facilities visited did not have a low-pressure suction alarm/pump shut-off on the control panel; 33% of the facilities visited lacked pump's elapsed time meters; 13% of the facilities visited had a control panel not labeled adequately; 30% of the facilities inspected had a fence or gate that is not adequate; 60% of the facilities visited had inadequate interior and/or exterior lighting, and 18% of the facilities visited had an unsatisfactory physical appearance.

The observed deficiencies in terms of the Regional evaluations for Caguas, Ponce, Toa Alta, and Manatí Operational Areas for potable water systems, which were rated as Poor, were the following:

- Unavailability of as-built drawings
- Insufficient staff
- Maintenance parts inventory inadequate
- Lack of training

The Fajardo and San Germán Operational Areas were rated as Adequate with fewer deficiencies. However, in Yauco Operational Area, one deficiency was observed, the lack of training.

The WPSs overall rating increased significantly to borderline Adequate (1.6), which is an increase of 0.4 compared to the 2020 results. However, they are still rated close to the Poor range. Note that 13 facilities (43% of the evaluated facilities) were rated as Unacceptable or Poor. Regardless, they are expected to continue to serve their intended function of delivering drinking water throughout the distribution systems. However, the intended function could be impacted if improvements are not performed soon. The deficiencies noted are related to the lack of features to optimize O&M practices and the condition of facilities' equipment. The most significant deficiencies observed at the facilities were pumps out of service, the lack of an operating EGU, leaks ranging from minor to severe, corrosion ranging from minor to severe, the lack of flow meters, the lack of remote monitoring, inadequate

interior and/or exterior lighting, the lack of low-pressure suction alarm/pump shut-off on the control panels, lack of pump's elapsed time meters, fence or gate not adequate, and unsatisfactory physical appearance. Other noted deficiencies, such as control panel not being labeled adequately, leaks, and overgrown vegetation, can be addressed through routine maintenance or PRASA's R&R program and do not require major capital improvements.

4.2.2.5 Wastewater Pump Stations

PRASA has reported that it owns and operates 846 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 (2% of total WWPSs) were inspected in FY2021. 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 results of the assessments of those stations are described below.

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 other criterion considers maintenance aspects, which are carried out either 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/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, three (15%) received an overall rating of Good, eight (40%) received an overall rating of Adequate, nine (45%) received an overall rating of Poor, and none was rated Unacceptable. The facilites rated as Poor included: Concordia (Boca Morena) (West Region, Mayagüez), Los Árboles (East Region, Fajardo), Arenales (North Region, Toa Alta), Ciudad Señorial (Metro Region, San Juan), Altos de la Fuente (East Region, Caguas), Villas de Río Grande (East Region, Fajardo), Laderas de San Juan (Metro Region, Guaynabo), Monte Elena (North Region, Toa Alta), and Santa Elena II (Metro Region, Guaynabo).

In addition to the facilities rated as Poor, four WWPSs (equivalent to 25% of WWPS inspected) rated as Adequate in the facility criterion received a rating below 2.0 and, if left unattended, their condition could deteriorate, downgrading their rating to Poor or Unacceptable in the future. These facilities were: General Electric (East Region, Caguas), Santurce (West Region, Mayagüez), and Perla del Sur and Villa Grillasca, both from the Ponce Operational Area (South Region).

The inspection results for previous years were compared to the inspection results from this round of inspections to analyze performance changes. Table 4-10 compares the average overall rating for 2014 through 2021 of the facilities by each category evaluated which considers each evaluation criteria.

Table 4-9. WWPSs – Comparison of Average Rating Results for 2014-2021

Criteria	2014	2015	2017	2018	2019	2020	2021	Change 2021 vs. 2020
Overall Ratings	2.3	2.4	1.8	1.8	1.9	1.7	1.7	0.0

As shown in Table 4-10, the overall rating remained the same, in the lower range of Adequate when compared to the 2020 results. There has not been a significant improvement which can mostly be attributed to the lack of funding in improvement works the last few years due to the ongoing financial situation.

In general, some of the most significant, facility-specific deficiencies encountered during the inspections revealed the following:

- 80% of the facilities inspected were not remotely monitored;
- 65% of the facilities inspected had their exhaust fans out of service, missing, or operating in manual mode;
- 55% of the facilities inspected lack exterior or interior audible alarm;
- 45% of the facilities inspected had recorded overflows during the evaluation period;
- 40% of the facilities inspected had inadequate exterior or interior lighting;
- 40% of the facilities inspected had floating solids or debris in the pumps pit;
- 30% of the facilities inspected lack crane rails and cranes;
- 20% of the facilities inspected had signs of corrosion on pump, piping, valves, or fittings; and
- 15% of the facilities inspected had bar screens not properly cleaned.

PRASA expects to begin addressing some of the issues with the reactivation of the CIP and with ongoing efforts in the R&R program.

The common deficiencies observed in terms of the Regional evaluations for Guaynabo, Ponce, Toa Alta, and Manatí Operational Areas for wastewater systems, which were rated as Poor, were the following:

- Challenges in the parts procurement process are very slow
- Maintenance parts inventory inadequate
- Unavailability of as-built drawings
- Inadequate training
- Insufficient staff

As for the Toa Alta Operational Area, which was rated in the lower end of poor (0.7) has exhibited more deficiencies than the other areas, such as no schedule for outstanding work orders and no corrective or preventive maintenance. The other operational areas evaluated, San Juan, Fajardo, Mayagüez, and San Germán, were rated as Adequate and had some of the previously mentioned deficiencies. Conversely, the Caguas and Yauco Operational Areas were rated as Good and experienced fewer deficiencies than the other areas.

Overall, the WWPSs are in Adequate to Poor condition. The facilities inspected remained the same as barely Adequate in overall average rating compared to FY2020. It is mostly a result of the lack of finding in the last few years due to the ongoing financial situation. While only 45% of the inspected facilities had recorded overflows during this evaluation period, it is still a concern. PRASA has provided all WWPSs with EGUs. Also, 85% of the facilities inspected are not remotely monitored, 55% do not have an exterior alarm, and 10% had pumps out of service, among other issues. Having remote monitoring will help PRASA prevent overflows in the system. In addition, adding a comminutor (grinder type) to those facilities that receive vast amounts of solids would help maintain the pump entryway clear of debris. PRASA’s Operational Regions continue their effort with IMP to install telemetry at all facilities to enable monitoring from the ROCs. However, they are addressing the WSTs and WPSs first, thus the WWPS are lagging.

4.2.2.6 Water Storage Tanks

PRASA owns and operates 1,557 WSTs[10] that vary in storage capacity (size) from 100 to 10,000,000 gallons. A total of 34 WSTs (2% of total tanks) were inspected in FY2021. Each assessment consisted of a site inspection and an interview with the designated personnel. The results of the evaluations of those sites are described below. Table 6-1 summarizes the two evaluation categories and corresponding weighting factors used to assess WSTs. The facilities were evaluated using facility-specific and regional-specific criteria to better understand the facility's conditions and obtain an overview of the Regions Operational Areas. The facility-specific criterion considers operations, process control, and equipment aspects related to a specific facility. The other criterion considers maintenance aspects, which are carried out either 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 34 WSTs inspected, three (9%) received a Good, 19 (56%) were rated as Adequate, 10 (29%) were rated as Poor and two (6%) were rated as Unacceptable under the overall rating criteria. The facilities that were rated as Unacceptable and Poor in this criterion include: La Casona (North Region, Manatí) and Colinas de Luquillo (East Region, Fajardo) as Unacceptable; and Cupey (Metro Region, San Juan), Hoya Fría 2 (North Region, Toa Alta), Buena Vista Carrion 2da Etapa (East Region, Fajardo), Glenview (South Region, Ponce), Hacienda Margarita (East Region, Fajardo), Hato Viejo 2da Etapa (East Region, Fajardo), Millón de Dorado (North Region, Toa Alta), Higuillar (North Region, Toa Alta), and Cuesta del Tigre (East Region, Fajardo) as Poor. Note that the average overall rating was in the lower end of the Adequate range (1.7) and, if left unattended, can fall into the Poor range. Also, in contrast with previous assessments, the overall regional evaluation of Operational Areas was rated as Poor. As previously stated, the facility-specific criterion accounts for 75% of the weighted factor. Emphasizing the facility-specific criterion, the WSTs rating distribution for this evaluation is as follows: two (6%) WSTs were rated as Unacceptable, ten (29%) were rated as Poor, 15 (44%) were rated as Adequate, and seven (21%) were rated as Good.

The inspection results for previous years were compared to the inspection results from the 2021 inspection to analyze performance changes since the previous inspections. The overall rating was in the borderline Adequate range, with an overall rating of 1.7. Table 4-11 compares the average overall rating of the facilities using each category evaluated criteria for 2014 through 2021.

Table 4-10. WSTs – Comparison of Average Rating Results for 2014-2021

Criteria	2014	2015	2017	2018	2019	2020	2021	Change 2021 vs. 2020
Overall Ratings	2.4	2.3	2.4	1.9	1.9	1.9	1.7	-0.2

On average, the overall rating decreased by 0.2 compared to the 2020 results. The overall average rating is borderline Adequate and considering that WSTs do not have that much equipment and do not deteriorate at the same rate as wells or WPSs, it is concerning that recently Arcadis has observed more overflow issues, signs of corrosion in the pipeline, air vents, or float valves than in previous years. Also, concrete deterioration was observed even though this occurs at a slower rate, which could mean WSTs need maintenance or improvements. Ten (29%) of the 19 WSTs inspected rated as Adequate in overall rating received a score below a 2.0 in the facility criterion and, if left unattended, their condition could deteriorate, downgrading their rating to Poor or

[10] Source: PRASA Geographical Information System (GIS), updated June 2021.

Unacceptable in the future. These facilities are San Lorenzo Urbano and Beatriz 3ra Etapa WSTs (East Region, Caguas), Fullana and Campamento WSTs (North Region, Manatí), Relevo Villa Paraíso & La Yuca and El Monte Elevado WSTs (South Region, Ponce), Parcelas de Lavadero WST (West Region, San Germán), Venezuela (Gueracal) WST (Metro Region, San Juan), Palmarito (North Region, Toa Alta), and Monte Pelao (South Region, Yauco).

In general, some of the most significant deficiencies encountered during the inspections revealed the following:

- 85% of the tanks inspected had inadequate exterior or interior lighting;
- 68% of the tanks inspected have an unsatisfactory physical appearance;
- 47% of the tanks inspected are not visited daily;
- 44% of the tanks inspected had corrosion on the pipeline, air vents, or float valves;
- 44% of the tanks inspected did not have emergency numbers posted;
- 41% of the tanks inspected do not have a high/low-level alarm;
- 32% of the tanks inspected do not have adequate fences or gate;
- 29% of the tanks inspected have deteriorated concrete walls, with cracks ranging from minor, moderate, and severe degree; and have roof surface defects;
- 29% of the tanks inspected do not have an adequate overflow with protection measures;
- 24% of the tanks inspected did not have a local level indicator;
- 21% of the tanks do not have adequate insect screens;
- 18% of the tanks inspected do not have an adequate area around the tank for accessibility; and
- 18% of the tanks inspected do not have adequate doors and windows locks.

Even though not all tanks are visited daily, PRASA stated that all tanks comply with the Tank Monitoring Program established in the 2006 PRDOH Settlement Agreement, as amended.

The observed deficiencies in the Regional evaluations are the same as described in the WPS section for potable water systems.

As illustrated by the results, the WSTs are showing more deterioration and have continued to fall to barely Adequate condition (1.7 overall rating); however, they are expected to continue to serve their intended function of providing potable water storage throughout the distribution systems. The most significant deficiencies observed were deteriorated concrete walls, minor/moderate/severe cracks, overflows, unsatisfactory physical appearance, tanks not visited daily, corrosion along the pipelines, air vents or float valves, roof surface defects, lack of local level indicator, lack of high/low-level alarm, poor exterior or interior lighting, emergency numbers not posted, inadequate fenced or gate, missing insect screen, lack of access around the tank, and missing doors and windows locks. These deficiencies may not require significant capital upgrades, but rather a modification to O&M practices (e.g., removal of overgrown vegetation and periodic tank internal inspections) or can be addressed through PRASA's R&R program (e.g., repairs to tank hatches, vents, level alarms, and security fences). Deficiencies that could require capital upgrades, such as tank refurbishing, deteriorated concrete, and significant cracks through walls, were observed in 29% of the inspected tanks. Note that PRASA has included in their CIP, which recently started activities, several projects to address WSTs. Also, it is important to follow up the concern with the structural integrity of the Glenview WST.

In addition, remote monitoring is recommended as an optimization measure and as a preventative measure against water losses in the distribution system. PRASA had started this initiative by providing remote monitoring to those tanks that have been identified as critical in the distribution system. Even though PRASA's Operational Regions are at different stages of the WSTs optimization measures implementation, specifically visualization, all have established goals to achieve it and will continue implementation until reaching visualization of 100%.

4.3 Buried Infrastructure

Although buried infrastructure (i.e., water meters, water mains and distribution pipes, buried valves, sewer trunks and collection pipes, and manholes) was not inspected, the following sections discuss indirect indicators of the condition of the buried infrastructure. Since FY2005, PRASA has invested in developing and updating its Geographical 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. Meter replacements are programmed and managed through PRASA's Non-Revenue Water (NRW) Reduction Program.

4.3.1 Water Meters

PRASA owns approximately 1.4 million water meters ranging from 5/8 to 12 inches in diameter. PRASA has continued its meter replacement initiative under the Revenue Optimization Program. As reported by PRASA, about 771,866 small meters (1-inch in diameter or less) and over 5,576 large meters (greater than 1-inch in diameter) were replaced between FY2009-FY2021. However, due to PRASA's fiscal situation, the initiatives included in the Revenue Optimization Program have been slowed down, and meter replacements are proceeding conservatively. As a result, about 33,866 small meters and 76 large meters were replaced during FY2021. These replacements were mainly due to maintenance, theft, or special client requests.

PRASA is currently focusing its efforts on planning and implementing the 2021 PRASA Fiscal Plan. As part of PRASA's Fiscal Plan, one of the main initiatives is 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.

4.3.2 Water Distribution System

Based on PRASA's GIS updated in June 2021, PRASA owns over 15,160 miles of water pipelines, including transmission and distribution pipes with sizes 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 unbilled 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 poor water service, firefighter usage, etc.

Table 4-12 summarizes key water distribution system metrics since FY2012, including current levels of water production, water losses, and NRW, as reported by PRASA. PRASA's NRW levels have been consistently declining except recently, from FY2018 thru 2021, where there were increases due to the continuous fiscal situation.

Table 4-11. Water Losses and Non-Revenue Water

Fiscal Year	Total Water Production (MGD)[1]	Water Losses	Non-Revenue Water
		(MGD)	(MGD)
FY2012	647	381	399
FY2013	617	354	363
FY2014	598	343	351
FY2015	557	299	307
FY2016	508	291	298
FY2017	507	293	299
FY2018	507	308	314
FY2019	542	342	349
FY2020	541	352	359
FY2021	551	356	368
Difference FY2021-2020	**10**	**4**	**9**
Cumulative Difference FY2012-2020	**-96**	**-25**	**-31**

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

As shown in Table 4-12, from FY2012 to FY2021, PRASA reports to have reduced the amount (volume) of water produced (96 MGD reduction), amount of water losses (25 MGD reduction), and NRW (31 MGD reduction). In FY2021, of the total 551 MGD produced, approximately 368 MGD was NRW, a slight increase in NRW over FY2020 results (359 MGD). Of this amount of NRW, 356 MGD was due to water losses (both apparent and real), and 12 MGD was due to unbilled authorized consumption. Of the total water losses in FY2021, approximately 44 MGD was due to apparent (commercial) losses, while approximately 312 MGD was due to real (physical) losses. According to the FY2021 Fiscal Plan, PRASA's goal is to reduce water losses by 52 MGD by FY2026 by successfully implementing the Water Recovery Office (WRO) three main programs: Master Meters[11], Pressure Management[12] and Leaks Detection and Reduction[13].

Following the industry's recommended NRW data analysis and reporting, PRASA reports NRW in terms of volume reduced in its annual water audits and no longer as a percentage of the water production. The American Water Works Association (AWWA) recommends not to use NRW as a percentage of water production as a

[11] Master Meters: accurately measuring water production by the installation of water meters at critical facilities.
[12] Pressure Management: incorporating pressure management best practices across the transmission and distribution network.
[13] Leaks Detection and Reduction: improving identification, prioritization, and resolution of major leaks across PRASA assets.

performance indicator of NRW efforts because this method may show confusing and misleading results. NRW as a percentage of water production does not necessarily represent NRW performance efforts.

Since FY2012, PRASA began measuring the Infrastructure Leakage Index (ILI), an indicator used to measure the level of physical losses in the water distribution system. The ILI is defined as the current annual real losses divided by the unavoidable annual real losses. The unavoidable annual real losses represent the lowest technically achievable annual real losses for a well-maintained, well-managed system and are the likely lower bound on water losses. As a performance indicator, the ILI represents a measure of the combined performance of three infrastructure management methods for real losses: the speed and quality of repairs, active leakage control, and asset management. Factors that affect the ILI include the pipe age and material, customer density, and system pressure. The ILI was introduced in 2000[14] and is also defined and calculated in AWWA's M36 Water Audits and Loss Controls manual. An ILI between 1 and 3 is considered excellent. U.S. utilities with combined operations currently measuring the ILI for their systems reported values ranging from 1.16 to 3.08, with a median of 2.07[15]. Globally, systems in developed countries report lower values of 5, while in developing countries, values range from 10 up to about 50. Since FY2013, PRASA's ILI has reduced by about 43% until the reported value of 10.19 in FY2018, which slightly increased to 12.16 in FY2019 and decreased to 11.31 in FY2020. In FY2021, PRASA reported an ILI of 12.82, which constitutes an increase of 13% from FY2020.

PRASA calculates these AWWA indicators (ILI and volume of commercial and physical losses per connections per day) as part of the annual water audit process. However, PRASA indicated that a high amount of estimation takes place to do so, which may affect the validity of the results. Therefore, PRASA's NRW team is redefining the NRW goals and metrics and developing new initiatives to obtain more reliable results based on real data measurements (i.e., flow, tank water levels, systems' pressures).

PRASA attributes the reductions in NRW since FY2012 to the following main contributing factors and measures:

- Greater understanding and improvement of management practices regarding NRW and water losses.
- Improvements in data management and quality (better production measurement).
- Reduction in events and duration of water storage tank overflows.
- Reduction in the time to repair leaks.
- Leak detection with specialized equipment.
- Pressure management in the distribution system.

PRASA's level of NRW is still higher than the average utility benchmarks results. For example, U.S. and Canada average results of apparent (commercial) losses per service connection per day and average results of real (physical) losses per service connection per day for utilities with combined (water and wastewater) operations range from 5.15 to 14.21 gallons (median of 8.40) and from 24.27 to 62.57 gallons (median of 42.00)[16], respectively.

PRASA recognizes that reducing its NRW and water losses volume and, in turn, its water production will positively affect 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 2021 PRASA Fiscal Plan.

[14] Source: Alegre, H. Hirner, W., Bapista, J., and Parena, R. (2000). "Performance indicators for water supply services" IWA Manual of Best Practices.
[15]Source: 2020 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.
[16] Source: 2020 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

Additionally, PRASA's NRW office is focused 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 a more significant percentage of the authorized unbilled consumption, and reducing the unmetered production by installing additional flow meters at WTPs to adequately measure daily production to distribution flows. According to the FY2021 Fiscal Plan, PRASA's goal is to reach a metered reading of 92% of the water production by the end of FY2022. During FY2021, PRASA exceeded the expected goal of 80% by 6%. Measuring the most amount of water production increases the credibility of the results and decreases the probable overestimation of the NRW results. Nonetheless, as previously mentioned, PRASA is currently redefining the NRW goals and metrics, with this one particular goal under review. In addition, PRASA's Operational Regions plan to install meters to measure the water discarded as part of the System's programmed drainages implemented as part of the measures to meet compliance with DBP levels in the System.

4.3.2.1 Leak Monitoring and Control

Table 4-13 shows that leaks reported in FY2021 amounted to 56,831. Table 4-13 also shows the average annual leaks per 100 miles of water piping for recent fiscal years. The total annual reported leaks for FY2021 increased approximately 24% compared to FY2018. There was a decreasing trend from FY2017 and FY2018. However, Arcadis has not made an independent evaluation to identify the root causes of this recent decrease. For FY2018, a part could be attributed to the 2017 Hurricanes that impacted the island when PRASA refocused efforts to recovery activities and other more critical matters. In FY2019, after the normalization of PRASA's operations, the annually reported leaks went back up 26%. Yet, in FY2020, the trend went back down by 4%, which may be due to the impact of the COVID-19 pandemic and people not reporting as frequently. Lastly, in FY2021 it remained nearly the same with a slight increase of 0.5%.

PRASA's reported rate of leak occurrence continues to be extremely high compared to other utilities in the U.S. and Canada (average annual combined leaks and breaks per 100 miles are between 10.2 and 37.9, with a median of 21.7)[17]. 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. In addition, aging infrastructure is another contributing factor to the high rate of leaks and the decrease of funding available for pipeline R&R.

Table 4-12 Reported Leaks from FY2016 to FY2021

Fiscal Year	Total Annual Reported Leaks	Annual Leaks per 100 miles Using 15,160 miles of Water Pipeline
2016	62,079	421
2017	54,810	372
2018	45,873	311
2019	57,997	393
2020	56,536	383

[17] Source: 2020 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

Fiscal Year	Total Annual Reported Leaks	Annual Leaks per 100 miles Using 15,160 miles of Water Pipeline
2021	56,831	458

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

The average weekly reported and repaired leaks per fiscal year and the percentage of repaired leaks for the number of leaks reported in each fiscal year are shown in Figure 4-1. For FY2021, PRASA reports an average of leaks per week of approximately 519. Comparing the weekly reported leaks, it can be observed that from FY2018 to FY2019, the weekly reported leaks increased by approximately 26% and decreased by 4% from FY2019 to FY2020. Similarly, from FY2020 to FY2021 it decreased significantly by 49%. The same trend is observed with the weekly repaired leaks. However, the percent leaks repaired increased to 100% from FY2020 to FY2021.

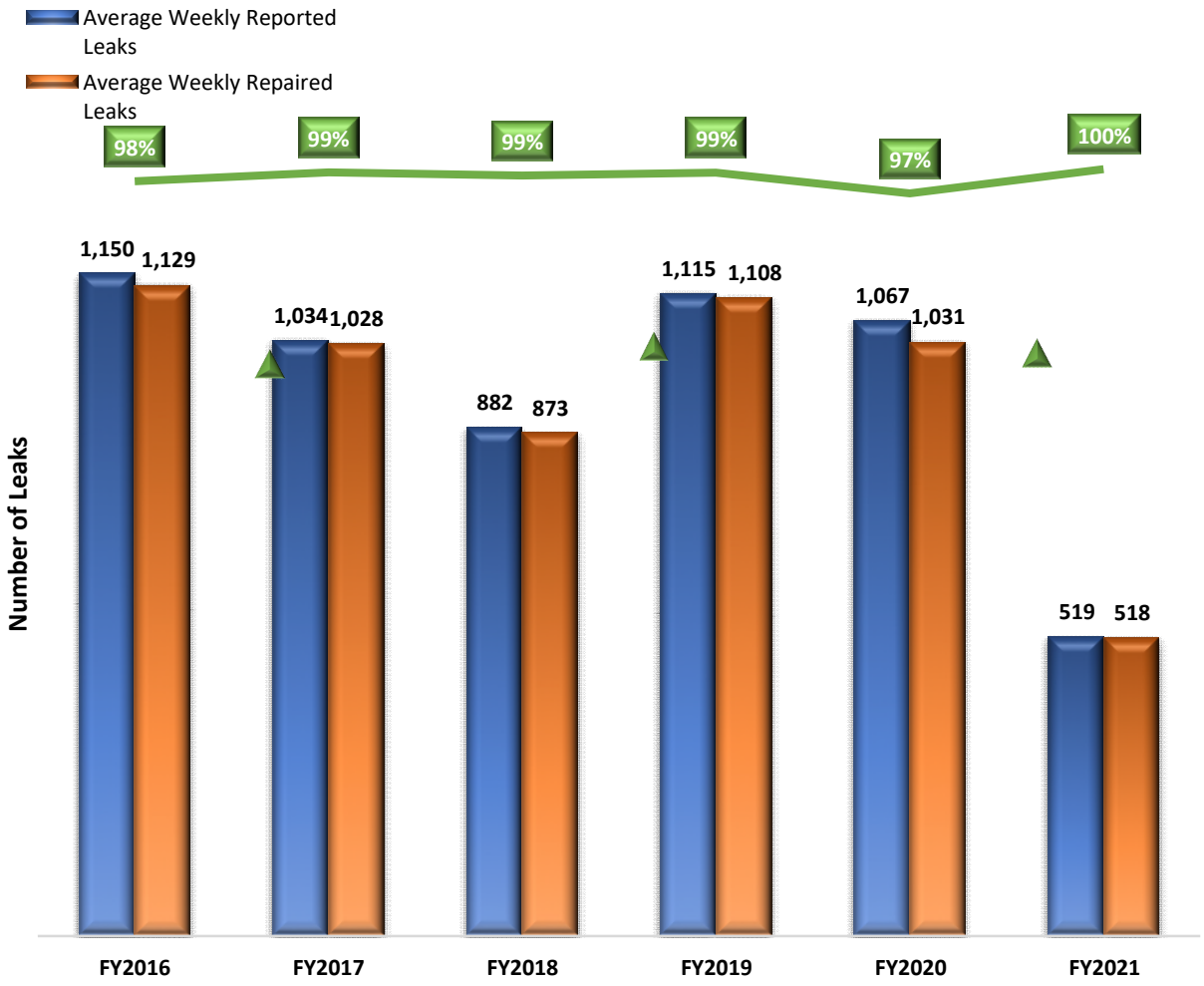

Figure 4-1. Islandwide Weekly Average Leaks Reported and Repaired

Figure 4-2 shows the active leaks with a duration greater than seven days before being repaired for recent fiscal years. In FY2016, the number of leaks with a duration greater than seven days was reduced to 2,698 pending

leaks with a duration greater than seven days and 54 weekly average pending leaks with a duration greater than seven days. Furthermore, in FY2017, the number of leaks with a duration greater than seven days was significantly reduced to 365 pending leaks with a duration greater than seven days and 8.1 weekly average pending leaks with a duration greater than seven days. However, the month of June 2017 data was not available. For FY2018, insufficient data was obtained to generate a good trend since the only data available was from March 2018 to June 2018. It was mostly due to the impact of the 2017 Hurricanes and the recovery efforts, damage to the communications infrastructure, and the responsible personnel being temporarily relocated to attend the more urgent recovery and restoration of the System. For FY2019, the number of leaks with a duration greater than seven days significantly increase to a total of 13,291 pending leaks with a duration greater than seven days and 289 weekly average pending leaks with a duration greater than seven days. For FY2020, the number of leaks with a duration greater than seven days was similar to FY2019, with 13,360 pending leaks with a duration greater than seven days and 334 weekly average pending leaks with a duration greater than seven days. Lastly, in FY2021, the number of leaks with a duration greater than seven days increased to 14,475 pending leaks with a duration greater than seven days and 336 weekly average pending leaks with a duration greater than seven days.

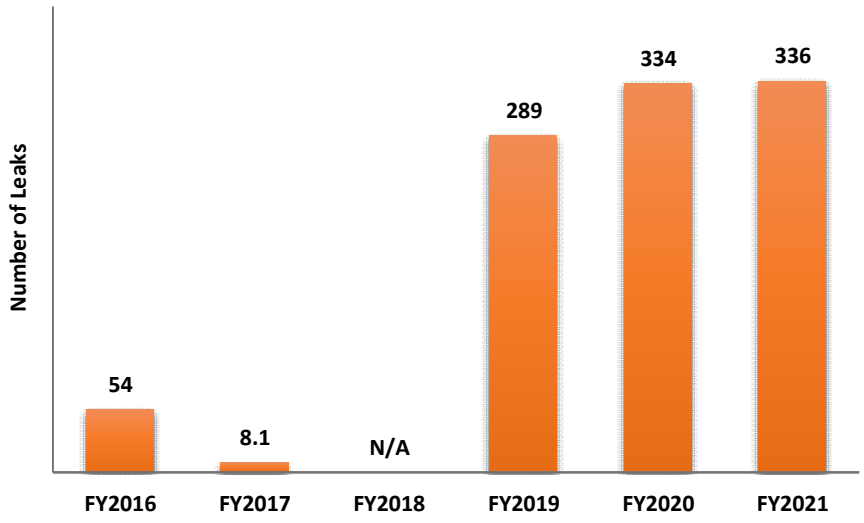

Figure 4-2. Islandwide Weekly Average Pending Leaks with Duration >7 Days

Table 4-14 summarizes the average repaired leaks per working day and average backlog for the recent fiscal years. Based on the weekly average pending leaks and weekly average pending leaks with a duration greater than seven days, it can be observed that in FY2017, the average backlog days for pending leaks continued its improvement from FY2016 by reducing another 13%. For FY2018, insufficient data was obtained to generate a good trend since the only data available was from March 2018 to June 2018. Notwithstanding, FY2019 reflects the effects of the 2017 Hurricanes as all criteria increased significantly from the last reported available data in FY2017. In FY2020, under the impact of the COVID-19 pandemic, the average backlog days for pending leaks and backlog increased compared to FY2019. Although it is still high from PRASA's goal when the recovery process accelerates, and the influence of the pandemic diminishes, a continued increase in effectiveness is expected. Also, hidden leaks have a negative impact on the average backlogs' days for pending leaks. Therefore, in FY2021, it is observed that for the average seven days backlog, there is no significant change compared to FY2020.

Table 4-13. Annual Average Backlog of Pending Leaks

Fiscal Year	Average Weekly Pending Leaks	Average Weekly Pending Leaks >7 Days	Average Repaired Leaks per Working Day[1]	Average Backlog Days for Pending Leaks	Average Backlog Days for Pending Leaks >7 Days
2016	354	54	234	1.5	0.2
2017	263	8.1	210	1.3	0.04
2018	N/A	N/A	N/A	N/A	N/A
2019	864	289	222	3.9	1.3
2020	893	334	210	4.25	1.59
2021	886	337	223	3.97	1.51

[1] Assumes five working days per week. Source: PRASA SAP (Commercial) Database.

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 the fiscal situation and repair prioritization allows. It is still PRASA's goal to reach 100% monitoring in water storage tanks at some point. Finally, as a measure 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. Additionally, the WRO has initiatives like pressure management (reduce pressures, pressure gage at tanks, validation & replacement, valves) and Leak Detection Program, which will help with tank overflows.

4.3.3 Wastewater Collection System

PRASA's GIS updated in June 2021 shows that PRASA owns approximately 5,787 miles of wastewater pipelines. Although the wastewater collection system was not inspected, it is reasonable to assume that a significant portion of the wastewater collection system will require some structural repairs and rehabilitation (replacement) to reduce inflow and infiltration, and overflow occurrences and address the impacts of the recent damaging events.

4.3.3.1 4.3.3.1 Overflow Monitoring and Control

As shown in Table 4-15, PRASA indicates that overflows reported in FY2021 were 28,769. However, data is not available regarding 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 4-15 also shows the average annual overflows occurrence per 100 miles of sewer. In FY2021, an average of 467 overflows per 100 miles of sewer were reported. However, in FY2020, an average of 455 overflows per

100 miles of sewer were reported, as in FY2019. In FY2017 and FY2018, there was a decrease in reported overflows of 5% and 16% compared to FY2016 and FY2017, respectively. However, in FY2019, there was an increase of 16% in reported overflows which could be due to the 2017 Hurricanes impact on the buried infrastructure and WWPSs. Again, as with the increase in FY2016, Arcadis has not made an independent evaluation to identify the root causes of this increase. In FY2020, there was a negligible increase (0.1%) in reported overflows. However, in FY2021, there was an increase of 5% in reported overflows.

PRASA's reported rate of overflow occurrence continues to be extremely high compared to other utilities in the U.S. and Canada with combined operations (average annual overflows {non-capacity & capacity} per 100 miles are between 0.5 and 6.1 overflows, with a median of 1.9)[18]. However, this high rate is not surprising given the size and complexity of the System. Other contributing factors to this high rate of overflows include aging infrastructure, damages from 2017 Hurricanes, and inadequate customer use (i.e., illegal connections and discharges).

Table 4-14. Reported Overflows from FY2016 to FY2021

Fiscal Year	Reported Overflows	Annual Overflows per 100 miles Using 5,787 miles of Wastewater Pipeline
2016	29,991	500
2017	28,510	476
2018	23,819	397
2019	27,253	455
2020	27,478	455
2021	28,769	467

Source: PRASA SAP (Commercial) Database

PRASA's average weekly reported and repaired overflows per fiscal year for recent fiscal years are shown in Figure 4-3. For FY2021, PRASA reported an average of approximately 553 per week. In FY2016, the average weekly reported overflows experienced an increase of 5% compared to FY2015 results, respectively. Conversely, in FY2017, a decrease of 3% was observed compared to FY2016 and continuing the decreasing trend, a 15% drop from FY2017 to FY2018. However, FY2018's significant reported drop may be an outlier because of the lower reporting in the aftermath of the 2017 Hurricanes. Note, however, that in FY2019, an average weekly reported overflows increase of 14% was observed compared to FY2018. In FY2020, an average weekly reported overflows decrease of 1% was observed compared to FY2019. Lastly, in FY2021, an average weekly reported increased by 7%. Also shown in Figure 4-3 is the percentage of repaired overflows concerning the number of overflows reported in each fiscal year, FY2021 increased to 101%.

[18] Source: 2020 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

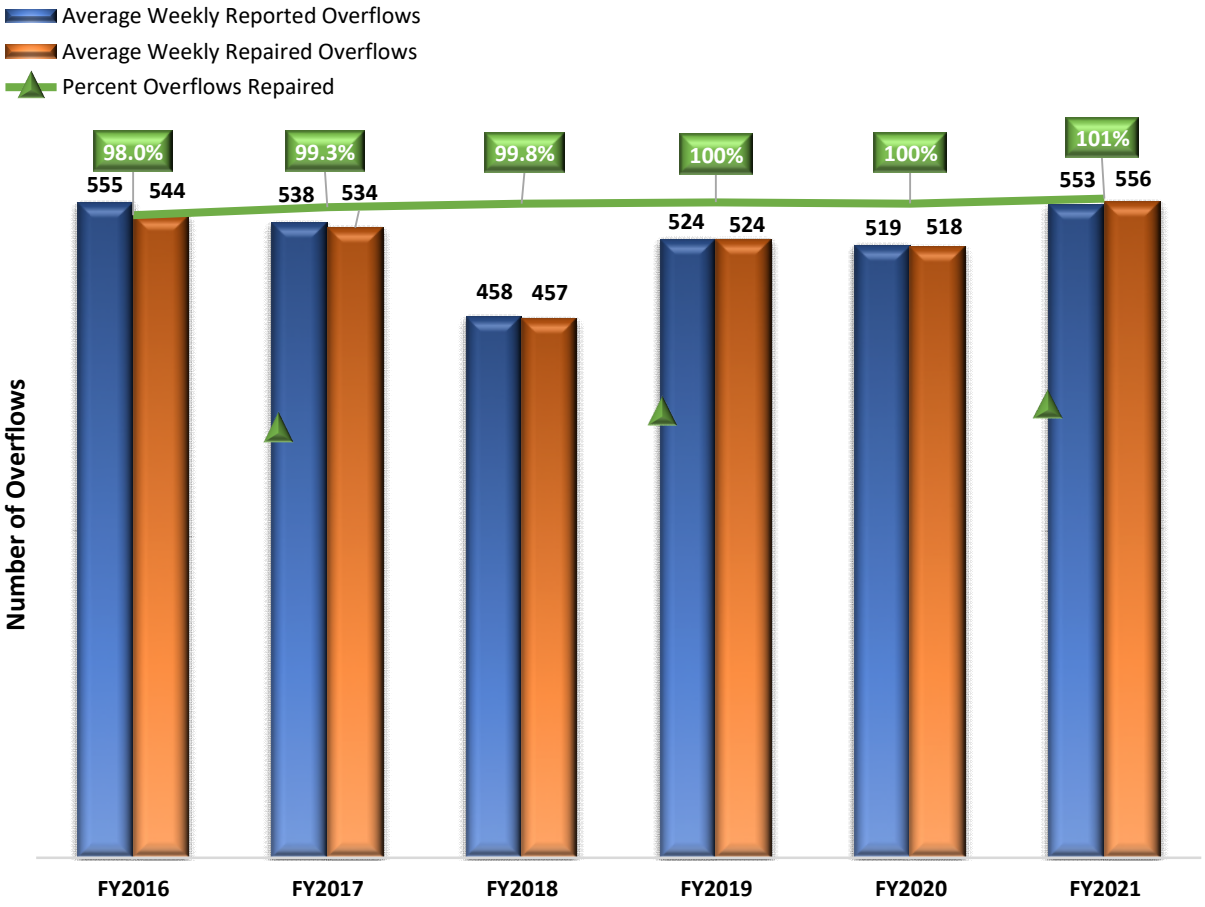

Figure 4-3. Islandwide Weekly Average Overflows Reported and Repaired

Figure 4-4 shows the pending overflows with a duration greater than seven days for recent fiscal years. As shown in the figure, in FY2016, there was an increase in the weekly average pending overflows with a duration greater than seven days of about 30%. Conversely, in FY2017, there was a decrease of 62% in the weekly average pending overflows with a duration greater than seven days. For FY2018, insufficient data was obtained to generate a good trend since the only data available was from March 2018 to June 2018. It was mostly due to the impact of the 2017 Hurricanes and the recovery efforts, damage to the communications infrastructure, and the fact the responsible personnel were temporarily relocated to attend the more urgent recovery and restoration of the System. However, in FY2019, there was a significant increase in pending overflows compared to the last reported fiscal year. These could be due to the slow recovery process and non-repaired impact to the buried infrastructure and WWPSs due to the 2017 Hurricanes. However, Arcadis has not made an independent evaluation to identify the root causes of this increase. For FY2020, there was a slight decrease of 6% in the weekly average pending overflows with a duration greater than seven days compared to FY2019. Lastly, in FY2021, there was a greater increase of 47% in the weekly average pending overflows with a duration greater than seven days compared to FY2020.

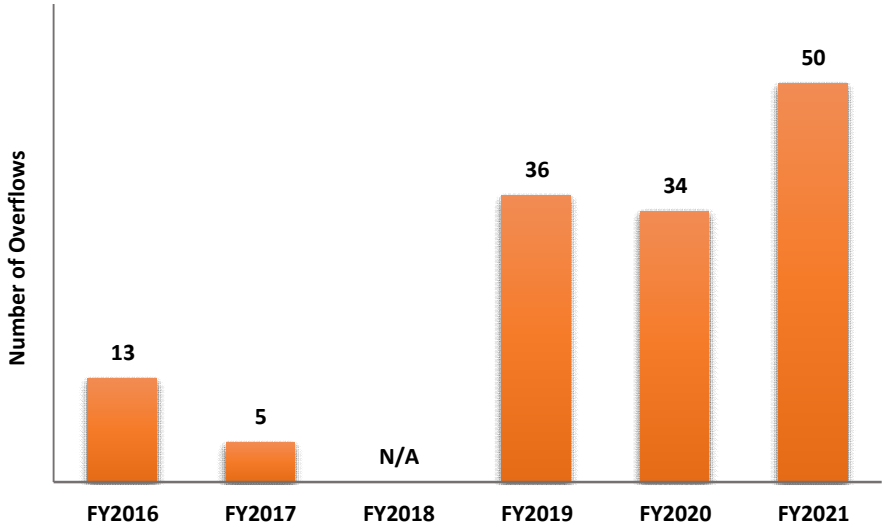

Figure 4-4. Islandwide Weekly Average Pending Overflows with Duration >7 Days

Table 4-16 summarizes the average repaired overflows per working day and average backlog. As shown, in FY2016 and FY2017, PRASA reported a decreasing trend with 104 and 75 average weekly pending overflows, respectively. In FY2017, PRASA also improved its average backlog achieving approximately 0.7 days of pending overflows and the backlog of pending overflows with a duration greater than seven days to 0.05. These results represent a reduction of about 22% and 58%, respectively, compared to FY2016 results. PRASA's effectiveness in repairing pending overflows has continued to improve year after year since FY2015, particularly those with a duration greater than seven days, except for FY2016. For FY2018, insufficient data was obtained to generate a good trend since the only data available was from March 2018 to June 2018.

Furthermore, FY2019 reflects the effects of the 2017 Hurricanes as all criteria increased significantly from the last reported available data in FY2017. In FY2020, the improving trend continued with 146 average weekly pending overflows. Similarly, the backlog of pending overflows and pending overflows with a duration greater than seven days improved by 8% and 8.5%, respectively. Lastly, in FY2021, it is observed that there is an increase throughout the table compared to FY2020.

Table 4-15. Annual Average Backlog of Pending Overflows

Fiscal Year	Average Weekly Pending Overflows	Average Weekly Pending Overflows >7 Days	Average Repaired Overflows per Working Day[1]	Average Backlog Days for Pending Overflows	Average Backlog Days for Pending Overflows >7 Days
2016	104	13	113	0.9	0.12
2017	75	5	109	0.7	0.05
2018	N/A	N/A	N/A	N/A	N/A
2019	156	36	105	1.5	0.35
2020	146	34	106	1.38	0.32

Fiscal Year	Average Weekly Pending Overflows	Average Weekly Pending Overflows >7 Days	Average Repaired Overflows per Working Day[1]	Average Backlog Days for Pending Overflows	Average Backlog Days for Pending Overflows >7 Days
2021	185	50	112	1.67	0.45

[1] Assumes five working days per week. Source: PRASA SAP (Commercial) Database

As with leaks, PRASA expects to improve its sewer overflows response time and metrics tracking using the new mobile technology currently being implemented across its operational regions. Also, PRASA continues with the Fats, Oils, and Grease (FOG) Program, which should continue to impact overflows positively.

4.4 Conclusions

Table 4-17 summarizes the inspection's overall rating result. Arcadis visited a total of 180 facilities throughout PRASA's five Operational Regions between February and July of 2021 to conduct a condition assessment of PRASA's facilities. Of the inspected facilities, 80 (44%) were treatment (WTP and WWTP) facilities. The data indicates that only 7% of the facilities inspected in FY2021 are in the Good range, and 66% are in the Adequate range. However, almost half of the facilities rated as Adequate (40 of 118, 34%) are rated 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.

Furthermore, 28% of the facilities are in the Unacceptable to the Poor range. The greatest current concern continues to be the physical condition of the facilities. In addition to the physical condition, the Staffing/Training criterion impacts the overall condition of the facilities. This criterion was mostly affected by the migration of staff to the mainland due to the 2017 Hurricanes and fiscal situation, the voluntary and incentivized retirement windows the last couple of years, and the fact that PRASA is to some degree in a hiring freeze.

Table 4-16. 2021 vs. 2020 Asset Condition Inspections' Results Summary

Asset Category	Unacceptable		Poor		Adequate		Good		Total	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Water Treatment Plants	0	0	2	1	49	41	6	2	**57**	**44**
Wastewater Treatment Plants	0	0	10	8	13	20	0	0	**23**	**28**
Wells	2	2	2	4	12	14	0	0	**16**	**20**
Water Pump Stations	1	4	12	13	16	13	1	0	**30**	**30**
Water Storage Tanks	2	0	10	5	19	26	3	0	**34**	**31**

Asset Category	Unacceptable		Poor		Adequate		Good		Total	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Wastewater Pump Stations	0	0	9	5	9	15	2	0	**20**	**20**
Total	**5**	**6**	**45**	**36**	**118**	**129**	**12**	**2**	**180**	**173**
Percent of Total	**3%**	**3%**	**25%**	**21%**	**66%**	**75%**	**7%**	**1%**	**-**	**-**

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

Overall, the WTPs inspected are mostly in adequate condition. To the extent that the physical structures and operational/process controls are maintained or improved, they are expected to continue to serve their intended purpose of providing a potable water supply in compliance with applicable regulations. Facility ratings increased in operations/ process control, Equipment/Maintenance, and staffing/training criterion compared to the 2020 inspections. Conversely, facility inspection decreased in overall rating compared to the 2020 inspections. Regarding compliance, even though the rating was Good, PRASA acknowledges that it has some challenges ahead with the Stage 2 D/DBPR compliance and has performed water quality modeling to identify the root cause of these non-compliance events and establish corrective actions and control measures to improve compliance. PRASA has developed an action plan to address exceedances to TTHM and HAA, which consists of but is not limited to the combination of the following corrective measures: elimination/reduction of pre-chlorination; increasing frequency of process tanks/systems wash; WST oscillation monitoring; more frequent drainage of systems; change in coagulants; hydraulic modeling to reduce retention time in tanks; lowering pH; and increase of testing frequency in non-compliance areas to verify the progress of corrective measures, among others.

The WWTPs generally range from Poor to Adequate condition in overall rating, with the Equipment/Maintenance as the category of primary concern. 17 facilities had an overall score rating lower than 2.0 and should be considered for improvements. Process control is also a challenge in some facilities, even though plant operators indicated that standard operating procedures and control strategies are followed. The compliance criterion was 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 treat to meet permanent limits.

Regarding ancillary facilities, the facility criteria rating of WPS increased significantly to Adequate. At the same time, wells, WSTs, and WWPSs remain in the lower end of Adequate, and if left unattended, could continue to deteriorate. WSTs facility criteria rating did not materially change, remaining as Adequate; however, they do not have that much equipment, so they do not deteriorate at the same rate as wells or WPSs, but recently we have observed more signs of corrosion on the pipelines, air vents or float valves than previous years. Moreover, corrosion is also showing signs that WSTs need maintenance or improvements. Note, however, that financing of PRASA's R&R program has also been negatively affected given PRASA's fiscal situation. Most of the deficiencies noted can be addressed through PRASA's Renewal & Replacement (R&R) program and may not require major capital improvements. However, future regulatory requirements may require either implementing significant capital

improvements to include and achieve additional treatment capabilities at Wells facilities or the closure of certain wells.

PRASA should address the shortcomings 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. 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. Moreover, 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 is a concern. Also, other staffing needs are identified for WTPs, WWTPs, and ancillary facilities.

In general, to reduce NRW, PRASA continues efforts to improve its leak detection, leak repair, and monitoring practices. By applying the established NRW reduction initiatives, PRASA has helped reduce water production, water losses, and NRW reported. Furthermore, the 2021 PRASA Fiscal Plan WRO 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. Moreover, the provision of meters or mechanisms to measure the water discarded as part of the System's programmed drains 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 U.S., 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.

Because of the size and complexity of PRASA's 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 continues to age and as new compliance regulations are implemented, an increased O&M budget may be necessary to address maintenance and repairs and compliance matters. Therefore, PRASA's updated Six-Year CIP, as included in the 2021 PRASA Fiscal Plan certified by the Oversight Board, includes all adjustments resulting from negotiations with the regulatory agencies and damage from the 2017 Hurricanes.

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 not known at this time. 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. However, as the impact of future regulations becomes more defined, CIP modifications may be required to accommodate the resulting needs adequately. As negotiated or being negotiated with Regulatory Agencies, these CIP needs will be prioritized, and implementation schedules will depend on PRASA's financial capacity. It is important to note that since the fiscal situation has significantly prolonged and adversely impacted the implementation of PRASA's CIP, key initiatives, and reduced the R&R investments, the condition of the facilities has continued to deteriorate. Combine that with the detrimental impact caused by the 2017 Hurricanes, improvements are needed to repair, modernize or mitigate PRASA's Infrastructure and consequently protect public health, safeguard environmental quality, and allow continued economic development. If needed

improvements continue to be postponed or remain unaddressed, operation of facility treatment will be hindered, thus, impacting the public and increasing capital needs. Notwithstanding, PRASA expects to begin addressing some of the issues within the recently started CIP and ongoing efforts in the R&R program.

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 key operational and strategic initiatives being implemented. Arcadis used the information and facility observations obtained by field inspectors through the asset condition assessment efforts presented in detail in Section 4 and information provided by PRASA through numerous interviews conducted with PRASA staff. A summary of the O&M highlights, O&M costs (benchmarked against other industry utilities), and a detailed summary of 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 and Emergency Response Plans (ERPs); missing laboratory equipment and jar tests not being performed consistently; lack of working EGUs; and deficient house/grounds keeping. Despite some operations and process control issues, the WTPs generally deliver potable water adequately. Conversely, some 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. Furthermore, there is room for improvement concerning prioritization, scheduling, and execution of corrective and routine maintenance activities and optimization and strengthening of the System (through permanent rehabilitation projects).

Despite all the challenges faced by PRASA in recent years, slow recovery from the impact of the 2017 Hurricanes, the 2020 Earthquakes, and COVID-19 pandemic, most of the facilities have been brought to operational status and, at least in the short term, continue to serve their intended purpose of providing potable water supply and treating used water. However, it becomes more imperative that projects and operational actions necessary to address the damages and improve conditions are implemented to guarantee safe drinking water production and wastewater treatment in compliance with applicable regulations. Note that since the CIP has started, many of the treatment plants' issues will be addressed in ongoing or future projects.

5.3 O&M Costs

Over the past five fiscal years, PRASA's O&M expenses have fluctuated from $635M in FY2015 to $721M in FY2020, mostly from the increase in the retirement cost as the new requirements for pensions Pay-Go. PRASA continues its effort to become more efficient by exercising greater management controls to reduce its O&M costs and by implementing various operational programs and initiatives.

PRASA's FY2021 O&M expenses preliminary projection for the water and wastewater system (combined) is approximately $673M, of which $616M are directly related to the O&M of the System. The other $57M are related to commercial activities and provision of customer services, including but not limited to staffing and operation of customer service offices island-wide; meter reading; connection and disconnection services; invoice preparation, printing, and distribution; and customer service call centers, amongst others. PRASA estimates that during FY2021, approximately 73% of its System's O&M budget ($450M) was allocated to the water system and the remaining 27% ($166M) 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 FY2021 O&M Water System Budget Benchmarks

Performance Indicator	FY2021 PRASA	2020 AWWA Benchmark Median[1]
Cost per Account[2]	$360.00	$444.00
Cost per MG Processed[3]	$2,238.00	$2,882.00
Cost per 100 miles of pipe[4]	$2,968,338.00	$2,806,103.00
Total O&M System FY2021 Results	$450M	-

[1]Source: 2020 AWWA Utility Benchmarking: Performance Management for Water and Wastewater. Values are rounded.
[2]Based on the number of accounts at the end of FY2021 of 1,251,116 (water accounts) and 772,929 (wastewater accounts). [3]Based on FY2021 total production and distribution of approximately 551 MGD of potable water.
[4]Based on 15,160 miles of water pipeline.

Table 5-2. PRASA FY2021 O&M Wastewater System Budget Benchmarks

Performance Indicator	FY2021 PRASA	2020 AWWA Benchmark Median[1]
Cost per Account[2]	$215.00	$378.00
Cost per MG Treated[3]	$2,187.00	$2,447.00
Cost per 100 miles of pipe[4]	$2,868,498.00	$2,934,060.00
Total O&M System FY2021 Results	$166M	-

[1]Source: 2020 AWWA Utility Benchmarking: Performance Management for Water and Wastewater. Values are rounded.
[2]Based on the number of accounts at the end of FY2021 of 1,251,116 (water accounts) and 772,929 (wastewater accounts). [3]Based on FY2021 total treatment of approximately 208 MGD of wastewater.
[4]Based on 5,787 miles of wastewater pipeline.

5.4 Support Departments and Regional O&M Highlights

Arcadis conducted meetings with key PRASA department directors and other personnel to obtain an update on the status of the different departments, operations, and initiatives. A summary of the information provided by PRASA is detailed in the following sub-sections.

5.4.1 Department Updates

5.4.1.1 Human Resources

PRASA's Human Resources (HR) Department is currently focusing on two main tasks: 1) achieving PRASA's headcount goal of 4,700 employees by FY2026 (with no vacant positions) as presented in the 2021 PRASA Fiscal Plan and 2) understanding and implementing the requirements included in the series of acts (Act 3-2017, Act 26-2017, and Act 80-2020) that have been passed in recent years.

Act 80-2020 is the new voluntary pre-retirement incentive program; however, as of September 30, 2021, it has not been approved and remains under evaluation by the Oversight Board.

As for PRASA employees' benefits during FY2021, vacation leave time was reduced to 15 days and sick leave remains the same at 18 days if the employee commencement date is prior to the memorandum dated December 20, 2021; if not, they will have 12 sick days.

The medical plan services for FY2022 will have a provider change, but benefits and deductibles will stay the same.

Lastly, the HR Department ongoing initiatives include:

- Updating and complying with KPIs that are related to HR changes.
- Finalized integration with SAP to manage Health Plan Insurance information.
- A PRASA contractor continues to work on employee redistribution studies to evaluate salary scales and the number of employees per department. The study should be finalized by FY2022.

New initiatives of HR for FY2022 are:

- My Portal App – With this App, employees can view their leave balances, access their W2, and request training. The App will integrate with SAP to obtain employee information. The App is expected to be launched in November 2022.
- Explore and evaluate alternatives to promote remote work under Act 36 for different positions, which requires an evaluation from the labor unions. HR expects to present the teleworking plan to the labor union by February 2022 and expects the plan to be in place for FY2023.

5.4.1.2 Customer Services

PRASA's Customer Service Department continues to focus on measuring and implementing metrics to improve the following further: invoicing, collections, billing adjustments, customer service complaints, service interruptions, service quality, actual meter reading, and waiting time in commercial offices as in the call center.

PRASA operates 11 commercial offices; the Culebra office is still waiting to sign a contract with the municipality to rent a space. Since reopening after COVID 19, visits are now scheduled by appointments, of which there are more than 960 available daily. Also, walk-ins are assisted. In addition, PRASA has two private call centers currently under contract until the end of December 2021, when a new contract is expected to be signed. The RFP for call center services was completed, and one vendor was selected and awarded the new call center contract, pending contract signing. Furthermore, PRASA has fully implemented the App for mobile phones in which customers can report service interruptions and/or pay their bills.

The Customer Service Department has been slowly re-establishing the KPIs set for measuring water meters and not estimating. During COVID-19, routes were paused, but all routes are active now. The Metro area has the lowest rate at 89%, and the Islandwide KPI is 92%. The Department is still limited to not being able to disconnect customers due to the Governor's legal ordinance (Act 39 2020).

The inventory of 5/8-inch meters is currently low, and it is being limited to new service connections or critical replacements. At present, PRASA is working on an RFP to replace all the water meters in Puerto Rico. This RFP will also include an Advanced Metering Infrastructure (AMI) system for the remote reading of all meters (Approximately 1,400,000 meters Islandwide). This Project will work through a pilot program to select the technology that will be used and is expected to be implemented commences late FY2023. Therefore, the P3 Project Agreement has been put on hold.

The department's ongoing initiatives are summarized below:

- Revision of Customer Service Protocols for alignment with the most recent version of Regulation 8901 was completed during FY2021.
- The 550 *Terminal Portátil de Lectura* (TPLs, for its Spanish acronym) needed for the whole department have been replaced. The old TPLs have been passed down to the operations department.
- Use of virtual turns as an alternative for physically waiting in line. Due to the COVID-19 pandemic, this initiative was fast-tracked and implemented by July 2020 and are still being used to date.
- An RFP to perform a study (analysis) on a new Rate Structure was released and completed during FY2021. Currently, it is in the approval process by PRASA's Governing Board, public hearings process, and FOMB review and approvals. The new rate structure should be implemented by June 2022.
- By the end of FY2021, PRASA's customer service app was fully implemented.

The department's new initiatives include:

- Various routes have been developed to read government accounts (water consumption) accurately. The initiative started in the South Region and is in place for FY2022. The East Region is at 90% of the planning stage. The Metro, North and West Regions have not started. Notwithstanding, the goal is to read 90% of government accounts by the end of FY2023.

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 currently 11 vacancies throughout the department due to personnel turnover, some of these are warehouse assistants, purchasing analysts, and chauffeurs.

The improvements to the Aguadilla Warehouse were completed during FY2021, and the improvements to the Carolina and Cayey warehouses are expected to be completed by the end of FY2022. The department is still trying to allocate funds for the improvements to the Humacao warehouse. The inventories of all warehouses need to be processed with the Finance Department; however, this activity is currently on hold.

An improvement was achieved with the SAP R3 retained requisition *pedido retenido*. If a request does not have enough money in the *Solicitud de Pedido* (SOLPED, for its Spanish acronym), the proponent has one day to fix the budget in the system. If the proponent does not fix the budget, the requisition is placed on hold until the funds are released. Once the budget is allowed, they can reactivate the requisition.

Purchases adhere to the following:

- From $0 - $10,000: requires three quotes and only needs approval by the different regional managers
- Open Market, between $3,000 - $100,000: requires three quotes and all approvals are necessary.
- Public Bid > $100,000: requires Purchase Manager, Regional Manager and President approval
- Under Procedure 400, CIP projects and WTP/WWTP R&R/Operations can purchase, and construct orders up to $400,000 without the three quotes required by Law 73.

The department's ongoing initiatives are summarized below:

- The mobile System FIORI (SAP) initiative is functional for all “Reservas”, requisitions and SOLPED. FIORI allows users to access SAP, create and approve POs, look at stock in warehouses and perform warehouse management through a mobile unit. During FY2021, changes were made to FIORI and are fully functional. Other improvements to the FIORI app allow photos, quotes, and bids in the process and allow the creation and approval of Emergency 331 requisitions in the system.
- The bar-coding initiative has been implemented in Aguadilla and Trujillo Alto and has started the organization process in Ponce. Once the Accenture contract is reviewed and finalized (expected in February 2022), the implementation phase will commence in Ponce. The organization phase for Arecibo will launch in March 2022 and is expected to be in place by June 2022. For FY2023, they will commence with the smaller warehouses.
- New System to measure MPI has not been implemented yet. Therefore, queries need to be processed manually, each Regional manager sends their queries, and they are gathered in SEDE, where a pivot table is generated.
- The process to track the whereabouts of chlorine gas cylinders (150 lbs. &1-ton) in SAP has been completed. The cycle will be tracked from the original shipment from the provider to the Puerto Nuevo WWTP for storage, to each WTP and back for a refill. The tracking commenced in April 2020. As of FY2021, all cylinders are in the system and being tracked.
- PRASA is revising all procedures; currently, two procedures have been updated, 312 and 319, and are working on Procedure 311.

The department's new initiatives include:

- The replacement of security camaras in Aguadilla, Trujillo Alto, Ponce, and Arecibo warehouses. At the moment, they are waiting to allocate FEMA funds and hope to have the project in place by the end of FY2022.
- The revision of the Materials Catalog is in the process of organization and is expected to be completed in FY2023.

5.4.1.4 Systems and Information Technology

PRASA Systems and Information Technology (IT) Department continues developing the information technology management areas and implementing the Global Technological Innovation for PRASA's Renovation Program.

During FY2021, the following initiatives and programs were implemented:

- SAP improvements
  - Integration of SAP with QPLUS; it is software that utilizes an android platform. The implementation within the Preventive Maintenance Department was performed in October 2020. Also, underway is the

replacement of the handheld computers (tablets) used in the field to generate orders with a Sonim Handheld; 100 units are still pending the upgrade.

- SAP Single Sign-On initiative will facilitate and reduce the use of multiple passwords, resulting in fewer help desk tickets and increased employee productivity. Already in place for FIORI and R3 and will be ready for other applications by December 2020. The pilot is ongoing within the IT Department. This initiative has been in place since February 2021 throughout all programs
- Business Warehouse – BW 4 HANA is an SAP tool to obtain real-time reports. It's expected to be completed by November 2021.

- Arin Application that provides internet redundancy has not been implemented yet. However, the routers have been bought and the software is complete. A consultant is currently working on this initiative, which is expected to be completed by December 2021.
- The SAIA Application was completed during FY2018; however, the implementation contract is still pending due to an outstanding Memorandum of Understanding (MOU) between PRASA and the Puerto Rico Fire Department. This application enhances the hydrants' inspection process.
- PS and SAP Grants – will facilitate Grant management and disbursement (for Infrastructure and Finance Departments). The project 1st phase was completed and implemented in October 2020. The project is currently in the 2nd phase, which is scheduled to be implemented by December 2021.
- Dynatrace Software (Artificial Intelligence) initiative will help identify errors, diagnose and fix performance issues and find the root cause analysis. The 1st phase of the initiative was completed; and currently in the 2nd phase, which is acquiring the monitoring Software for SAP HANA. In the process of evaluating the proposals.
- SAP Analytic Cloud works like Microsoft Power BI, real-time analytics with forecasting and dashboards. It has been implemented and is in place.
- Payment Card Industry (PCI) – is a consolidation of all payment methods. Audits and policies were completed in FY2021. Currently in the Remediation process and should be completed by June 2022.
- Q Order is a program like QPLUS with PMs and Customer Service as end users. The program was completed and in place during FY2021, still awaiting to upgrade the last 17 androids from Customer Service Department. It is expected to be complete in the next months.
- Storage Infrastructure – The IT Department is in the process of changing how the information is stored in PRASA database. The upgrade of the storage infrastructure was implemented in September 2021.
- System Integration initiative – Consists in the integration of different databases within PRASA such as SAP ISU (clients), GIS (location and cadaster information), SIM (emergency information), and SCADA (real-time asset information); this will allow PRASA to join information on specific systems and provide accurate & detailed information when areas are without service. Also, provide maps with detailed information of clients.
  - The initiative's 1st phase was completed in October 2021 and integrated GIS and SAP ISU.
  - Two more phases will be announced later and added to next year's initiatives.
- Network System – PREPA Net contract ended in November 2021. A bid for a new network provider is in process. The new provider needs to include upgrades to one Gigabyte (GB) WAN island-wide on all fiber optics circuits, access to the cloud (Microsoft and for PRASA), and 2nd Disaster recovery site, no bandwidth charges, and an express route one GB Circuit. The bid announcement was placed on October 23, 2020, and

in February 2021, the bid was awarded, and the contract was signed in November 2021 with Hub Advanced Network.

PRASA's IT future initiatives include the following:

- SAP Maintenance – The current contract for the Maintenance of SAP ends in February 2022. The RFP notice was announced in September 2021. The Bid is scheduled to be awarded by December 2021 and the contract signed by February 2022.
- Security Awareness Program – The IT Department is looking to upgrade their Security program and is currently looking for suppliers and at the same time putting together a purchase order request. It is expected to be implemented during FY2022.
- Business Continuity Plan (BCP) – In the process of updating the past business plan and aiming to complete a new BCP by June 2022.
- Q Plus (Archiving) – Offline backup of Q Plus is taking too long (up to a day). By archiving the old orders, the daily backup will run faster. This backup was completed in October 2021.
- IT Master Plan – The Master Plan for the department will cover 4 to 5 years. The final plan was presented in 2017. Currently, IT is working with suppliers and is expected to be complete all tasks by June 2022.

5.4.1.5 Communications

PRASA's Communications Department has been focusing efforts on moving forward and improving the utilization of PRASA's website and the different social media platforms such as Instagram, Twitter, Facebook, YouTube and LinkedIn. There has been a substantial increase in followers for the social media platforms used. Due to the quick availability of information and images received through social media, PRASA has reported service outages quicker. It also allows PRASA to respond faster to its customers. In addition, PRASA indicates that this has positively impacted customers' perspectives towards the service offered. PRASA continues to use social media as an educational platform by constantly sharing information on treatment processes, how their infrastructure works, and new projects. Social media platforms are also being used to share information on repair status (including pictures of crews working), service interruption, etc., to keep the public informed of ongoing and resolution of operational situations. Press conferences and other events are also shared on social media. For the FY2022, PRASA also wants 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. All government agencies' websites will follow the same template for consistency. Also, PRASA's branding has changed to the government's logo used throughout all the agencies.

Two key positions for Educational Program and Webmaster are pending to be filled in FY2022.

The Communications Department has been working with ongoing initiatives that include the following:

- YouTube: PRASA launched in October 2021 *AcueductosTV*, which they have a goal of producing two videos a month. PRASA is responsible for the production and acquisition of new software for the creation of the videos (Adobe Creative Cloud Suite)
- Media Tour for Infrastructure projects. In collaboration with Presidency and Infrastructure, throughout social media, radio stations, and the press, promote new CIP projects.

- Internal Newsletter is being published once a month.
- PRASA is working on syncing all social media accounts to post simultaneously. However, there is a licensing problem and they have not been able to link all accounts. Regional Communications Directors are in charge of producing materials for the accounts.
- Educational events: all events and programs are given in person and online. Not at the rate as before COVID-19.
- The Water Conservation Program and Educational campaign are ongoing. The educational campaign is a joint effort among PRASA, DNER, and Emergency Response.
- PRASA uses the hashtags for social media: #GotaAGota and #SomosAAA from the President's Office.
- Preparation of an annual report in December, including the activities performed in each Region, such as interviews, community events, public notice, etc.
- PRASA addresses all messages and comments posted by clients on social media platforms. Each regional communications director is responsible for addressing posts.
- PRASA's Communication Department's future initiatives include the following:
- LinkedIn – Create a page that will be used to meet PRASA's team with photos, expected to be launched by January 2022.
- Announce Bids on Social media to be implemented during FY2022.
- The Water Recovery Office (WRO) will create a program to train and educate field personnel to communicate with the press. This personnel operates in hours when the Communications Department is unavailable to attend the press.
- A recognition program will occur twice a year; Phase 1 will be in February 2022 and Phase 2 in November 2022. This campaign will be with the President's Office.

The Communication Department will begin new campaigns and continue existing ones in FY2022. The programs originate in different departments, and the Communications Department creates campaigns according to the needs of the other departments. Also, the Communications Department will be working on reinforcing the internal communications focusing on improving labor relations through social media.

5.4.1.6 Compliance

PRASA's Compliance Department continues to monitor regulatory compliance in PRASA facilities and maintains open channels of communication with Regulatory Agencies. The 2017 Hurricanes destroyed the PRASA Central Laboratory located in Caguas. Four years after those events, PRASA continues processing samples in the multiple mobile office trailer units installed as the temporary laboratory complex and through subcontracting local laboratory services. PRASA's partially certified temporary facility can only handle 60-70 percent of the samples. The remaining 40-30 percent are subcontracted. However, the old PRASA Central Laboratory demolition was completed during FY2020. The design/build project is currently under construction (48.5%) and the substantial completion is scheduled for August 2022. PRASA will continue using the temporary facility until the new facility is completed with some additional help from smaller-scale laboratories.

Regarding the smaller-scale laboratories located at strategic points on the island, only PRASA Mayagüez Laboratory operates normally. Conversely, PRASA Camuy Laboratory is no longer in operations (it does not meet standards).

PRASA continues implementing several operational strategies and initiatives in the water systems to reduce DBPs, which is still the greatest compliance challenge, after the implementation of the Stage 2 Disinfectant By-Products Rule (D/DBPR). Complying with Stage 2 D/DBPR is more difficult since averaging results across monitoring locations within a system is no longer applicable. Hence, reporting for the DBPs running annual average (RAA) per location has resulted in more violation instances. PRASA continues to perform water quality modeling to identify the root cause of these non-compliance events to establish corrective actions and implement control measures. Current efforts are focused primarily on water treatment plant (WTPs) process optimization, maintaining low turbidity or organics concentration and adding the least amount of chlorine to comply with contact time (CT) requirements. Eventually, additional efforts will be implemented throughout the distribution system.

Since FY2017, PRASA has developed an action plan to address DBP exceedances and, in FY2021, has continued to implement a combination of the following corrective measures:

- Elimination/reduction of pre-chlorination
- Increasing frequency of process tanks/systems cleaning
- Flushing program
- Change in coagulants
- Hydraulic modeling to reduce retention time in tanks
- Lowering pH
- Training
- Evaluation of new chemicals for pre-disinfection and coagulation (e.g., polymers, chlorine dioxide)
- Tank levels oscillation
- Increase sampling frequency

In FY2021, PRASA continued the implementation of the following additional initiatives that were integrated to create a more robust plan for DBPs control:

- Purchase of Portable TOC equipment for systems with DBPs exceedances.
- Established a Process Control Program for DBPs.
- Optimization and actions plans are being implemented along with site visits, chlorine residuals, CT evaluation utilizing the minimum amount of chlorine
- Process control for reducing turbidity/organics at WTPs

PRASA recognizes that no single corrective action will solve the DBP issues; rather, corrective measures will need to be combined. The different departments involved must collaborate to achieve compliance. Therefore, PRASA created a committee by region that include personnel from different areas such as: regional director and operational areas director, managers and compliance, and distribution system. Monthly meetings are performed to discuss operational adjustment, challenges, and findings to learn necessary steps to improve in this area.

Regarding the GWUDI program, PRASA has completed five priority evaluations and has performed MPA samplings in selected wells, initially identified as at risk due to their proximity to a superficial body of water or geological conditions, to evaluate further the potential of a well of being GWUDI. The GWUDI evaluations could prove beneficial to identify additional needs in these facilities. As of FY2021, PRASA has completed a GWUDI assessment of 169 wells initially identified at risk due to their proximity to a superficial body of water or geological conditions. During the assessment, 21 wells were determined to be out of service and eight wells were eliminated

or moved directly to the MPA sampling schedule; this resulted in an adjusted total of 140 wells for the assessment. After correlating the water quality results of groundwater and surface water, 24 wells were identified as No-GWUDI and the remaining 116 wells were determined in need of MPA testing. From the 116 wells identified as potential GWUDI, 15 wells were out of service, 98 were sampled for MPA. Of those 98 wells, 96 resulted as No-GWUDI, and two were medium to high risk. These two wells were disconnected from the Water System. The remaining three wells were identified as out of service; therefore, MPA sampling will be scheduled once they become active.

As indicated by the Compliance Department, the implementation of the Sewer System Operation and Maintenance Plan (SSOMP) program for Puerto Nuevo WWTP (includes mapping pipelines, cleaning and flushing program, and assessing System's condition, among others) is ongoing. The sewer cleaning of the High Priority Areas (lines greater than 30 inches in diameter) was delayed. The Compliance Department also reported that they continue implementing the FOG Program, performing monthly visits, delivering educational material, locating and focusing areas prone to overflows.

Also, in compliance with the consent decree requirements, PRASA continues the implementation of the Process Control System (PCS) at treatment facilities following potable water and wastewater industry standards. The PCS aims to keep current and revised to address, as appropriate, new regulations, treatment process changes, new equipment and/or treatment units installed/eliminated, and addition/elimination of chemicals. PRASA has completed the PCS for Metro and West (STS and WWT) regions; the remaining regions are expected to be completed by the end of FY2022. Also, the department continues focusing on implementing remedial measures and commitments to improve the separate and combined sanitary sewer system operating efficiency to minimize sewer overflow impacts.

Furthermore, the department continues as the responsible party for PRASA's Environment, Health and Safety Program (EHS), including workshops, meetings, accident investigations and task risk assessments to improve O&M practices and employee safety. Although some efforts have been directed to the development and implementation of the Health and Safety Plan, it has been delayed due to the limited staff available due to personnel reduction, COVID-19 pandemic, 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, COVID-19, etc.) for uniform and consistent procedures throughout the program.

New initiatives and upcoming regulations:

- Integrated Infrastructure, Compliance and Operations Departments within the CIP program to ensure open communication channels to meet project expectations.
- USEPA proposal for Lead and Copper Rule came out in October 2019, including lower level, focus on schools, childcare facilities, and public education. USEPA anticipates finalizing the forthcoming Lead and Copper Rule Improvements (LCRI) prior to October 16, 2024, the initial compliance date in the LCRR. However, this could be a challenge for PRASA soon because there are no records of existing lead pipelines in Puerto Rico.

Additional upcoming regulations can be found in Section 6. Lastly, the Compliance Department is significantly understaffed; along with funding limitations, the COVID-19 pandemic has resulted in program initiatives delays.

5.4.1.7 Legal

The Legal Department deals with 1) claims, which include courts and extra-judicial; and 2) litigations, which include damages, contract non-compliance (class action lawsuits, service and construction contracts), bid injunctions, bankruptcy and administrative (bills, water theft, injunctions). The department consists of the director, three auxiliary directors (Litigation, Opinions/Counsel, Contracts) and a pool of seven lawyers. Also, the department uses contracted external counsel for damages (Torts) and prejudgments litigation related to insurance claims. The department has various vacancies, including two legal resources, four administrative resources, and one office administrator.

The Legal Department receives approximately eight claims per month. Approximately 90% of the claims fall under insurance policies and public responsibility. Claims have decreased substantially compared to previous years. However, the fiscal situation has forced the legal department to use in-house lawyers to reduce contracting costs.

Due to COVID-19 protocols, invoice objection and water theft litigations are managed through virtual administrative proceedings, with an average of eight administrative hearings per day. 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 department reports that they anticipate an increase in litigation cases due to the CIP ramping up during FY2021. During FY2021, the legal department concentrated on existing litigation, mainly related to damages and prejudice claims and some awarded bid appeals.

The Legal Department provides support and legal guidance in re-negotiating Consent Decree stipulations, amendments, and deadlines associated with Force Majeure events. The re-negotiations are advanced and projected to be finalized by the end of FY2022. The 2006 PRDOH Drinking Water Settlement Agreement continues negotiations through the individual systems vehicles provided under the Agreement. For FY2023, the Legal Department expects to provide an action plan for the whole agreement to the PRDOH. Additionally, the department continues to support PRASA's land acquisition for sales and expropriation cases. Lastly, it also provides support to PRASA for another project associated with the customer water meters.

Few laws and executive orders have been passed during the FY2021. The new laws and Executive Orders applicable to PRASA are:

- 2021-07: "Law for a Worthy Retirement"
- 2021-08: National Holidays
- 2021-09: Collective Agreements

PRASA's legal team continues communication and discussion with the Central Government regarding the impacts of these laws on PRASA's procedures and the potential schedule and cost increase that might result.

Ongoing initiatives for FY2022 include:

- Management Systems Office (reports directly to the Legal Department) developed a work plan to revise and organize internal procedures (institutional documents). This initiative is a high priority for PRASA. The first stage was implemented in October 2021 and included 34 procedures. The expected completion date for this task is January 2022. The Second and Third stages are scheduled for the next fiscal year.
- Implemented the following KPI metrics and are reported in each staff meeting:

- KPI to measure the processing time to grant contracts to professional services. Currently, it is being developed since not all the responsibility is within the legal department.
- KPI to measure the management of information requested from legislative bodies (*ponencias*).
- KPI for administrative hearings:
  - Measure the number of cases pending vs. the ones that will expire
  - This initiative will be developed in combination with the Customer Service Department. Currently, there are more incoming new administrative hearings than cases being resolved.

Lastly, for the next fiscal years, the Legal Department expects an upturn in contracts and claims and land acquisition cases due to the start of the CIP program and the funding being received. As a result, they are seeing an increase in competitive bidding and expecting more claims and complaints.

5.4.1.8 Infrastructure

PRASA's Infrastructure Department continues to oversee and manage PRASA's CIP. The Infrastructure Department has managed 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 Executive Management Team, has undertaken the process to reactivating the CIP Consortium Management Program. Previously, the CIP program had started for several SRF funded projects, which began in December 2019. However, during September 2020, PRASA was able to start the CIP with one Consortium, and in late February 2021, negotiated the start of a second Consortium.

Moreover, in May 2021, the CIP added another Consortium, and lastly, in July 2021, the final Consortium approved was activated. PRASA envisions the CIP will be implemented at its full capacity and with projects added as needed. The Infrastructure Department is also responsible for managing the Comprehensive Energy Management Program.

The Energy Management Program's Energy Performance Contracts (EPCs) with Honeywell were permanently canceled. However, the Solar Power Purchase Agreement (PPA) contracts continue with Windmar Renewable Energy. For further detail, refer to Section 5.6.3.

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 Agreement.
- Reconstruction & Recovery projects
- Carraízo Dam dredge and improvements
- Renewal and rehabilitation of the overall deteriorated infrastructure

For further detail, refer to Section 6.

5.4.1.9 Strategic and Corporate Planning

PRASA's Strategic and Corporate Planning oversees and manages the Project Management Office (PMO), the IT Department, Training and Continuing Education Program, Customer Service Department (as of September 2021), and the Water Recovery Office (WRO). Most of the efforts are guided towards the WRO and the NRW reduction efforts, the development of the PMO, and the implementation of the Strategic Plan (2021-2025).

The PMO has been defined but has yet to assign a PMO Director. A permanent PMO director must be assigned by June 30, 2022, to support and provide feedback on the structural developments. By August 31, 2022, the director must submit the final PMO structure, process, roles and responsibilities to the Oversight Board. The Vice President of Strategic Planning will implement the complete PMO structure by December 31, 2022. PRASA's PMO goals are to establish standards and procedures that can be followed with any type of project throughout the three areas in which they are executed: Operations, Information Systems, and Infrastructure. This will further provide a “best practices" approach: to help improve O&M performance; to become less reactive and more preventive; to incorporate and use lessons learned; and to maximize available data (data mining).

The WRO focuses on water recovery (NRW) and operational optimization. However, note the Leak Detection Program (LDP), has been approved additional funding for FY2022 to implement the LDP throughout the island and eventually transition knowledge and equipment to each Operational Region. Presently, the LDP has progressed slowly due to staffing limitations and regional support. Regarding operational optimization, the WRO goals are to provide continuous support to PRASA Operations, specifically on reducing costs, optimizing income, becoming more cost-efficient, increasing visibility of the Systems, determining where to invest and get the most benefits, and standardization throughout all Regions, among others.

5.4.2 Regional Updates: Challenges and Initiatives

Meetings with all five regional directors were conducted. The purpose of these meetings was to assess the progress of each region based on the established KPIs, the impact of Puerto Rico's fiscal situation, the ongoing issues and challenges, the recovery after the 2017 Hurricanes and 2020 Earthquakes, the programs and initiatives developed in FY2021, achievements, overall operational activities, and future initiatives.

Some of the most common issues and/or challenges among all regions are listed below:

- Lack of personnel for O&M functions, mainly due to the FOMB headcount cap and low workforce supply caused, in part, by the population migration to the U.S. and the Voluntary Pre-Retirement Program. However, there are mechanisms available to fill positions of difficult recruitment, and currently, efforts are focused on covering these vacancies. One of the greatest challenges that regional O&M functions experience is finding and keeping operators, electromechanics, among other vacancies.
- Although many Systems have restored the visualization, there are still telemetry systems pending to be installed to achieve full visualization of the water systems. In addition, efforts have been focused on achieving visualization of water storage tanks. Wastewater systems, in general, have limited visualization.
- Limited availability of fleet vehicles, mainly due to deterioration of vehicles, long repair times and limited to no budget for purchasing new vehicles. Even though PRASA was able to acquire and distribute a very limited number of vehicles for each region during FY2021, it was reported by all regions that there is still a significant need regarding fleets.
- Delays in obtaining approvals of POs.
- Aging infrastructure and lack of maintenance.
- Length of time to complete and close out work service orders.
- Challenges to maintain and/or reach compliance with the DBPs regulations, mainly due to a limited budget, which prevents investment for repairs, additional sampling, exploration of new technologies, among others.

During FY2021, 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. However, all employees have reported to work, and COVID-19 is no longer an obstacle even with the Safe Return protocols in place.

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 commencement of the CIP program will allow new capital improvement projects to be scheduled in the upcoming years. Also, the regions are continuing their efforts to control costs and System optimization to the extent possible. Nevertheless, other programs implemented during previous fiscal years are currently 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, Energy Consumption Reduction, among others.

There are other issues specific to each Region that are important to note. For example, in the West Region, budgeting for repairs or new equipment; fleet maintenance and upgrades to vehicles; and addressing WWTP corrosion and plant upgrades. In addition, STS presents significant equipment and management issues in the region. In the Metro Region, sewer line inspections and cleaning continue to challenge PRASA assigned crews due to fleet and staff limitations. Despite this limitation, the Metro Region continues with the sewer line cleaning, identification of sanitary defects and illegal connections as per the S2OMP. 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 rehabilitation of the Manatí trunk sewer, which collapsed in several segments. Moreover, the region is working to reduce water system pressures by switching several wells to standby mode and installing pressure regulators at strategic locations. Also, reduction of service areas and several WTP elimination projects (under evaluation) are being performed for optimization and compliance purposes. No data provided by the East Region.

Table 5-3 summarizes some of the initiatives and projects being implemented or planned during FY2021 and initiatives to be implemented during FY2022, subject to funding availability.

Table 5-3. New and Future Initiatives and Projects by Operational Region

Region	Initiatives/Projects	Description
West	Optimization Initiatives	• Elimination of water pump stations at strategic locations. • Elimination of San Sebastián Nueva and Vieja WTPs. • Visualization of water tanks is approximate 100% and pump stations and wells ~85% • Elimination of Wastewater facilities • Infiltration study • Project for chemicals optimization and reduction specially for chlorine and bisulfite application.
	Water Compliance Actions to meet DBPs	• Guajataca WTP- under action plans. Completed the evaluation of different chemical and injection points. • Rehabilitation of Aguadilla (Montaña) WTP and dredging of the water source.

Region	Initiatives/Projects	Description
		• Lajas WTP and Sabana Grande WTP have received sporadic DBPs non-compliance. Evaluated multiple sampling points and relocate them accordingly. • Betances WTP (Cabo Rojo) - PRASA is investigating the root cause in addition to operational adjustments such as an increase of oscillation of Palmas tank. • University of Puerto Rico at Mayaguez (RUM) collaboration on additional sampling.
	Non-Revenue Water	• Optimization of WTPs was performed evaluating and measuring water production. Also, there are projects for line replacement and identification and repairs of hidden water main leaks. • Flow meters were installed at PF Lajas, PF Guajataca, PF Isabela and PF Montaña. • West Region has very limited pitometry staff. There is only one available in San German that provides support to the other areas.
	Projects	• Mayagüez Submarine Outfall - repair of pipeline rupture, to address violations to the discharge permit. • Rehab Aguadilla (Montaña) WTP and dredging of the water source. • Installation of permanent EGUs at multiple locations. • Rehabilitation of Intake at Culebrinas WTP. • Improvements at Aguada and Mayagüez WWTPs. • Installation of the 2 MGD *Super Toma* for Guajataca WTP. • Corrosion Control projects for Lajas and San Germán WWTPs.
Metro	Water Compliance Actions to meet DBPs	• Ongoing initiative of reduction of chlorine application (1.8 - 2 mg/l) at discharge and elimination/reduction of pre-Cl. • System's drainage program, tank clean-up program (yearly). Use divers for tanks that cannot be taken out of service. • Tanks oscillation and elimination to reduce retention time to avoid water aging. • Flushing program was implemented as well as sampling points (100% accomplished). • Application of new chemicals at raw water sources to reduce organics. • Initiative to improve raw water quality – Aeration project at Carraízo Dam – project was cancelled because preliminary studies indicate aeration location will not provide any improvement in the water quality. • Continue use of bactericide in Sergio Cuevas algicide in Carraízo.

Region	Initiatives/Projects	Description
		• Currently, Carraízo has project of cleaning the reservoir (plant removal).
	Acquisition of Vehicle Fleet	• Only few vehicles were received during FY2021, mostly pick-up trucks for supervisors and employees, but not maintenance brigade vehicles, which are the most important. • Flushing trucks have been leased since is more cost effective.
	Optimization Initiatives	• Delimitation of Guzman Arriba Area for sectorization; underground piping was identified, and installed pressure regulator valve. Now no need to switch water supply into the two main sectors as previously. • Delimitation of service areas. • Installed pressure regulator valve in Cupey Water System. • Continue with pressure reduction measures in the distribution system. • Redundancy and Flexibility of the potable water distribution system has continued to be achieved.
	S2OMP – Sewer System Operation & Maintenance Program	The program provides for sewer line cleaning, identification of defects, identification of any illegal connections, among others which result in the repair of lines to control and prevent future overflows. This program is ongoing.
	Energy Consumption Reduction Program	Targeted energy reduction was achieved. This initiative includes performing pumps adjustments, reducing time in operation, using smart system in several systems, which reduces consumption. Other projects to achieve Energy Consumption reductions were corrected leakage in sedimentation tank in Sergio Cuevas WTP and eliminated Lomas de Trujillo WPS. In addition, elimination of additional WPSs and WWPSs and replacement of vertical pumps by VFDs are other initiatives that are being continuously implemented. Replacement of illumination system by solar system technology at strategic locations (WWTPs, roadways, Op. buildings, etc.).
East		Arcadis tried but could not schedule meeting with Region to provide more detailed information.
North	Water Compliance Actions to meet DBPs	This initiative includes the following measures: WSTs level oscillation, frequent WST wash program, increase in the drainage frequency at, Manatí, and Corozal distribution tanks, level control at WSTs, water quality testing, elimination of several WSTs, restructuration of service areas based on pressure and capacity, and elimination/reduction of pre-chlorine injection. Continue sectorization plan for optimization and compliance improvements. Coto Sur system is under observation and Morovis Sur has Hydraulic Modelling being performed.
	Pipe Rupture and Water Loss Mitigation	Aggressive plan to replace pipelines. There are several measures to reduce pressure in the system. Some measures are to reduce the use of wells by switching several wells to standby mode and installation of

Region	Initiatives/Projects	Description
		pressure regulators, especially in the Manatí Operational Area. Sectorization based on pressure, capacity, and water demand resulted in significant reduction of piping ruptures. Location and repairs of unseen leaks. This is an ongoing plan and has decreased potable water loss, but it is limited to the available budget.
	Sanitary Overflow Prevention Initiative	Identification of illegal interconnections in the Arecibo Operational Area, infiltration of saline water into Islote Trunk Sewer, CSWOs, and collapsed pipe segments in Manatí Trunk Sewer, piping replacement plan, sectorization, and detailed investigation for the occurrence of overflows.
	Optimization/Energy Consumption Reduction Initiative	Same concept as other regions. Key initiatives include: • Installation of telemetry systems to integrate more facilities into visualization system. • Installation of timers at Unibón WWTP and Santa Rosa Well • Eliminated Indiera Alta WTP • Evaluation of timer installation on blowers at several WWTPs • Sectorization and pressure control
	Projects	• Quebrada WTP Rehabilitation (LT2 compliance) • Relocation of the Dorado WWTP • Rehabilitation of the WTP is scheduled for FY2021 • Rehabilitation of Hatillo-Camuy raw water intake and pipeline • Elimination of Indiera Alta WTP • Elimination of UV system and replacement of STS at Morovis Sur • New 15 MGD Arecibo WTP • Elimination of Río Arriba WTP • Improvement to Vega Alta WTP treatment technology • Evaluation of a new well in Indiera Alta • Construction of 2 water wells for Sabana Grande de Utuado, 2 for Santa Isabel Water System, and 2 water wells for Pozas Water System (total of 6 wells).
South	Water Compliance Actions to meet DBPs	This initiative includes the elimination of the pre-chlorine and post chlorine injection points; enhanced coagulation with the implementation of Gulbrandsen GPAC 200, GC850, MAC 4000, MAC 2000; increased frequency of sedimentation tanks cleaning from a semi-annual basis to three times per year,); sampling of drainage points at water distribution system with higher concentrations of non-compliance; tanks oscillation, and weekly staff training and refreshers regarding compliance equipment, operations, continuous monitoring among others.

Region	Initiatives/Projects	Description
	Acquisition of Vehicle Fleet	• No new vehicles were acquired in FY2021. • There are currently 164 vehicles in the workshop for maintenance • Active contract with shops in Coamo and Guayama for lightweight mechanics; Yauco and Ponce is done internally with PRASA Staff. All operational regions have contract with shops for corrective maintenance.
	Pipeline Ruptures and SSOs Control	This initiative includes the validation of leak/overflow claims; relocation of the Guayama WTP raw water pipeline and raw water transfer of 600gpm to Carite, which will decrease the water pressure in the raw water pipeline in addition to a reduction in energy consumption of the raw water pumping, due to Carite system is a gravity system. Guayama Operational Area began an aggressive program of leak detection, installation of pressure regulators valves, replacement of float valves and pressure control initiatives. Pressure management in all operational areas except for Guayama and Patillas that are currently replacing lines. Replacing digital pressure switch gauge ("*coquitrols*") in Yauco and Ponce, these are the areas with the greatest number of pipe ruptures.
	Energy Consumption Reduction Initiatives	Similar concept as other regions. This initiative includes: • Guayama penstock • Facilities lighting replacement to LED • Hydraulic modelling for optimization and reduction of energy consumption by the elimination of pump stations in Ponce Area. • Installation of timer on blowers of Package WWTP to reduce operations at night.
	Optimization of Operations	• Regarding the Salinas Aquifer Restoration, PRASA continues to decrease water extraction from the aquifer even though PRASA is not the entity that causes major impact per the results of Level and TDS analyses. This initiative is pending on other agencies to take the necessary steps toward the solutions of this issue. • H-H modelling – El Tuque (Brisas) – eliminate 2 WPS or reduce their capacity. These are: Brisas I and Brisas II. • Continue transitioning to chlorine solution in several systems. • Evaluation and relocation of NPDES of few WTPs and • Elimination of Cotto Laurel WTP discharge NPDES through the connection with Ponce wastewater system. • Evaluation of different polymers to adjust dosing to reduce chemical consumption.

Region	Initiatives/Projects	Description
	Non-Revenue Water Recovery	Measurement of Systems drain flow and installation of water meters at PRASA's facilities. Drainage flow metering has been implemented in Yauco only for fire hydrants. Increased visualization of PRASA's South Region System water tanks. In addition, continue to perform operational adjustments and installation of digital pressure switch gauge "*coquitrols*" on strategic locations throughout the distribution system.
	Projects	• Yauco WWTP - Improvements to aeration system, repairs of clarification process, awaiting 2 BNR. • Santa Isabel WWTP - liner replacement in the retention pond. Currently is being worked a scope of work for SBR cleaning. • Guayama WWTP- cleaning of influent structures. • Guánica WWTP- replacement of degritter; went under bid process in 2022. • Ponce WWTP - replacement of influent bar screens. This is tied to the elimination of Peñuelas WWTP. Two plants Guayanilla and Peñuelas WWTP will discharge into PAS Ponce. • Ponce WTP– raw water intake was relocated. Previously it obtained water from Toa Vaca lake and now is from Portugués River. This was an old intake that was rehabilitated in addition to repairs of sections of pipe.

5.5 Strategic Plan

PRASA's Executive Management Team completed the 2021-2025 Strategic Plan, which is aligned with the objectives included in the 2021 PRASA Fiscal Plan. The plan was revised and approved by PRASA's Governing Board. PRASA has reported that the new Strategic Plan maintains the basic elements of the previous plan while striving for PRASA's Goals and Vision. In addition, operational and performance KPIs and metrics were revised.

5.5.1 Key Performance Indicators

As per the strategic plan, PRASA developed new KPIs for FY2021. Table 5-4 summarizes PRASA's new KPI goals and results for FY2021 as of June 30, 2021.

Strategic Plan Initiative	Key Performance Indicator	FY2021 Goals	Results as of June 2021
	Drinking Water Compliance	Increase to 100%	99.97%
	Sampling Compliance	Increase to 100%	100%

Strategic Plan Initiative	Key Performance Indicator	FY2021 Goals	Results as of June 2021
Public Health & Environment Summary	Schedule Performance Index (SPI)	Reach 0.98 or Above	0.77
	NPDES Parameters Compliance	Maintain 97% or above	97.46%
	Average Lineal Feet Cleaned	100% (Reach 200,000 lineal feet per month)	78.86%
	Overflow Caused by FOG	Lower to 45%	61.92%
	People Reached per Campaign	100% (Reach 100,000 clients per month)	85.27%
Operational Efficiency Summary	Complaints in Customer Service (per 1000 Actives Accounts)	Reduce to 11.03 claims per month or Below	15.83 claims/month
	Average Time to Resolve Claims	Less than 15 min	19.16 min
	Service Interruptions	Reduce to 3.5% or Below	29.66%
	Cost Performance Index (CPI)	Reach 0.98 or Below	1.07
Leadership Development Summary	Training (Cumulative Hours per Employee)	More than 24.4 cumulative hrs per employee per year	15.36 hrs per employee
	Work Related Injuries	Reduce to 10 injuries per month	19.42 injuries per month
	Sickness absence days	Reduce to 4.81 days per FTE	2.61 days per FTE
	Employees per 1,000 Connection	3.07 or less Employees per 1,000 connections	2.78

Strategic Plan Initiative	Key Performance Indicator	FY2021 Goals	Results as of June 2021
Financial Sustainability Summary	Billing Adjustment	Less than 3%	5.67%
	Operating Expenses	100% (Spend $831,000 or Less per month)	96.03%[1]
	Self-Funded CIP	More than 25.00%	100%
Innovation & Accountability Summary	Process Digitalize	Reach 100%	94.26%
	Average Communication	Reach 100%	93.10%
	Employee Engagement Coverage	Reach 95%	75.08%[2]

[1]Results do not include the months of May or June 2021.
[2]Results do not include the month of November 2020.

5.6 Ongoing Programs and Initiatives

The following are programs and initiatives pursued by PRASA, some of which began development and implementation prior to FY2015. A brief description and status of each of these initiatives are provided below.

5.6.1 Integrated Maintenance Program (IMP)

The 2015 Consent Decree with USEPA and the 2006 PRDOH Agreement required that PRASA implement and continue to develop a comprehensive Integrated Preventive Maintenance Program, which evolved to the IMP during FY2013 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. Through this program, PRASA established a plan to enable programmed and continuous maintenance for treatment plants, pump stations, vehicles, and equipment to provide more reliable service, improve client satisfaction, and achieve long-term operational cost savings through the preservation of assets.

The 2015 USEPA Consent Decree included the requirement for PRASA to continue with the approved IMP, which includes the following key components:

- Recordkeeping
- Maintenance planning and scheduling
- Storeroom and inventory system
- Maintenance personnel training and organization
- Cost and budget for maintenance operations

Following the requirements established on the 2015 USEPA Consent Decree, PRASA has incorporated 100 percent of the facilities into the IMP. In addition, the SAP PM tool is being utilized to manage job itineraries that eventually are discussed during the Master Planning Schedule (MPS) meetings.

On-going IMP initiatives and programs include the following:

- IMP metrics are implemented, but they are not meeting goals. For example, one of the Metrics they wish to measure is repair times. But since the employees open the orders to note what was fixed, the actual repair time is not captured.
- Implementation of the new handheld (HH) technology that allows for more accurate work documentation and system updates in real-time has been implemented since August 2021. All work crews have a Sonim Handheld.
- Installation of flow meters at all water treatment facilities to measure production to be able to account for NRW. NRW staff installing larger WTPs and IMP staff the smaller WTPs. This initiative is ongoing and currently reporting through SCADA 76% of the water produced.
- Ongoing improvements to SAP PM for IMP processes optimization.
- Integration of IMP routes in SAP for optimization. It is still ongoing.
- IMP Procedures Revision initiative - The department has 12 procedures. 5 procedures have not been updated and are scheduled to be revised during FY2022.
- A predictive maintenance program for WTPs and WWTPs is in place for all regions. A contract was signed with an external consultant in April 2021. Some predictive maintenance techniques include ultrasound technology and vibration, among others, to ensure that the preventive maintenance is working properly and to predict future failures. The end goal of this initiative is to train PRASA personnel to continue the implementation of predictive maintenance internally; however, for the time being the program will continue to be subcontracted.
- The Corrosion Control Program was initiated during FY2021. Currently, PRASA is in the process of evaluating the most critical facilities to develop an action plan on a case-by-case basis. The Department has 895 facilities under the Program and of those, has currently visited and reported findings of 513 facilities. They have prepared a scope of work with a cost estimate for 466 of these facilities.
    - In collaboration with the Infrastructure Department, IMP intends to integrate the developed corrosion protocols into the design phase of CIP projects and IMP's projects.
- IMP Department began the installation of technologies for the visualization of water tanks. During FY2021, IMP achieved 79% visualization of all Water Storage Tanks. It is expected to reach 100% in the future.
- Acquisition, installation, and maintenance of EGUs to ensure systems redundancy. They have acquired and installed 191 EGU's and 25 Portable units Currently bidding Phase II – 99 units and Phase III - 55 units and are also evaluating the facilities for Phase IV.
- In FY2021, a Command Center *Centro de Excelencia* was implemented to assist planning, monitoring, assigning tasks for preventive and corrective maintenance, contracts, and all required documentation and data collection within the IMP Department's tasks and purview. Also, they currently have two offices for planning managed internally and the centralized services managed externally.
- In FY2021, an Asset Management Program for electro-mechanical equipment was developed. Currently, the Program has been implemented on 63% of the equipment and it is expected to reach full implementation during FY2022.

PRASA's IMP Department future initiatives and programs include the following:

- WPS visualization (New Technology Panels with the capacity to operate WPS) – The goal for FY2022 is to install at least ten new panels in each PRASA Region.
- MPS procedures are being revised to a more Planning focus, although monitoring status remains part of IMP staff meetings discussions. Develop a plan for remote monitoring of Wells. They expected that in March 2022 to have the plan.

Critical factors affecting PRASA's ability to implement the IMP efficiently are the fiscal situation and the limitations to hiring new staff. As stated by the IMP Department, a consistent issue is the difficulty of enforcing the program due to limitations on technical staff. PRASA needs to recruit additional staff to support the program. Currently, they have 148 vacant positions. Additionally, the lack of technical personnel adversely affects the KPIs tracking.

PRASA continues contracting external resources to provide repairs and maintenance services to critical equipment to ensure continuity of operations. It is important to mention that the IMP Department has an inventory of critical equipment available to avoid or limit service interruptions.

5.6.2 Non-Revenue Water Reductions Program

In May of 2008, PRASA began implementing its comprehensive NRW Reduction Program to reduce water losses (apparent and real), increase revenue, reduce operational costs, and minimize water infrastructure capital investments.

Reducing NRW is a high priority goal for PRASA, as it will have both a revenue enhancing and an expense reduction impact on PRASA's finances. In late 2011, PRASA retained the services of Miya, an NRW consultant, who completed a Report (May 2012) that identifies a series of short, mid, and long-term activities. Furthermore, as part of the NRW Management and Reduction Plan, PRASA established the Water Recovery Office and is now conducting periodic water audits (refer to Section 4), which are used to implement controls and develop action items to address NRW and meet the established goals.

As challenging as it has been, reducing NRW continues to be a top priority objective for PRASA. Hence, in pursuing PRASA's vision to achieve long-term sustainability, PRASA has included the reduction of NRW as one of the three key focus areas of the 2020 PRASA Fiscal Plan. To do so, PRASA has established three main programs for reducing physical losses to achieve a reduction by 41 MGD by FY2025. These programs are listed below:

- Master Meters – accurately measuring water production by installing water meters at critical facilities. The goal is to measure 92% of WTP production by FY2022.
- Pressure Management – incorporating pressure management best practices across the transmission and distribution network
- Leaks Detection and Reduction – improving identification, prioritization, and resolution of major leaks across PRASA assets.

Complementing these main programs, PRASA has other initiatives to replace the customers meters Islandwide and provide an advanced metering technology to obtain metering readings remotely.

During the implementation of these programs and initiatives, the WRO has encountered some issues which have hindered their implementation or affected their precision; these are:

- Installation – Locations – there is an opportunity to adjust and improve data collection to help reduce physical losses.

- Non-operational equipment
- Inaccuracy of Equipment or failure to properly calibrate
- Lack of maintenance in the PRASA facilities/assets

To address some of these issues, WRO is inspecting meters and installing new insertion meters (where run lengths upstream and downstream permit), which can be "hot tap", have expedite calibration, high accuracy (M36 standard) and are easy to replace. During FY2021, the office 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. Furthermore, the WRO will purchase a new meter that complies with the field conditions if the existing meter is not operational. During FY2022, more facilities will be visited and make the corresponding changes to meet the goal of 92% of the water produced by PRASA.

The WRO further established an NRW team (“TeamORA”) to include the Water Recovery Office staff and integrate operations 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.

5.6.2.1 Revenue Optimization Program

As part of the NRW Reduction Program, PRASA's strategy has focused mostly on revenue optimization (enhancing) initiatives, targeting apparent losses related to its commercial operation. Since 2009, PRASA has implemented a public-private effort that identifies new opportunities for revenue sources and optimizing collections. These activities, which include small and large meter changes, identifying theft and inactive accounts, disconnections, and collections efforts, among others, have resulted in significant additional revenue for PRASA over the past fiscal years. Historically, approximately $100M per year of PRASA's revenues (or about 10% of total Operating Revenues) is generated from these initiatives. This initiative has been on hold for the past years, but they hope to obtain the funds to continue for FY2023.

5.6.2.2 Accounts and Structures Validation Initiative

The WRO established the Accounts and Structures Validation Initiative (INVEC, by its Spanish acronym) in FY2015. This initiative has identified connections that are not already identified in PRASA's SAP customer database or georeferenced in PRASA's Geodatabase, thereby helping to identify and address illegal connections. For example, through INVEC, PRASA identified what is internally known as "red structures". Red structures are occupied housings located at a distance of 100 meters or less from PRASA infrastructure, as reported by GIS, that are not connected to PRASA system. Hence, these structures may be non-PRASA communities (communities with their own private water source) or illegal connections (theft, derivations).

An initial number of 300,000 accounts were identified. In its Geodatabase efforts for previous fiscal years, PRASA was able to narrow down this number to 265,505 by eliminating structures that were 600 square feet (sqft) or less and at a distance of six meters from a water meter to reduce the potential of keeping gazebos as structures. Then, PRASA searched for structures such as hotels and industries to also disregard those and further narrow the number down to 205,000 accounts. Thirteen percent (13%) of these accounts (26,000 accounts) were identified as communities with low economic resources that are illegally connected to PRASA (with service but without meters), known as the "yellow structures". These yellow structures are to be georeferenced in PRASA's

Geodatabase. PRASA intends to continue searching for schools and hospitals to reduce this number before going to the field for verification. However, this initiative was impacted by the effects of the 2017 Hurricanes and was put on hold during FY2018 and remained so through FY2021.

5.6.2.3 Water Leak Detection

To better understand the magnitude of hidden water leaks (physical losses) in PRASA's water system, in FY2013, PRASA carried out a project to detect leaks in the Arecibo and Caguas water distribution systems. Between the two systems, 600 miles of pipeline were surveyed. About 288 leaks were detected with an estimated flow of about 4.7 MGD. As a result of this project, PRASA confirmed that there are a significant number of undetected water leaks in their water system and estimated that there could be as much as 100 MGD being lost through undetected water leaks throughout the island. Therefore, PRASA's Executive Management Team believes that detection and repair of these leaks could significantly reduce the volume of PRASA's NRW.

Furthermore, in January 2014, PRASA expanded the leak detection project throughout the island. PRASA established a goal of surveying about 7,000 miles of water pipelines, Islandwide, over 18 months. The water pipeline inspection's goal was completed by June 2015 and a total of 3,800 leaks were detected. Moreover, as of December 2015, PRASA established a new goal of surveying about 3,500 miles of small meter water pipelines throughout the island and a total of about 25.5 miles of large meter water pipelines in selected areas. The bid process for this project was performed and a contractor was selected. However, this initiative was delayed due to the 2017 Hurricanes' impact.

To continue implementing the Water Leak Detection Program, which is to be performed in parallel with the Pressure Management Program, WRO started with a pilot program in Old San Juan, followed by several areas in the Metro Region. Ongoing efforts to expand throughout PRASA's Regions have continued; various regions have procured WRO leak detection services. A regional training program was implemented in FY2021, but the training was placed on hold because of lack of dedicated staff. The WRO also deployed their field employees to the South Region after the earthquakes in January 2020. The team detected and pinpointed leaks in Ponce and Guayanilla, subsequently repaired by South Region personnel. Currently, the WRO has actively been locating leaks, the Regional Department Director has notified them that they have water deficiencies. Several Leaks have been located.

The program tasks included, but were not limited to:

- *Sondeo Sonido* (Values) & Water Meters
- Data gathering (pre-location)
- Search for leaks (sounding, quantity of loss)
- Pinpointing leaks (OP 36 (Unreported leaks))
- Awareness, response, repairs

In addition, the team monetized the leaks by calculating the loss in gallons per minute (gpm) and assigning the cost of producing per gpm in terms of volume lost. This way, PRASA can interpret, prioritize and present urgent issues to the Executive Management Team.

Simultaneously, the Pressure Management Program was implemented by visiting valves located at Pumps stations and tanks. The field team commenced in the Metro Region and has expanded throughout all the

Regions. This exercise has allowed the WRO to have a database of the number of valves in the system and their condition. Tasks include:

- Tanks pressure gage validation
- Replacement & Decommission
- Tanks valves validation
- Replacement & Decommission
- Validation of valves in distribution
- Replacement & Decommission
- Pumps valves validation
- Replacement & Decommission

Also, as part of the pressure management initiative, 39 pressure zones have been identified, optimized, and monitored. These areas will be monitored through FY2022 to verify if the pressure in the zone is adequate. Once the areas function at an optimal pressure, new areas will be identified. The WRO continues to obtain additional funds to expand its field team. It has allowed the office to move to new areas, proactively locate leaks, and allow other crews to continue assisting regional directors in areas with water deficiencies. By the end of FY2022, they expect to have ten new crew members, who will be assigned two per region.

5.6.3 Comprehensive Energy Management Program

PRASA's energy cost is the second highest cost behind Payroll and Benefits. PRASA's energy cost has been mostly driven by energy consumption and the electric power costs (which in turn are mostly driven by fuel oil costs). PRASA's energy use, through Regional energy conservation measures[19], has reduced from 744 million kWh during FY2013 to 619 million kWh during FY2020. Energy costs were around 639 million kWh during FY2021 (consumption data based on PREPA/LUMA invoices as of July 2021). This current estimate may slightly increase as PREPA has pending retroactive adjustments to perform due, among others, to damaged measuring equipment.

PRASA continues its Comprehensive Energy Management Program to manage and reduce its energy consumption and costs. However, PRASA is only continuing one of the two programs previously engaged. As previously mentioned, the EPCs were canceled, and only the Solar PPA continues. Additionally, PRASA continues its internal initiatives and activities implemented by the operational Regions and PRASA's Infrastructure Department. A description of the different initiatives is provided in the following sub-sections.

5.6.3.1 Demand Side Projects through Energy Performance Contracts

The objective of this initiative, which began during FY2009, was to have Energy Service Companies (also referred to as ESCOs) perform assessments and guarantee savings obtained by installing equipment and implementing activities designed to reduce energy consumption. The most important benefit for PRASA in employing this type of performance contract is the operational benefit from improvements guaranteed by the ESCOs, i.e., if the energy savings are not achieved, the ESCO will pay PRASA for the non-achieved savings. However, the ESCOs savings guarantee extends until the investment is recovered and they have earned their agreed payments.

[19] For more details in Regional energy conservation measures refer to Section 5.4.2 Regional Updates: Challenges and Initiatives.

Unfortunately, as previously reported, PRASA encountered several issues with the contractor and achieving the Project's objective during the implementation of this initiative. It resulted in the cancellation of all EPCs. Therefore, this initiative continues to be suspended until further notice.

5.6.3.2 Supply Side Projects through Power Purchase Agreements

In 2009, PRASA also undertook a parallel process for procuring companies interested in providing independent energy supply services through PPAs. The objective is to secure one or more PPAs for lower energy unit costs per kWh than PRASA currently pays to PREPA. From this process, PRASA concluded successful agreements with three companies, of which one has been completed and is currently in operation. The gasification projects were canceled. Table 5-5 provides a status summary of the PPAs in place. For FY2021, PPA energy production was around 10.3 MM kWh. In addition, as of FY2021, PRASA has saved approximately $2.14MM (production average of approximately 10 million kWh per year) from the solar PPAs currently in operation. The ten facilities operating PPAs under contract with Windmar Renewable Energy 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
Guaynabo WTP	0.86
Aguada-Aguadilla WWTP	0.86
Humacao WWTP	0.86
Cayey WWTP	0.86
Culebra WWTP	0.49
Vieques WWTP	0.33
Arcadia WPS	0.19
TOTAL kWh	**11.30**

Lastly, PRASA has a list of 14 sites with potential for solar projects with an estimated capacity of approximately 16 MW. PRASA has shared this list with proponents that approach PRASA with the intent to submit non-solicited proposals, but, to date, none have been submitted.

5.7 Treatment Plant Automation Program

In prior years, PRASA embarked on a Treatment Plant Automation Program, which consisted of installing the necessary equipment and developing the system protocols to operate and remotely monitor its WTPs automatically. However, PRDOH requested that a WTP should not be maintained without operators for more than

four hours, implementing partially automated shifts following the 8-4-8-4 Automation plan. Consequently, PRDOH and PRASA agreed on an endorsement procedure prior to implementing 8-4-8-4 and remote operation; this meant that while plants can have Automatic Shutdown (ASD) or full automation capabilities, the WTPs must follow the endorsement procedure before implementation of reduced shifts or staff. In addition, PRASA Operations shall develop a scope of work for the improvements necessary at each selected facility to comply with the program. During FY2021, there was no activity under this program, as it is on hold for the time being. However, it is expected to resume during FY2023.

5.8 Conclusions

Compared to industry benchmarks published by the AWWA, PRASA's O&M costs are within industry standards. Despite certain O&M related observations made during facility inspections, PRASA's O&M practices are adequate. A common challenge identified through Operational Regions and departments was the lack of funding and personnel for O&M functions, fleet shortage and availability, aging infrastructure and lack of maintenance, length of time to complete and closeout work service orders, and the impact of COVID-19 on their day-to-day functions.

PRASA's main O&M efforts during FY2021 continued to focus on re-establishing the System in the aftermath of Hurricanes Irma and María and the 2020 Earthquakes. The CIP program is being reactivated to oversee capital improvement projects now that funds are being secured. Although some of the FY2021 planned O&M investments and key PRASA initiatives were ongoing, several have remained delayed or suspended due to the extraordinary events that affected the island in FY2021. PRASA activated the CIP during FY2021 and anticipates the implementation of projects will address some of the major System needs and issues. Also, the Strategic Plan was completed and approved during FY2021.

Lastly, PRASA's established new KPI for FY2021, and even though the results cannot be directly compared to other years, it is noticeable that PRASA is falling short on most of the established goals and needs improvement to meet those goals. PRASA was only able to meet six out of the 21 established KPIs or 29 percent. However, since the KPIs are new and this is the implementation year it may take PRASA some time to adjust, as such, they envision improvement on the next fiscal year.

6 Capital Improvement Program and Regulatory Compliance Status

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 and safeguard environmental quality while enabling continued economic development and meeting all regulatory requirements. In addition, PRASA has included the restoration of damaged infrastructure to its condition prior to 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 needs and sources of funds are identified, and as projects transition from pre-construction to the construction phase to finally reach start-up and commissioning. Historically, the CIP has been funded with external financing from bond issuances and federal assistance in accordance with standard utility financing practices. From 2006 to 2016, PRASA invested approximately $3.7B in its CIP to bring the System into compliance and supplement pre-existing capital needs from prior year funding shortfalls. The 2021 PRASA Fiscal Plan and public policies endorsed by PRASA's Governing Board include financing the CIP with federals funds and self-financing via PRASA's Operating Revenues.

The number and budget of projects are updated regularly, as the CIP is continuously evolving considering needs and as projects are completed. The CIP is subject to review and approval by PRASA's Governing Board.

The CIP presented in this Report refers to the six-year CIP as included in the 2021 PRASA Fiscal Plan. The approval and execution of this six-year CIP is contingent upon funding availability and allocation and approval by PRASA's Governing Board.

6.1.1 PRASA’s CIP Status

The Government's fiscal situation and resulting rating agency classification downgrades had a major impact on PRASA, as each downgrade also resulted in a consequential downgrade for PRASA. This limited PRASA's ability to access the capital markets to obtain financing to cover immediate CIP related expenses. As a result, PRASA began cost-cutting efforts on its CIP in 2014. It was customary for PRASA to use a portion of its operating funds to cover expenses for its CIP projects. However, in FY2016, after spending all of its surplus operating income and reserves to repay bond anticipation notes and cover a portion of its unfunded CIP, PRASA was forced to postpone or cancel the execution of all CIP projects; this included the suspension of 55 projects under construction totaling $352M and the cancellation of an additional 86 projects totaling $247M in investment. Notwithstanding, PRASA was able to pay off all outstanding payments due to contractors and CIP consultants.

During this fiscal year, PRASA was able to secure federal debt reprograming agreements with the United States Environmental Protection Agency (USEPA) and the United States Department of Agriculture (USDA), which has once again opened access to the State Revolving Funds (SRF) Program ($241 Million) and the Rural Development (RD) Program ($52.2 Million), respectively. In addition, PRASA was able to secure an obligation of $3.7 Billion from the Federal Emergency Management Agency (FEMA) for the CIP. Furthermore, PRASA was

able to restructure the debt and improve its rating, thus gaining access to the Bond Market for additional funding. Moreover, PRASA is actively requesting and searching for additional federal funding, like ARPA.

6.2 CIP Implementation Management

In FY2019, PRASA had initiated a procurement process to qualify and select program management consultants (PMCs) to support their Infrastructure Department in the planning, design, procurement, construction and management of the CIP projects in each of the five Regions. PRASA's vision is to partner with qualified and experienced program managers to oversee the implementation and management of CIP projects throughout pre-construction, construction and post-construction. As part of the pre-construction activities, the PMCs will 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 will serve as PRASA's representative on CIP projects and include managing project schedules, negotiating project change orders, and administering construction contracts. Finally, as part of the post-construction services, the PMCs will support project start-up, training, and closeout activities.

As previously stated, in September 2020, PRASA was able to start the CIP with one Consortium, and in late February 2021, negotiated the start of a second Consortium. In May 2021, the CIP added another Consortium, and lastly, in July 2021, the final Consortium approved was activated.

6.3 CIP: Project Distribution and Costs

CIP projects are divided into categories, groups, and types. Additionally, PRASA has implemented a prioritization system to manage the large and complex CIP better. Projects included in the CIP cover major capital improvements identified throughout all five Regions, as well as island-wide system improvement initiatives such as integration of technological advancements, telemetry implementation, and general R&R. The CIP was developed by PRASA with the following key points in mind: a) recovery of the system after hurricane impacts and focus on improving the System efficiency b) ensuring water quality, c) regulatory commitments as stipulated in consent decrees, administrative orders, and other agreements with Regulatory Agencies and d) 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 constructions 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, 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 need and to budget for the activities necessary to execute construction works. However, not all projects will require an additional 60% budgeting, as each project is evaluated on its specific characteristics and complexities.

Design costs typically use the College of Engineers and Land Surveyors of Puerto Rico (CIAPR, by its Spanish acronym) professional services compensation guidelines (vary by project type and complexity) and modified by local designers' 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 net construction cost, while contingencies were estimated to be about 10% of net construction cost. PRASA eliminated the annual inflation rate of 3.8% formerly used, considering the downturn in construction activity and lower project cost estimate results received during project bids. However, considering the construction materials cost increase after the 2017 Hurricanes, the COVID-19 pandemic, and the recent boom in construction, PRASA should reassess the previously described cost percentages used to determine the various stages of project lifecycle' cost.

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 are used to cover change order costs and miscellaneous expenses that may arise, such as additional land acquisition, permitting or design activities. Before the CIP suspension, PRASA reported that the existing contract change order percent in construction projects was approximately 3%, much lower than the typical industry average of 15-20%. The current CIP target for change order percent in construction is 5%, excluding the added scope of work.

6.3.1 Project Classification and Prioritization

CIP projects, as recently redefined in the 2021 PRASA Fiscal Plan, are classified into the following mandatory and non-mandatory categories:

- FEMA Accelerated Award Strategy (FAASt) or Reconstruction & Recovery Projects
- Renewal and Replacement (R&R)
- Compliance (Mandatory and Non-Mandatory)
- Quality
- Meters
- Fleet and IT
- Optimization and Emergencies
- Safety & Growth
- Others

FAASt or Reconstruction & Recovery Projects are projects to repair the infrastructure impacted by the 2017 Hurricanes to industry standards and based on a workplan submitted to FEMA on April 8, 2021. R&R are projects aimed at renewing or replacing aging infrastructure at or near the end of its useful life (pipelines, pumps, motors, etc.). The Compliance category covers projects required by agreements with USEPA & PRDOH (2015 USEPA Consent Decree projects, 2006 PRDOH Drinking Settlement Agreement projects, Civil Actions, administrative orders, court orders, and other mandatory projects), or that would be included in the future if not performed.

Quality projects are meant to increase the quality of the water and wastewater service provided to customers. Meters projects include the cost to replace meters to measure water consumption from PRASA's clients and master meters to measure water production. Fleet and IT are intended to replace vehicles in PRASA's fleet and improve IT infrastructure. Optimization and Emergencies projects aim to increase efficiency, mainly about electrical consumption and address infrastructure emergencies and contingencies. Safety and Growth projects allow for System growth and increased security at PRASA's facilities. The final category, Others, covers projects considered as necessary.

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, amongst 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 PRASA's 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 Project (10%). However, 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 in the PRASA's new 10-year Master Plan, which has been awarded and is expected to be completed during FY2022 or FY2023, contingent on the availability of the 2020 US Census data. The implementation schedule of future long-term projects will be subject to the prioritization system and PRASA's financial capacity.

Furthermore, with the CIP reactivation, PRASA began pursuing immediate restoration of all infrastructure damaged by the hurricanes and continued compliance with Regulatory Agencies. As such, PRASA has identified the following priorities:

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.
3. Construction projects that were stopped and postponed with the suspension of the CIP in 2016.
4. Renewal and replacement; needed to rehabilitate and replace its assets to maintain and improve its current levels of infrastructure performance.

6.3.2 CIP Metrics and KPIs

As included in the 2021 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 prior to the suspension of the CIP to ensure compliance with the forecasted execution schedules. The tracking tool is used to perform project time management, 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 gap causes that delayed projects. Moreover, PRASA is 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 will implement KPIs to allow for detailed tracking of CIP compliance and success and evaluate the Consortiums' performance. These include two construction industry standards in Cost Performance Index (CPI) and Schedule Performance Index (SPI). The CPI measures the cost efficiency of resources

committed to the project compared to the budget (assesses whether the project will be completed on budget). In contrast, the SPI measures the relationship between the executed work against planned work, assessing whether the project will be completed on time.

6.4 Six-Year CIP (FY2021-FY2026)

PRASA's six-year CIP for FY2021 through FY2026, as included in the 2021 PRASA Fiscal Plan, amounts to $2.87 Billion (B). Annual capital expenditures by project category are presented in Figure 6-1 and Table 6-1. As shown, the six-year CIP is mainly composed of Reconstruction & Recovery, R&R and Compliance projects, which account for 89% of the total forecasted expenditures.

Reconstruction and Recovery, totaling 65% of the total CIP, increased by over 300% to $1,861.8M and is now the largest category in terms of dollars throughout this CIP period. Renewal & Replacement category moves down to second, with an annual average expenditure of $48.8M and total of $292.7M (10% of total CIP) over six years. Historically, the majority of PRASA's CIP investment (about 60%) was for Mandatory and Non-Mandatory Compliance driven projects. This shift in priorities is mainly due to repair needs for infrastructure impacted by the 2017 Hurricanes, 2020 Earthquakes and higher prioritization of hardening efforts to transition to a more resilient System. Compliance projects are 13% of the total CIP with an allocation of $383.3M over the six years.

Compared to the 2020 PRASA Fiscal Plan six-year CIP ($1,704M), the 2021 PRASA Fiscal Plan CIP was increased by a total expenditure of about $162.1M, which is around a 9.5% increment. The difference is mainly accounted for by the increase of the Recovery & Reconstruction, as shown above. In contrast, the FY2021 PRASA Fiscal Plan did have some reductions in projects and expenditures in various categories, such as $194.3M (44%) in Renewal and Replacement, $63.7M (47%) in Quality, and $51.7M (12%) in Mandatory/Non-Mandatory Compliance, among others.

Table 6-1. Capital Improvement Program FY2021-FY2026 by Category ($, Million)

Project Category	Fiscal Year Ending June 30						2021-2026 Total
	2021	2022	2023	2024	2025	2026	
Reconstruction & Recovery	$24.3	$204.7	$325.5	$325.0	$356.3	$626.0	$1,861.8
Renewal & Replacement	$37.4	$92.6	$43.7	$42.0	$39.1	$37.9	$292.7
Compliance (Mandatory/Non-mandatory)	$23.5	$105.6	$132.5	$73.9	$24.7	$23.1	$383.3
Quality	$6.5	$26.8	$24.8	$9.9	$1.9	$1.4	$71.3
Meters	$17.4	$20.6	$13.8	$9.9	$4.6	$4.2	$70.5
Fleet & IT	$5.9	$29.2	$11.7	$6.7	$6.3	$6.1	$65.9
Emergencies & Contingencies	$-	$10.0	$9.7	$8.4	$7.8	$7.6	$43.5

Project Category	Fiscal Year Ending June 30						2021-2026 Total
	2021	2022	2023	2024	2025	2026	
Safety & Growth	$3.0	$5.7	$9.5	$7.6	$5.1	$0.6	$31.5
Others	$7.3	$20.4	$15.4	$0.7	$1.1	$0.7	$45.6
Total	**$125.3**	**$515.6**	**$586.6**	**$484.1**	**$446.9**	**$707.6**	**$2,866.1**

[1]Numbers may not add due to rounding.

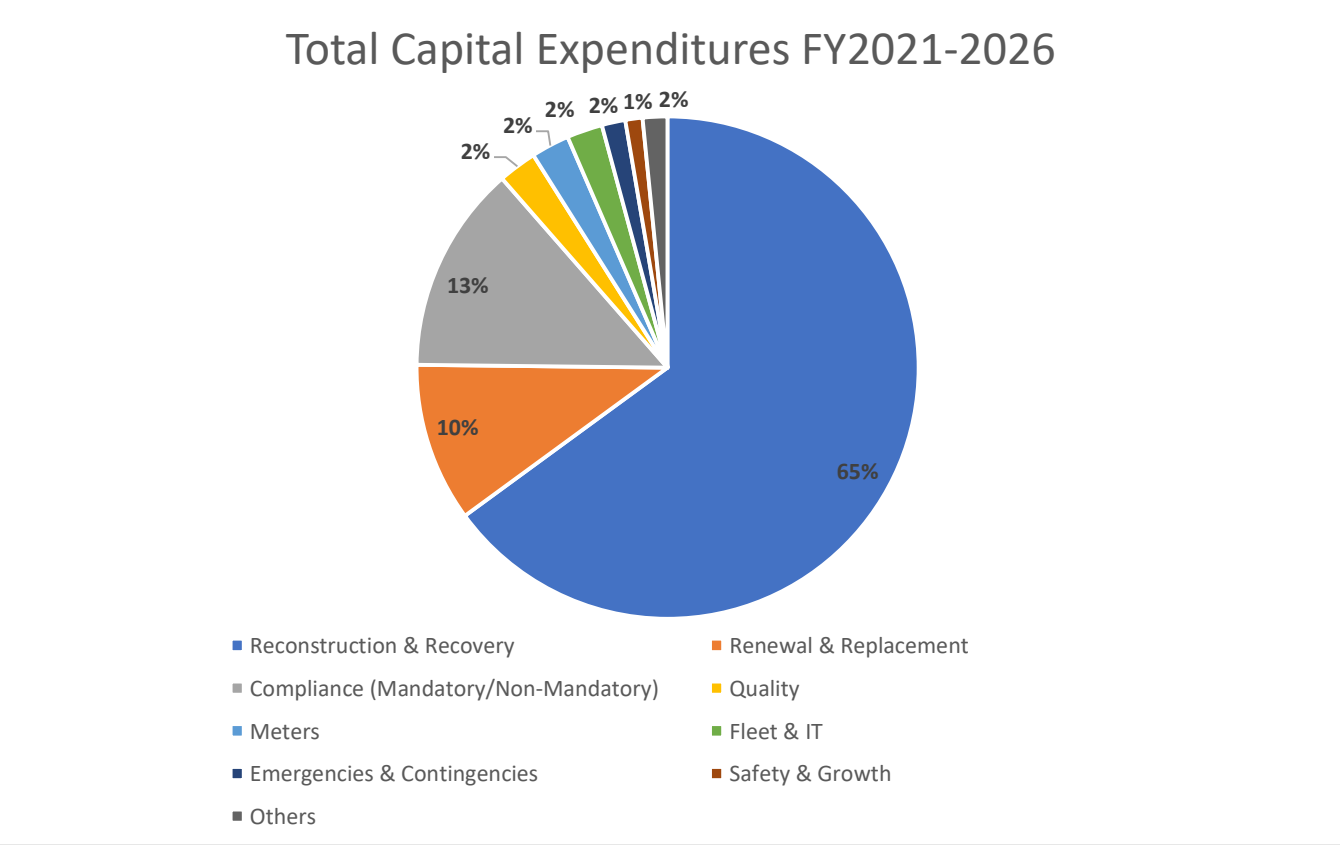

Figure 6-1. Six-Year CIP Capital Expenditures by Category

PRASA's six-year CIP consists of a total of 494 projects. As included in the CIP 2021-2026 certified by the FOMB, 91.5% are in the pre-construction stage (funding, planning, design, and bid), with about 80% of those starting at the planning stage, and 8.5% are in the construction and/or closeout stages.

PRASA has identified about 141 projects under the Reconstruction & Recovery category that have priority. Ten projects were identified for Renewal & Replacement, 53 to address Mandatory Compliance and 58 for Non-Mandatory Compliance. In addition, 76 projects focused on Quality, 64 on Growth and 33 on the Others category.

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 FY2021–FY2026 are estimated at approximately $855.2M. Approximately $107.6M is allocated for projects classified as Mandatory Compliance and approximately $669.4M is allocated for projects classified as Reconstruction & Recovery.

6.4.2 Wastewater System Projects

The wastewater system projects include works to improve compliance, new WWTPs, and upgrades to wastewater collection systems. Total capital expenditures in wastewater system projects for FY2021–FY2026 are estimated at $1,206.3M, of which approximately $159.4M is allocated for projects classified as Mandatory Compliance, $114.5M is allocated for projects classified as non-Mandatory Compliance and approximately $676.9M is allocated for projects classified as Reconstruction & Recovery.

6.4.3 Other Projects: Renovation & Replacement, Quality, Meters, and Electrical Generators, Safety, Fleet and IT, Emergency/Contingency, and Others

Total capital expenditures for all other capital projects are estimated at approximately $667.9M for FY2021 – FY2026. Approximately $320.8M 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 $78.1M allocated and Quality projects have $75M. Fleet and IT projects have $70.8M allocated, and Emergency/Contingency projects are budgeted at $50M. The remaining $73.2M is interspersed between Growth, Safety, and Others upgrades.

6.5 CIP and Current Regulatory Compliance

The six-year CIP main objectives are regulatory compliance with the existing 2015 USEPA Consent Decree and the 2006 PRDOH Settlement Agreement. In addition, they consider proposed modifications to said consent decree and agreement, as recently negotiated or in negotiations by and between PRASA and Regulatory Agencies. Nonetheless, it shall be noted that the actual cost of compliance with the consent decrees and agreements and PRASA's total capital expenditures may vary substantially depending on, among other things:

- Inflationary environment with respect to the costs of labor and supplies needed to implement the compliance program.
- Weather conditions that could adversely affect construction schedules and consumption patterns.
- Population trends and political and economic developments in Puerto Rico that 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.

- Inherent uncertainty involved in CIP projects of the magnitude undertaken by PRASA.

Until 2015, PRASA was subject to three consent decrees with USEPA and one settlement agreement with PRDOH to eliminate treatment plant non-compliance and unpermitted discharges of untreated sewage and improve the quality of potable water and STSs. Considering the challenges faced by PRASA, resulting from the continued uncertainty and strain on the Government's economy PRASA requested and negotiated amendments. It should be noted that PRASA substantially complies with the requirements of the consent decrees and agreements. In 2012, PRASA and the Regulatory Agencies began discussions to modify certain requirements of the consent decrees and agreements to re-align compliance priorities and, in turn, help alleviate PRASA's financial burden. After an extensive negotiation process and under the terms agreed upon by PRASA and USEPA, on September 15, 2015, the U.S. Department of Justice (USDOJ) filed the 2015 USEPA Consent Decree executed among USEPA, PRASA, and the Commonwealth of Puerto Rico in settlement of the matters addressed in a complaint brought against PRASA by USDOJ on behalf of USEPA also filed on such date. On May 23, 2016, the 2015 Consent Decree between USEPA and PRASA was officially logged and accepted by the Court, ending the extensive re-negotiation process. The 2015 USEPA Consent Decree consolidates and supersedes the three previous USEPA's Consent Decrees with PRASA (i.e., PRASA IV: 2003 Consent Decree, 2006 Wastewater Consent Decree and 2010 USEPA STS Consent Decree).

As for the PRDOH settlement agreement, the 2006 PRDOH Settlement Agreement, as amended, remains valid. PRASA restarted negotiation talks with PRDOH in January 2017. To date, PRASA has presented joint motions to PRDOH, and the re-negotiation of certain terms and conditions on the Term 2 and Term 3 mandatory projects have been accomplished, such as the re-negotiation of Juncos Urbano System. Refer to Section 6.5.2 for more details.

The consent decree and settlement agreement currently in effect with the Regulatory Agencies are:

- 2015 USEPA Consent Decree: U.S. v. PRASA and Commonwealth of Puerto Rico, Civil Action No. 15-2283 (JAG) – Addresses violations to the Section 301 and 402 of the CWA and regulations promulgated there under, and PRASA's NPDES permits with regards to PRASA's WWTPs, WWPSs and WTP's 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.

Until the two weather events in September 2017, Hurricanes Irma and María, PRASA had been in continuous compliance with the 2015 USEPA Consent Decree and the 2006 Settlement Agreement, as amended. In September 2017, upon declarations of "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. In June 2018, another letter was sent to the Regulatory Agencies requesting time extensions with their corresponding justifications due to the lack of funding to reactivate the CIP, the ongoing debt re-negotiation process, and the impact of the hurricanes. Essentially, PRASA requested a hold for a period to be determined for certain obligations and for stipulated penalties to be excused. Moreover, during FY2020, PRASA continued to carry over the operation and compliance challenges caused by the hurricanes Irma and María, which were exacerbated by several natural threats such as tropical storms (Dorian, Karen, Isaías, and Laura tropical storms) and earthquake, labor strikeout, and the COVID-19 pandemic that are detrimental to the already deteriorated facilities and its operations. Therefore, PRASA continues a re-negotiation process with USEPA and USDOJ regarding deadlines to comply with certain programs contemplated under the 2015 USEPA

Consent Decree. To support PRASA's Force Majeure claim, they met on several occasions via conference call and exchanged electronic correspondence to discuss technical matters and facility inspections. PRASA provided and obtained additional information from these meetings with USEPA. Regarding the additional threats that have impacted PRASA over the FY2020, PRASA has maintained continuous communication with the USEPA and DOJ, notifying the force majeure events that may delay performance or cause non-compliance of any obligation as stipulated by the 2015 USEPA Consent Decree section XXVII. Below is included a timeline of events that affected PRASA during FY2020.

- Tropical Storm Dorian – August 2019
- Labor Strike (24hrs) – September 2019
- Earthquakes – January 2020
- COVID-19 – March 2020
- Tropical Storm Isaias – July 2020
- Tropical Storm Laura – August 2020

Since the COVID-19 pandemic is an unprecedented situation worldwide, it became obvious that there was no certain way to handle the situation and no knowledge of the level of effort required to overcome all the challenges that came with it. Unquestionably, this resulted in additional obstacles for PRASA to continue the necessary efforts to achieve compliance with stipulations under the Consent Decree. As a result, PRASA sent communications to USEPA concerning the COVID-19 pandemic to invoke force majeure on March 16, 2020, and April 14, 2020. Subsequently, on April 23, 2020, a conference call was held, which outlined the discussions until the COVID-19 pandemic was recognized as a force majeure event.

There are ongoing discussions between PRASA, USEPA, and USDOJ concerning the Force Majeure protection that have resulted in the submission of Amendments. However, Force Majeure will remain until the new Amendments are approved. Conversely, there are ongoing negotiations with respect to the 2006 PRDOH Settlement Agreement. Therefore, at this time, no assurances can be given that the USEPA or the PRDOH will grant such project deadline extensions. However, PRASA remains positive and maintains open communication with the Regulatory Agencies.

PRASA continues the utilization of the MS Power Bi Compliance Monitoring Tool developed in 2019 to facilitate the review, monitoring, and tracking of the requirements of each program stipulated on the 2015 USEPA Consent Decree and the 2006 Settlement Agreement, as amended. PRASA will evaluate alternatives to proceed with a more robust and automated tool to prevent future issues associated with the dashboards' data refresh. In addition, PRASA will address any discrepancies reported between the information included in the progress report and the Compliance Monitoring Tool.

6.5.1 2015 USEPA Consent Decree Modifications

The 2015 USEPA Consent Decree includes the following modifications:

- Postponement or advancement in deadlines and completion dates of certain projects currently included in the CIP. Compliance deadlines were extended through approximately 2034.
- Scope of work revisions negotiated for certain projects to better address certain facilities' current needs.

- Elimination of certain projects from the consent decrees and agreements given that the facility: 1) is in compliance, 2) has declining population trends and the project no longer needs to be performed, or 3) because the project has already been completed and certified.
- The addition of new compliance projects (categorized as Other Regulatory Projects and New Mandatory Projects). Several projects not originally included in the consent decrees were negotiated to be included. Additional projects include capacity evaluation projects for compliance of STSs, I/I studies for the seven sanitary sewer systems covered by the first Sanitary Sewer System Evaluation Plan (SSSEP), and Caño Martin Peña/ENLACE projects. Also, PRASA shall develop and implement a second SSSEP for all other sanitary sewer systems by December 2016 (completed).
- The operation, maintenance, and capital improvement program requirements related to the Puerto Nuevo wastewater collection system include alleged CSWOs. Therefore, PRASA shall comply with all the requirements of its NPDES Permit and with the Permit concerning CSWOs. Furthermore, the most recent NPDES permit for the Puerto Nuevo WWTP requires that PRASA implement the Nine Minimum Control (NMC) measures, to be revised annually, and a Long-Term Control Plan (LTCP) for the Puerto Nuevo WWTP service area to address wastewater collection system and CSWOs occurrences. As such, PRASA undertook the development and design of a Sewer SSOMP or S2OMP for the Puerto Nuevo WWTP service area. The SSOMP will manage both the combined sewer systems and the sanitary sewer system requirements as stipulated in the NPDES permit (NMC and LTCP) and a comprehensive capacity, management, operations, and maintenance (CMOM) program for all the Puerto Nuevo sanitary sewer system. As required by the 2015 Consent Decree, PRASA submitted the SSOMP for USEPA's review and approval on June 30, 2016. By January 2017, USEPA commented on PRASA's SSOMP and approved it. In addition, PRASA was required to submit annual reports on the status of the implementation of the SSOMP. The first annual report was submitted to USEPA in May 2017. For the subsequent SSOMP Annual Reports, as discussed and agreed with USEPA, PRASA will submit a consolidated SSOMP Annual Report that shall include requirements of S2OMP Report, Nine Minimum Controls Report, Combined Sewer System Characterization, Monitoring and Modeling, and an annual electronic revision of the Puerto Nuevo RWWTP Sewer System in GIS format. The 2020 SSOMP Annual Report was submitted on May 28, 2021.
    - The following tasks, at a minimum, shall be performed by either PRASA personnel or a private contractor as part of the SSOMP: sewer system reconnaissance to enable complete inspections, observation, and cleaning of the sewers; fats, oil, and grease control; sewer cleaning; sanitary sewer overflows, dry-weather overflows and unauthorized release prevention and control; and mapping. Through these efforts, PRASA expects to identify System needs related to overflows (including CSWOs) and to be able to estimate better the effort and expected costs of a future repair plan. After the inspections are completed, if deemed necessary, within 60 days of completing the sewer system reconnaissance of the Puerto Nuevo WWTP service area, PRASA shall submit to USEPA for review and approval its proposed plan to undertake the Condition Assessment of the Puerto Nuevo WWTP sewer system, which shall include a series of remedial measures.
- Amendments to the interim limits. PRASA requested interim limits for its WTPs and WWTPs to comply with NPDES compliance parameters and newly implemented regulations regarding numeric nutrient criteria for nitrogen and phosphorus. It is anticipated that to comply with the lower discharge limits imposed and/or to be imposed by USEPA for these parameters and others, operational modifications and even additional capital improvements to treatment facilities may be required, which would be subject to the CIP Prioritization System.

- Development of a Prioritization System. The Prioritization System is a project scheduling methodology developed to provide an objective and systematic guideline to prioritize the implementation of infrastructure projects and required regulatory projects. Specific criteria were defined for each project category (water, wastewater, or STS), and a scoring methodology was developed to objectively prioritize, as much as possible, the list of projects. The criteria consider regulatory and environmental compliance, operational requirements and needs, and population served, among other characteristics. The prioritization system establishes the relative priority of all planned upcoming projects to allocate PRASA's limited financial resources according to such priority. Hence, for example, any projects to address future regulations would only be funded if included within PRASA's approved annual spending level and based on its priority score.
- Completion of scheduled mandatory projects under the Base List of projects, including high-priority mandatory compliance projects that have already started the process of planning, design, or construction and will not be subjected to the prioritization process. Specific deadlines for these high-priority projects were individually discussed and negotiated between PRASA and USEPA. As per information available for FY2021, completion dates for Base List projects continue as agreed.

6.5.2 2006 PRDOH Drinking Water Settlement Agreement Renegotiation between PRASA and PRDOH

The 2006 PRDOH Drinking Water Settlement Agreement with PRDOH re-negotiation status is as follows:

- PRASA and PRDOH requested a deadline extension for the Long Term 2 (LTP2) Juncos Urbano System projects (which included the elimination projects in Ceiba Sur WTP and the Quebrada Grande WTP) for a Long Term 3 (LTP3) deadline. In October 2018, PRASA presented Joint Motion KPE2006-0858 (904), in which the LTP3 deadline extension of December 2021 was granted. Additionally, to prevent future compliance exceedances in the Juncos Urbano System, several additional measures were included in the joint motion, which included, but is not limited to the following: more stringent drainage control measures, improvements to be performed at the Ceiba Sur WTP by December 2017, and measures to reduce water production to a maximum of 1 MGD at the Quebrada Grande WTP by February 2019. In May 2019, PRASA and PRDOH presented an Amendment to the joint motion for the Quebrada Grande WTP measure previously stated. Instead of limiting the water production to a 1MGD, PRASA would implement a series of procedures at an operational level. These procedures include but are not limited to adjustment and control of chlorine application in the treatment process to ensure that the required chlorine residual is maintained throughout the distribution system.
- On May 4, 2018, PRASA and PRDOH had a meeting to discuss several motions to LTP3 projects. As a result, a motion was revised and agreed upon on May 11, 2018. During FY2020, as per QSAR No. 50 (July 1 - September 30, 2020), PRASA met with the PRDOH on October 20, 2020, a proposal of additional remedial measures for Ceiba Sur WTP was issued while the construction of the Valenciano WTP was completed. Additional discussions regarding LTP3 projects and other Agreement requirements are ongoing as funding became available and projects were reactivated in FY2021.
- In addition to the 2006 PRDOH Drinking Water Settlement Agreement, PRASA has agreed with the PRDOH to prioritize the compliance projects required by the LTP2 Enhanced Surface Water Treatment Rule (ESWTR). This rule requires further treatment of cryptosporidium and other pathogenic microorganisms with the purpose of reducing the illness associated with them.

- Moreover, Joint Motion KPE2006-0858 (904) addresses Continuous Monitoring violations of the requirements stipulated in Appendix C-4 of the 2006 PRDOH Drinking Water Settlement Agreement for Aguadilla Urbano WTP. The joint motion specifically includes additional remedial measures determined to address DBP violations. Several additional measures were included to address DBPs exceedances and meet compliance with these requirements, such as monthly monitoring, tank repairs and cleaning, rehabilitation of filter units, implementing and maintaining pipelines and tanks flushing program, and operational adjustments.
- As of FY2021, still pending to complete the eight LTP3 projects for the following systems: Culebras, Río Blanco, Juncos Urbano, Canalizo, Frontón, La Pica, and Monte del Estado. Although the completion deadline for the LTP3 is December 31, 2021, Ceiba Sur WTP is included on the CIP list, and Culebra WTP and La Pica WTP are included in the Prioritization List of the 2015 USEPA Consent Decree Appendix H and I. Currently, PRASA is renegotiating with the PRDOH revised completion deadlines.

6.5.3 Consent Decrees and Agreements 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. In the preparation of this CER, Arcadis reviewed the following progress reports, submitted to Regulatory Agencies:

- 2015 USEPA Consent Decree Biannual Progress Report (BPR) No. 11 covers the period from September 1, 2020, to February 28, 2021; and No. 12 covers the period from March 1, 2021, to August 31, 2021.
- 2006 PRDOH Agreement Quarterly Progress Reports: No. 50, covering the period from July 1 to September 30, 2020; No. 51, covering the period from October 1 to December 31, 2020; No. 52, covering the period from January 1, 2021, to March 31, 2021; No. 53, covering the period from April 1 to June 30, 2021; and No. 54, covering the period from July 1 to September 30, 2021

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

6.5.3.1 2015 USEPA Consent Decree, Civil Actions No. 15-2283 (JAG)

The 2015 USEPA Consent Decree requires PRASA to submit BPRs. BPRs No. 10, No. 11, and No. 12, covering from March 1, 2020, to August 31, 2021, were considered for this section.

- PRASA had been in significant compliance with the consent decree and yet pressed by the aftermath of the 2017 Hurricanes. The efforts needed to restore the System and sustain operations made continued work pursuant to the consent decree extremely difficult and impossible in some cases. In addition, PRASA is still facing significant challenges in the recovery process after the 2017 Hurricanes due to funding and staffing limitations. Moreover, in FY2021, PRASA continued handling the aftermath of natural threats such as tropical storms and earthquakes, labor strikes, and the COVID-19 pandemic, which prolonged the already delayed recovery process. However, after the CIP was reactivated in September 2020, PRASA has slowly moved forward with prioritized projects for compliance and capital improvement projects.
- To such effect, PRASA requested Force Majeure protection for ongoing and upcoming work and deadlines and stipulated penalties under the 2015 USEPA Consent Decree. In addition, due to the COVID-19 pandemic, Force Majeure was invoked on March 12, 2020, and approved on April 23, 2020.
- PRASA, EPA, and USDOJ are currently working towards presenting in court a partial modification of the 2015 USEPA Consent Decree to address the effects of Force Majeure Events.

- On July 26, 2019, PRASA reached a debt restructuring agreement with the funding programs of the Clean Water and Drinking Water State Revolving Funds (CWSRF and DWSRF, respectively). This initiative allows PRASA access to the funds needed to execute CIPs included in Appendices H and J of the 2015 USEPA Consent Decree. New proposed dates for the Base List were presented to USEPA on October 17, 2019. Dates assumed that the funding agreements would be effective in 2019; however, this did not occur as planned due to delays in finalizing the new financial agreements with CWSR and DWSRF. While funding agreements were secured, PRASA started the design and permitting updates and the construction procurement process of the projects that could be started as internal funding sources became available. As a result, the Base List projects' agreed upon revised completion dates continue as planned.
- PRASA is currently working on achieving the revised dates of projects in Appendices H and J; whose expected start date was delayed due to delays in securing the SRF loans and the impact of the COVID-19 pandemic. Therefore, as of August 2021, a revision of the priority list projects of the Prioritization System has not changed and PRASA recommends allowing further progress of the Base List projects before changes are made.
- As reported by PRASA, the reasons that impaired compliance efforts after the 2017 Hurricanes followed in 2020 by earthquakes and the COVID-19 pandemic were, or a combination thereof, due to but not limited to:
  - Lack of electricity and/or water
  - Fuel shortage
  - No or poor communication
  - Providing and sustaining operation of installations and equipment with alternate power
  - Destruction or damages to PRASA installations and equipment, including Caguas Central Laboratory's destruction
  - Lack of access to equipment within installations
  - Logistics
  - Emergency and recovery phase priorities
  - The inability of personnel to report to work
  - Deployment of personnel available to attend emergencies and alternate supply of water and sewer services
  - Reestablishment of water and sewer services
  - Reinitiating and reopening of offices and installations
  - Challenges in operation logistics of facilities aligned to COVID-19 safety protocols
  - Limitations in PPE for all employees required to report on-site
  - Resources for remote work for administrative and support personnel

The 2015 USEPA Consent Decree specifies that PRASA shall continue implementing systemwide remedial measures at all WTPs, STS, and WWTPs and their corresponding Sewer Systems owned/operated by PRASA.

- Remedial Measures: included in the 2015 USEPA Consent Decree Appendix H (Base List for Remedial Measures to address wash water discharges at WTPs), Appendix I (Capital Projects subject to Prioritization) and Appendix J (Base List of Remedial Measures for WWTPs). Compliance dates were renegotiated with USEPA and vary among projects.

- All remedial measures regarding wash water discharges as included in the Base List were addressed by February 29, 2016, except for the Ceiba Sur WTP Elimination, which is scheduled for completion October 2025 as per an extension requested to USEPA as part of the ongoing discussions regarding the modifications to the 2015 USEPA Consent Decree. The proposed completion date is subject to the completion of a financial agreement based on debt restructuring reached for funding under CWA and SDWA revolving funds. PRASA's requested extension is under review and discussions with USEPA.
- Also, as stipulated by paragraphs 11 and 12 of the 2015 USEPA Consent Decree, flow meter devices with flow totalizers and level indicators were installed at the point of discharge for most WTPs; however, there are several flow meters and totalizers, and high-level alarms that were reported out of service on Table 1 and 2 of the Joint Bi-Annual Progress Report No.11 & No.12. A total of six flow meters, totalizers, and two high-level alarms were reported out of service for FY2021. These are expected to be repaired by December 2022.
- As for the WWTPs remedial measures, despite the best efforts taken to implement an infrastructure program to fulfill the commitments established with the Regulatory Agencies, PRASA requested another extension included the Force Majeure component. PRASA presented to the USEPA the nine outstanding projects as part of the ongoing modification discussion of the 2015 USEPA Consent Decree. The requested extension includes the new completion dates, subject to the financial agreement terms established on the CWSRF and DWSRF debt restructuring. In FY2021, the CIP was reactivated and PRASA slowly began to work with some of the high-priority projects of the WWTPs Remedial Measures. A list of projects is included in BPR No.12 Appendix #2.
- PRASA previously completed an analysis of the rain and wastewater flow relationships and infiltration/inflow (I/I) studies for 45 WWTPs. Repair projects for the Sewer Systems with completed I/I studies are included in the Prioritization List with expected completion by 2034. As a result of the Force Majeure events impact on projects schedule in Appendices H, I, and J included on the 2015 USEPA Consent Decree need review and may require changes to meet this requirement. For those reasons, PRASA is currently under re-negotiation regarding this matter.

- Modification/Prioritization of Remedial Measures:
  - In a letter dated December 15, 2016, to the USEPA and the USDOJ, PRASA requested a modification of the expected compliance dates established in the Consent Decree Appendices H and J (Base List Projects). The request is premised on the recognized fiscal crisis that the Government of Puerto Rico confronts and its cumbersome path towards recovery that has impacted PRASA's financial conditions and continuity of its CIP. The proposed revised compliance dates requested assumed that the CIP would be reactivated by January 2018, which did not occur. Since the CIP was not reactivated as planned in addition to the Force Majeure notification, the expected compliance dates established in Appendices H, I, and J of the 2015 USEPA Consent Decree may require changes to address the need to develop new or modified projects. PRASA presented this during the ongoing discussion with the USEPA.

The following presents a status summary of the applicable programs, standards, and special conditions of probation:

- Sludge Treatment Systems at WTP: Paragraphs 13 and 14 in section VI of the 2015 USEPA Consent Decree stipulates that any new PRASA WTP that begins operation after the day of lodging shall include an alternative power unit (APU) and an STS with sufficient hydraulic capacity to manage wash water discharges. There were no new STS constructed for the period covered in the BPRs No.11 and 12.

- SSOMP Program and Condition Assessment Program for the Puerto Nuevo WWTP sewer system: PRASA submitted the SSOMP on June 30, 2016, for comments and approval by USEPA. On May 1, 2017, the Puerto Nuevo 2016 SSOMP Annual Report was submitted to the USEPA. As stated in previous Bi-Annual Reports, USEPA agreed upon the submission of a consolidated SSOMP Annual Report beginning May 2019 until the Consent Decree terminates. Despite the Force Majeure invoked for the COVID-19 pandemic, PRASA met the submittal date of May 2020 for the Consolidated S2OMP on May 28, 2021.
  - As of August 31, 2021, PRASA has recognized over 1 million linear feet of pipelines connected to the Puerto Nuevo WWTP system. From the period covered in the Bi-Annual Report No.11 and 12, September 1, 2020, through August 31, 2021, PRASA completed the reconnaissance of an additional 92,000 linear feet for a total of 98% of the High Priority Areas. In addition, PRASA completed reconnaissance of 86% of sewer lines greater than 30-inches. As part of PRASA, USEPA, and USDOJ discussions regarding delays caused by the Force Majeure events, an extension of the Sewer System Reconnaissance High Priority Area deadline was sought after for June 2021 for all sewer lines with a diameter less than 30-inch. Based on the information included in the BPRs covered within this report, there was no information to confirm if the deadline was achieved. For the sewer lines with diameters of 30-inch or greater located within the High Priority Areas, PRASA scheduled and divided the project into 4 phases to complete reconnaissance by June 30, 2026. No illegal interconnections to the Puerto Nuevo WWTP sewer system were found during the period evaluated.
  - By August 31, 2021, the following has been found or achieved regarding the Puerto Nuevo WWTP sewer system:
  - Cleaning or identifying approximately a total of 892,000 linear feet (LF) of sanitary sewer pipeline. Below is included a summary of sewer lines less than 30-inch cleaned during the evaluated period:
    - September 1, 2020 – February 28, 2021: 91,500 LF
    - March 1, 2021 – August 31st, 2021: 13,700 LF
  - PRASA is currently performing sanitary sewer cleaning activities through private contractors.
  - From September 1, 2020, to August 31, 2021, 23 sewer line defects were identified within the Puerto Nuevo WWTP sewer system. Since SSOMP implementation, 229 sanitary sewer defects have been identified, and 198 sanitary sewer defects have been corrected. Additionally, seven sewer defects were identified to be corrected under the CIP. By August 2021, three of them had already been completed.
  - PRASA seeks modification of the one-year period to correct defects that hinder the operation of the Puerto Nuevo RWWTP sewer system. As part of the ongoing discussion between EPA/DOJ 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. Currently under review of EPA/DOJ to determine if it will be incorporated in the Consent Decree.
  - A delay was encountered as a result of the Force Majeure Event schedule. PRASA performed a pilot study to evaluate flow/level monitoring technologies within the Puerto Nuevo RWWTP collection system and CSO outfalls. This study demonstrated that the technologies evaluated were inadequate to estimate discharge flow due to the physical configuration of outfalls and upstream sewer hydraulic conditions. Nonetheless, PRASA continues to investigate options to monitor the occurrence of discharges from CSWO outfalls and means to estimate the discharge flow. Meanwhile, PRASA acquired level monitors with cellular connectivity for long deployment at the CSWO outfalls. In FY2020, these units were installed to help PRASA monitor the occurrence of discharges and assess the conditions that may lead to overflows. PRASA has deployed this technology to help prevent DWOs with continuous monitoring of

sewer flow depth. The data gathered is used to initiate preventive sewer cleaning or investigations before an overflow occurs if an increasing flow level trend is observed and a pre-determined threshold value is reached. PRASA continues to perform site inspections of the CSWO outfalls and will continue to inform USEPA of DWO events.

- Puerto Nuevo WWTP sewer system initiatives, PRASA's SSOMP Program, and status of FOG Program:
- Orientations and meetings were held with food associations, non-profit organizations, government agencies and municipalities to discuss the requirements and guidelines of the program. The inspections schedule was established according to the Prioritization System.
- PRASA continues the public educational campaign entitled: *Tuberías Limpias*. The campaign's goal is to educate citizens, establishments, and industries about the proper management of fats, oils, and grease. In addition, the campaign has a presence in mass media and social media.
- PRASA continues with the inspection of establishments under the FOG Control Program. The inspections schedule was established according to the Prioritization System of the program. During inspections, educational material was provided to business owners and general managers. Summary of inspections conducted from September 1, 2020, to August 31, 2021, are included in Table 6-2 below:

Table 6-2. Summary of FOG Program Inspections September 2020 to August 2021

Region	Number of Inspections
Metro	2,577
North	1,816
South	3000
East	1,916
West	1,384
Total	**10,693**

- As reported in BPRs No.11 and 12, no Dry Weather Overflows (DWOs) events occurred during this reporting period.
- PRASA continues utilizing the pictographic method approved by USEPA to approximate Sanitary Sewer Overflow (SSOs) or Unauthorized Release. This method identifies through comparison the approximate overflow flow rate in gallons per minute (gpm). Guided training on the selected method was provided to all PRASA personnel associated with sanitary sewer system duties and the 24-hour overflow notification.
- Status updates of SSO events reported in Joint BPRs No.9 and 10 are as follow:
  - #517 Lippitt St., Bo. Obrero, San Juan – completed on November 2, 2020
  - Alda St., Cupey – Completed on November 7, 2020
  - Int. Mayagüez St. and Ponce de León Ave., Hato Rey – completed on November 25, 2020

  - All the SSO events reported in BPR No. 11 were corrected within six months. Nonetheless, there were three sanitary sewer overflow events reported in BPR No. 12 as not corrected within six months of the date identified:
    - San José Industrial Zone, in front of the baseball park – expected completion date November 2021
    - Villas de Paraiso, Barbosa Ave., corner of Calle Duarte 265 – expected completion date November 2021
    - Bda Sabana Llana 334, Libertad Street – Expected completion date January 2022
- Caño Martin Peña Projects: None of these projects were performed during the period of September 2020 to August 2021. These projects are contingent upon the completion of related prerequisite projects to be developed by parties not affiliated with PRASA.
- Puerto Nuevo WWTP Sewer System Evaluation and Repairs:
  - Paragraph 34 of the consent decree establishes that a study and mapping of the Barriada Figueroa Sanitary Sewer System shall be completed and submitted by December 1, 2016. However, PRASA submitted a sewer inventory and mapping project status report on March 17, 2017. The final report was submitted to EPA on March 29, 2019. Therefore, this requirement has been completed.
  - As agreed with USEPA, PRASA will include the Puerto Nuevo RWWTP revised maps as part of the consolidated S2OMP Annual Report to be submitted in May each year. However, due to the Force Majeure invoked as a result of the impact of the COVID-19 pandemic, USEPA granted an extension up to November 2020 for the submittal of the 2019 S2OMP Annual Report.
    - 2019 S2OMP Annual Report – submitted in November 2020
    - 2020 S2OMP Annual Report – submitted in May 2021
  - Sewer Systems and Mapping Projects:
    - PRASA GIS Maps within the Barriada Figueroa basin continue to be updated after sewer cleaning of the area was performed. PRASA awarded several projects to clean high-priority basins based on observing maintenance problems related to FOG, sediment buildup, debris, or roots.
    - PRASA established a minimum of two-year revisit frequency for some areas within the High-Priority Area and documented it in PRASA's GIS.
    - PRASA's contractors will be phased out as the SSMC to maintain a consistent level of predictivity.
    - PRASA has cleaned or identified as cleaned approximately 801,000 linear feet of sewer lines that were identified by sewer reconnaissance within the High Priority Areas as requiring cleaning.
    - Cumulative percentage of High Priority Area is defined by sewer pipelines that have been cleaned once or identified as cleaned at least once in the asset's lifetime as documented within the PRASA GIS. PRASA has completed approximately 95% of the cleaning of the High Priority Areas as of September 2021.
    - Specialized contractors will perform large diameter sewer cleaning through public bid processes within the CIP prioritization process.
- Several areas of concern (19) 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 on Paragraph 36 of the Consent Decree; the request was granted. In addition, in May 2019, PRASA submitted a request to USEPA to include a new location to the Area of Concern List as established on the 2015 USEPA Consent Decree for a total of 17 active Areas of Concern. Inspections and educational campaigns were completed following the frequency stipulated in the Consent Decree.

- Interim Effluent Limits for WTPs and WWTPs: PRASA has continued to monitor compliance with the interim limits as established in Appendices S and T (Interim Effluent Limits for WWTPs and WTPs) and final NPDES limits. Notwithstanding, the Force Majeure events' impact on treatment facilities and water sampling equipment has affected PRASA's effluent monitoring data activities. Therefore, PRASA has not fully met its water quality sampling and analysis and reporting obligations under the CWA and 2015 USEPA Consent Decree for all its facilities despite preparatory measures and best efforts. The reasons attributable to PRASA's inability to do so were and are:
  - Water Quality Sampling: PRASA operated with a Central Laboratory located in the Municipality of Caguas and satellite laboratories in the Municipalities of Arecibo, Mayagüez and Ponce. The Caguas Laboratory, PRASA's full-scale laboratory, was severely damaged by Hurricane María. As stated on BPR No. 6, PRASA resumed discharge sampling and analysis of the 51 WWTPs and 113 WTPs for the STS. PRASA established a temporary lab nearby the Caguas Laboratory, while the new Central Lab is finalized. PRASA Central Laboratory demolition phase was completed during FY2020, and the design/build phase is undergoing. The project is currently under construction (48.5%) and substantial completion is expected in August 2022. The temporary lab is partially certified, still handling approximately 60-70% of analysis requirements. Therefore, private laboratories are still under contract for the bulk of the water sampling and analysis.
    - NPDES Permit Compliance, Interim and Financial Limits: PRASA's compliance with NPDES permit limitations at its WWTPs, WTPs, and STSs were too jeopardized by the passing of the hurricanes. PRASA's compliance with permit and 2015 USEPA Consent Decree limitations is compromised until facilities and sewer lines repairs are completed. In addition, during FY2020, PRASA experienced several natural threats such as the Earthquakes of the South and COVID-19 pandemic forced them to invoke Force Majeure as stated in the Consent Decree. For NPDES obligations not being complied with, including new restrictive limits of some parameters, PRASA continues to seek interim limits protection. Nonetheless, as a result of the reactivation of the CIP program, 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 eliminate issues associated to non-compliance.
    - There were negotiations of Interim Limits for the period covered by the BPRs No.11 and 12. Appendix 9 BPR No.12 includes a letter of the Interim Limits Re-negotiation Summary during this period sent on to USEPA. Parameters renegotiated include Total Dissolved Solids, Dissolved Oxygen, Enterococci, Phosphorus, Total Nitrogen, Copper, Cadmium, Silver, Zinc, Lead, etc.
- PRASA's IMP: FEMA and USACE are collaborating with PRASA in obtaining and providing EGUs for PRASA installations. As of August 31, 2019, a total of 34 EUGs provided by FEMA and other 62 rented EUGs were installed at multiple PRASA locations. The equipment calibrations were performed as usual; however, corrective maintenance was executed with limitations. As stated on the Bi-Annual Reports No.11 and No. 12 for the period covered, preventive and corrective maintenance continues being implemented with limitations

due to Force Majeure events. The program is currently working with Human Resources Department in recruiting and towards the restructuration of the IMP. Calibrations are being performed as required.

  - Corrosion Control Program (CCP): Although PRASA met the deadline of June 1, 2017, to submit the CCP, per the USEPA approved extension, the effects of the 2017 Hurricanes impaired the development of such program. Even though PRASA began implementing the CCP with site visits on September 3, 2019, the program's progress was again delayed due to additional Force Majeure events such as Earthquakes of the South and the COVID-19 pandemic that occurred during FY2020. Heightening the latest sources for delays is the limitation of personnel and funding.

- Operator Training Program: Per paragraph 56 of the 2015 USEPA Consent Decree stipulate 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. From September 1, 2020, to August 31, 2021, PRASA hired 48 operators. Only one operator completed the NPDES training, and 24 are still within the six months window from the hiring date. The remaining 23 exceeded the six months period. Therefore, the NPDES training requirement was not fully undertaken. The training delay was mainly caused due to the Force Majeure events in FY2020. Due to Force Majeure, PRASA will offer NPDES training via online modality. However, NPDES training requirement was not fully undertaken. Furthermore, for the period covered on BPR No. 11, PRASA offered 153 training courses included in the approved training program. In accordance with the recent restructuring of the Directorate of Training and Continued Education, improvements to SAP are ongoing to accommodate and adjust the needs as part of the automation process changes regarding PRASA's training program.
- Process Control Systems (PCSs): PCSs are being implemented at PRASA's WTP STSs and WWTPs as stipulated by Paragraph 59 of the 2015 USEPA Consent Decree. During the period covered on the BPP No.11 and 12, the PCS revision and updated requirements are part of the ongoing Consent Decree modification expected to be filed before the Court. PRASA implemented the revised and updated PCSs at the STSs and WWTPs in the Metro and West Regions. For East, North, and South Regions, according to the schedule discussed with USEPA, the PCS revisions and updates are expected to be completed by June 30, 2022.
- Spill Response and Cleanup Plan (SRCP): The review process of the updated SRCP submitted was interrupted by the 2017 Hurricanes. Moreover, further discussions between USEPA and PRASA regarding the SRCP updates were delayed due to implications associated with the COVID-19 pandemic. Notwithstanding, PRASA and USEPA met to discuss comments in the approval process.
- Monitoring, records, and reporting requirements for Unpermitted STS: Section XIX, Paragraph 66 of the Consent Decree, the STSs identified pending NPDES Permit applications at the time of lodging of the Consent Decree and their NPDES Permit status is:
  - For the period covered on the BPRs No.11 and No.12, all PRASA's STSs have a final NPDES Permit.
- WWTP Capacity and Flow Management: PRASA reported that Force Majeure events impact to treatment facilities have affected PRASA's flow monitoring equipment and flow monitoring activities.
  - Wastewater Treatment Capacity and Flow Management: Following paragraphs 70 and 71 of the 2015 Consent Decree, flow meter devices with flow totalizers and level indicators were installed at the point of discharge of most WWTPs; however, there were only two facilities that reported equipment (flow meters and/or totalizers) out of service on the BPRs No.11 and 12 that are expected to be repaired between May 2021 and November 2021.

Stipulated Penalties: From September 1, 2021, to August 31, 2021, consisting of BPRs No.11 and 12, penalties were not assessed or adjudicated due to the Force Majeure protection still in force.

6.5.3.2 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 Reports (QSAR). Arcadis reviewed QSARs number 50 through 53, covering the period from July 1, 2020, through September 30, 2021. Section VII of the 2006 PRDOH Settlement Agreement states that PRASA will implement remedial actions in multiple systems or components. These remedial measures are classified as short, mid, and long-term remedial measures. A summary of the status of the remedial actions as of September 30, 2021, is described below.

- Long-Term Measures 3: As of the period evaluated, July 1, 2020, through September 30, 2021 (QSAR No.54), none of the eight outstanding projects were completed. The eight projects are: Monte del Estado WTP, La Pica WTP, Frontón WTP, Canalizo WTP, El Duque WTP, Culebras WTP, the elimination of Ceiba Sur WTP and Quebrada Grande WTP. As previously mentioned, the elimination of Ceiba Sur WTP and Quebrada Grande WTP were LTP2 projects renegotiated via a joint motion with PRDOH to be completed under Term 3 projects. PRASA submitted to PRDOH a proposal including interim remedial measures for Ceiba Sur WTP regarding these LTP2 projects. These measures will stand until the construction of Valenciano WTP is completed and these plants can be eliminated. The El Duque WTP and Canalizo WTP remedial measures that originally considered its elimination were modified as per re-negotiations between PRASA and PRDOH. These facilities will no longer be eliminated because they are essential to supply the water demand in their respective areas. In addition, PRASA requested a modification to the Monte del Estado WTP remedial measure to consider the facility's rehabilitation instead of its elimination as originally contemplated, along with a deadline extension to December 2026. Culebras WTP improvements are currently in progress; however, due to delays in materials delivery, the PRDOH approved a completion deadline extension for March 2022.

The following LTP3 projects are included as part of the CIP program and completion deadlines are aligned to PRASA Prioritization List:

  - Frontón WTP – December 2025
  - Canalizo WTP – December 2027
  - La Pica – December 2028

- Continuous Monitoring Program: Section VII of the Settlement Agreement states that PRASA shall implement a Continuous Monitoring Program in all the WTPs. Continuous monitoring is implemented at each individual filter effluent and in the combined filter effluent. Each month PRASA submits to the PRDOH a compliance certification, which is included in each of the corresponding Settlement Agreement Reports.
  - QSAR No.50 states that PRASA submitted the required compliance certification and the status of the Continuous Monitoring Equipment for the period of July, August, and September 2020 to the PRDOH as agreed in Section VII of the Settlement Agreement.
  - QSAR No. 51 states that PRASA submitted the required compliance certification and the status of the Continuous Monitoring Equipment for the period of October, November, and December 2020 to the PRDOH as agreed in Section VII of the Settlement Agreement.

  - QSAR No. 52 states that PRASA submitted the required compliance certification and the Continuous Monitoring Equipment status for January, February, and March 2021 to the PRDOH as agreed in Section VII of the Settlement Agreement.
  - QSAR No. 53 states that PRASA submitted the required compliance certification and the Continuous Monitoring Equipment status for April, May, and June 2021 to the PRDOH as agreed in Section VII of the Settlement Agreement.
  - QSAR No. 54 states that PRASA submitted the required compliance certification and the status of the Continuous Monitoring Equipment for the period of July, August, and September 2021 to the PRDOH as agreed in Section VII of the Settlement Agreement.

- Process Control Program: Section VII of the Settlement Agreement states that PRASA shall develop a program aimed to optimize treatment processes to be implemented in larger systems. As per the QSARs reviewed, PRASA met on several occasions with the PRDOH to discuss the development of the Process Control Program focused on compliance with DBPs. As per QSAR No. 50, the Process Control Plan was submitted to the PRDOH. PRASA addressed further comments, and currently, the plan is under the PRDOH final review. Also, PRASA must implement preventive measures on those systems with frequent DBPs violations as stipulated in Section IX.
- Training Program: As stipulated in Section XI, PRASA must train all personnel for its facilities' satisfactory operation and management. Originally, an initial group of personnel (804 employees) was identified to complete the required training. Personnel identified within this group either completed the training or are inactive status. Due to the COVID-19 pandemic and all limitations associated, delays were encountered in the training logistics and delivery. According to the recent restructuring of the Directorate of Training and Continued Education, improvements to SAP are ongoing to accommodate and adjust the needs as part of the automation process changes regarding PRASA's Training Program. On April 16, 2021, PRASA approved revisions to the training material. As per QSAR No. 54, a total of 102 employees out of 331 (31%) have completed the training requirements; is expected to be completed by October 2021.
- Stipulated Penalties: During the period from July 1, 2020, to September 30, 2021, PRASA incurred in penalties related to exceedances to the primary standards, required deliverables, remedial measures, and mitigation measures. The amount of the penalties PRASA incurred during this period added up to $57,700, as summarized in Table 6-3. Furthermore, it is important to note that 44% of the penalties were related to Primary Standard DBPs exceedances, 32% were associated with missing or late deliverables, 17% to Mitigation Measures, and 7% in Primary Standard Turbidity. Some of the measures included in the action plans currently being implemented are the following: tank oscillation, lowering tank levels, elimination of tanks, elimination of pre-chlorine injection points, flushing, among other initiatives.

Table 6-3. Stipulated Penalties

Reporting Period	Penalty Amount
July 1, 2020 to September 30, 2020	$33,700.00
October 1, 2020 to December 31, 2020	$16,375.00
January 1, 2021 to March 31, 2021	$3,000.00
April 1, 2021 to June 30, 2021	$2,500.00
July 1, 2021 to September 30, 2021	$1,125.00

Reporting Period	Penalty Amount
Total	**$56,700.00[1]**

[1]QSAR 50 has a total of $41,900 and may need a revision.

- Supplementary Environmental Project (SEP): The SEP project presented to PRDOH was divided into three projects completed during FY2019.
- A second SEP (2nd SEP) project was presented to PRDOH. The project's proposed title is "Segundo Proyecto Ambiental de Salud Pública en Sistemas de Agua Públicos Comunales no servidos por la AAA, conocidos como sistemas Non-PRASA, para el Muestreo de Contaminantes Químicos Regulados en Agua Potable" or Second Environmental Public Health Project in a Community with a Public Non PRASA Potable Water System for the Sampling of Regulated Chemical Contaminants in Potable Water, in English.
  - An escrow account with an initial deposit of $563,700.00 was opened by PRASA on July 7, 2017, for the funding of the 2nd SEP project.
  - PRASA awarded the 2nd SEP project to Environmental Quality Inc. through a bidding process, and the contract was signed on July 18, 2019.
  - As per QSAR No. 50, PRASA has made three disbursement requests to the PRDOH from the escrow account between November 2019 and August 2020 for the 2nd SEP project. Table 6-4 summarizes the disbursement requests made by PRASA over the period covered in this report.
  - On October 15, 2020, PRASA filed an amendment to the Joint Motion regarding the 2nd SEP to add Non PRASA systems and additional sampling, including re-sampling.

Table 6-4. Disbursement Request for 2nd SEP Project

Request No.	Date	Amount Requested by PRASA	Amount Approved by PRDOH
1	November 14, 2019	$21,170.00	$21,170.00
2	February 14, 2020	$215,083.93	$213,877.25
3	August 28, 2020	$247,442.05	$242,393.65
	Total	**$486,695.98**	**$477,440.90**

- Future Violations: As stipulated in section XXVIII, PRASA shall submit to PRDOH for approval action plans, including remedial and/or corrective measures to address non-compliance and systems incurring violations of DPBs, TOC, LT2ESWTR and exceedances to lead and copper action level. Once the PRDOH approves the action plans proposed, a joint motion is requested to formally be included and enforced as part of the 2006 Drinking Water Settlement Agreement and obligations stipulated in Section VII (Remedial Measures) and Section XIII (Stipulated Penalties). Figure 2 illustrates the number of systems with action plans reported on the QSARs covered.

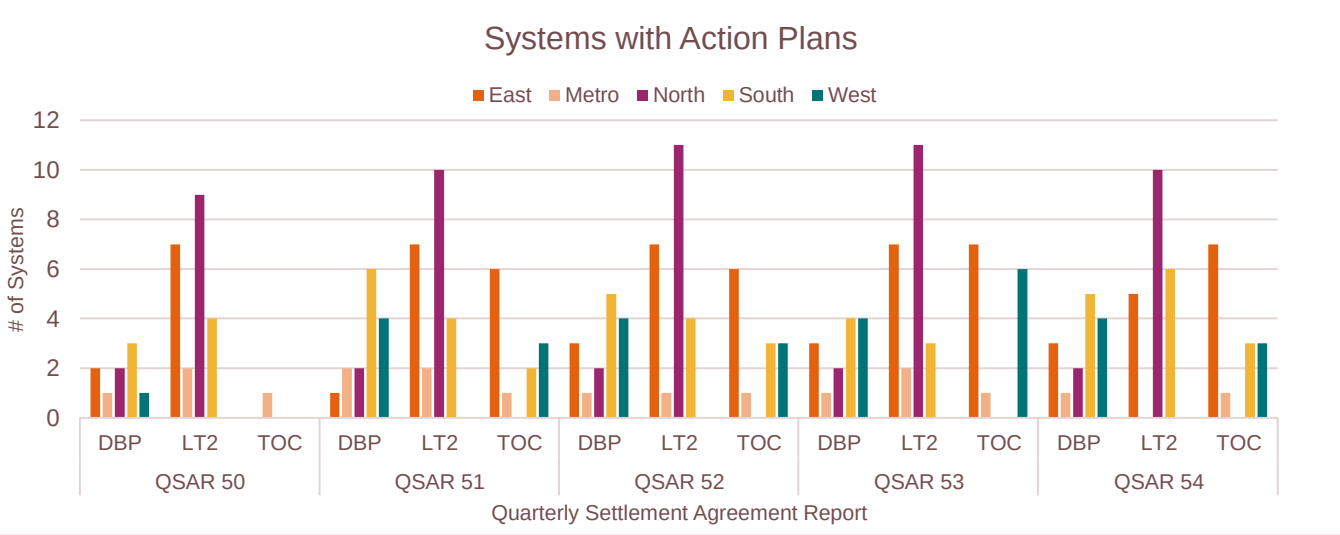

Figure 6-2. Systems with Action Plans by QSAR

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, nitrogen, and phosphorus, PRASA is mostly using interim limits due to their inability to meet the new lower limits for the abovementioned parameters due to the fiscal situation, which prevents PRASA from optimizing treatment and increasing the removal of these contaminants.

Regarding wastewater 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 time frame for when this will occur. However, it is likely that USEPA will include conditions and requirements such as those included in the Puerto Nuevo WWTP NPDES and the NPDES permits for other facilities.

Regarding the water system, future regulations for potable water systems (PWSs) include:

- Unregulated Contaminant Monitoring Program – The USEPA uses the Unregulated Contaminant Monitoring Program to collect data for contaminants suspected to be present in drinking water but do not have health-based standards set under the SDWA. Every six years, the USEPA reviews the list of contaminants, largely based on the Contaminant Candidate List (CCL). Unregulated contaminant data gathered will help USEPA shape the future regulatory environment.
- Candidate Contaminant List – The CCL is a list of contaminants that are currently not subject to any proposed or promulgated national primary drinking water regulations but are known or anticipated to occur in public water systems and may require regulation under the SDWA. The list includes pesticides, DBPs, chemicals used in commerce, waterborne pathogens, pharmaceuticals, biological toxins, perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), among others. USEPA issued preliminary determinations to regulate

PFOA and PFOS. On the other hand, on July 9, 2021, the draft of CCL5 was published; it is an ongoing and high-priority effort for the USEPA.

- Also, as previously noted, PRASA will likely be required to implement remediation measures in water wells that, under the GWUDI regulation, are influenced by surface water sources. Currently, the evaluation program is still underway. PRASA continues the evaluation process at these facilities to determine the improvement needs and develop the well remediation program and action plan. For more information regarding the GWUDI program, please refer to the Compliance Department summary in Section 5 of this report.
- On October 10, 2019, USEPA announced the proposal to revise the Lead and Copper Rule. Under the proposal, new actions include but are not limited to identifying the most impacted areas, strengthening drinking water treatment, replacing lead lines, increasing drinking water sampling reliability, improving risk communication to customers, and better protecting children in schools and children care facilities. USEPA anticipates finalizing the forthcoming Lead and Copper Rule Improvements (LCRI) prior to October 16, 2024, the initial compliance date in the LCRR. Therefore, PRASA must be aware of and responsive to these new rules if approved.

Lastly, PRASA may identify additional CIP needs to bring the water system into compliance with the Stage 2 D/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 Regulatory Agencies and the reconstruction from the 2017 Hurricanes. It includes projects covering a broad array of current and future needs, as identified by PRASA, and as required by consent decrees and agreements. The six-year CIP also includes funding for minor and major repair projects and PRASA's R&R program, and funding for Meters projects. Most of the projected six-year CIP investment is related to Reconstruction & Recovery and Renewal & Replacement projects. However, as noted in previous reports, given 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. Furthermore, as PRASA's 10-year Master Plan is completed, PRASA may need to further re-prioritize its funding and capital projects to address these critical system issues identified. Finally, PRASA's six-year CIP includes funding for quality improvements and other necessary infrastructure projects (i.e., Fleet & IT, building renovation, safety, NRW reduction, and technological improvements) essential to maintaining and preserving the utility assets.

After continuous efforts of PRASA to explore and find opportunities for funding compliance projects, PRASA reached a debt restructuring agreement with the funding programs of USDA’s RD, USEPA’s CWSRF and DWSRF. It allows PRASA to access new funding sources through these programs to execute compliance-driven projects. PRASA has begun taking advantage of these funds with several projects in the CIP that started during FY2021.

PRASA will need to perform additional assessments and implement operational changes or additional capital improvements to bring non-compliant facilities into compliance. Also, as the impact of future regulations becomes more defined, CIP modifications will be required to adequately accommodate resulting needs. This could vary from minor process changes and in other cases major capital improvements, such as the construction of new treatment processes and intensive repair programs. As negotiated or being negotiated with Regulatory Agencies,

these CIP needs will be prioritized, and implementation schedules will depend on PRASA's financial capacity. Note that one of these future regulations is the Lead and Copper Rule, which is currently under revision to become more stringent.

Lastly, additional CIP needs identified during the 10-year Master Plan development or by other means, will need to be prioritized and implementation schedules will depend on PRASA's funding sources. PRASA will identify the funding for new projects, add to the current CIP, and, depending on its priority, assign to one of the Program Management Consultants (PMCs) overseeing the Program.

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). In the event that 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 has reviewed PRASA's current insurance coverage as per the provided policies and determined the adequacy of the received policies considering the type and value of PRASA's fixed assets. Also addressed in the following sections are some outstanding recommendations to PRASA's insurance coverage from previous evaluations. For FY2021, PRASA's Broker of Record (BOR) remained Fedelta Insurance. The data, opinions, and comments included in this section have been based on PRASA's copies of policies and other documents provided by PRASA for this purpose.

7.2 Risk Management

Risk is exposure to loss. It is the chance of something happening that will lead to a loss or an undesirable outcome, and it is measured in terms of consequences and likelihood. Risk management is an effective process directed towards 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, loss prevention engineering.
- Contractual transfer:
  - Hold harmless agreements, indemnity agreements in contracts with suppliers, contractors, service providers, customer agreements.
- Transfer of risk through insurance:
  - Self-insurance.
  - Insurance policies and coverage available from insurance companies.

Insurance products/programs available from the government's Federal Emergency Management Agency (FEMA) and state (Commonwealth of Puerto Rico), including workers' compensation and health/medical, among others.

7.2.1 PRASA Insurance 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 the implementation of excellence in practices and processes. Furthermore, new construction is carried out in accordance with 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 & 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 Assessment of Insurance Program

This section of the Report provides outstanding recommendations concerning PRASA's insurance policies currently in force.

7.3.1 Property Insurance

The following are the findings and recommendations under the Commercial Property Program for FY2021 placed through MAPFRE PRAICO Insurance Company (MAPFRE). PRASA's Schedule of Values amounts to $11,021,002,890.00 of property is insured by a policy issued by MAPFRE and includes the London & International Markets. Renewal of the policy occurred in April 2020 and was extended until April 2021. PRASA’s premium for all coverage under this policy was $18,000,000; $15,000,000.00 for Primary coverage and $3,000,000.00 for 1st Layer coverage. Other insurance companies are shown on the MAPFRE policy as "subscribers." It means they have each agreed to bear a portion of each loss, as follows:

Primary of $150M with $100M SIR:

- MAPFRE – assumed 42% of $150M primary ($63M); PRASA's premium share for this policy amounts to $6,300,000.00.
- Certain Underwriters at Lloyd's assumes 25.5% of $150M ($38.25M); PRASA's premium share for this policy amounts to $3,825,000.00.
- Certain Underwriters at Lloyd's & International markets – assumes 22.5% of $150M ($33.75M); PRASA's premium share for this policy amounts to $3,375,000.00.
- International General Insurance (IGI) - assumes 10% of $150M ($15M). PRASA's premium share for this policy amounts to $1,500,000.00.

1st Layer of $150M in excess of S150M with $100M SIR:

- MAPFRE – assumed 42% of $150M in excess of $150M ($63M); PRASA's premium share for this policy amounts to $1,260,000.00.
- International General Insurance (IGI) – assumed 43% of $150M in excess of $150M ($64.5M). PRASA's premium share for this policy amounts to $1,290,000.00
- Houston Casualty Company (HCC) Tokio Marine – assumed 15% of $150M in excess of $150M ($22.5M). PRASA's premium share for this policy amounts to $450,000.00.

Coverage is written on an "all risks" basis. The policy insures real and business personal property, impounded water, dams, underground piping, and covers business interruption resulting from covered physical damage/loss to property as stated in the policy.

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

Table 7-1. FY2021 Property Coverage, Limits, and Deductibles

Coverage	Limit	Deductible
Total Insurable Value	**$300 million**	As stated below
Property – All Other Perils (AOP) (including Data Processing, In Transit and equipment breakdown)	$150 million per occurrence, All Risks of Direct Physical Loss or damage Insurance including Business interruption and Extra Expense, excess of applicable deductibles.	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Windstorm	Included in $150 million property coverage.	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery

Coverage	Limit	Deductible
Earthquake (EQ)	$150 million Combined Single Limit for Property Damage and Business Interruption each and every occurrence, excess of applicable deductibles and excluding wind driven water.	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Flood	$150 million Combined Single Limit for Property Damage and Business Interruption each and very occurrence, excess of applicable deductibles and excluding wind driven water.	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Business Interruption	Included in $150 million property for AOP.	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Extra Expense	Included in $150 million property for AOP, subject to a $35 million Sublimit	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Contingent Business Interruption	Included in $150 million property for AOP, subject to a $35 million Sublimit	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Professional Services Fees	Included in $150 million property for AOP, subject to a $2 million Sublimit	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Newly Acquired Locations	Included in $150 million property for AOP.	$100 million Each and every occurrence combined for Property Damage and Business Interruption,

Coverage	Limit	Deductible
		including Windstorm, Flood, Earthquake and Boiler & Machinery
Boiler and Machinery	Included in $150 million property coverage	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery

In addition, PRASA has property insurance coverage for Asbestos with $1M Sublimit, Professional Fees with $2M Sublimit, and Contingent Business Interruption / Extra Expense with $35M Sublimit. All Sub-limits are part of and not in addition to the Loss Limits and are per occurrence.

Renewal of this policy for FY2022 covers from April 1, 2021 and extends until April 1, 2022. The policy for the same Schedule of Values ($11,021,002,890), coverages for the primary and each excess layer remains the same as presented in **Table 7-1**. As the policy premiums increased 5.7% to $19,018,583.00.

The new FY2022 Policy coverage is a follows:

- Total Insurable Limit of $300M.
- Primary of $150M with $100M SIR.
    - MAPFRE – assumes 42% of $150M primary ($63M); PRASA's premium share for this policy amounts to $6,300,000.00.
    - London and International Markets – assumes 58% of $150M primary ($87M) ; PRASA's premium share for this policy amounts to $.
- First Layer of $150M in excess of $150M, with $100M SIR. Details of first layer coverage is unknown as PRASA did not provide FY2021 policy for updating.

1. All Risks, including Windstorm, Flood, Earthquake and Boiler and Machinery combined Single Limit for Property Damage and Business Interruption: $150M per each and every occurrence, excess of applicable deductibles. Deductible of $100M Property Damage and Business Interruption combined each and every occurrence.
2. Earthquake and Flood (excluding wind driven water): $150M per occurrence, Combined Single Limit for Property Damage and Business Interruption, excess of applicable deductibles. Deductible of $100M Property Damage and Business Interruption combined each and every occurrence.

In addition, property insurance coverage for: Asbestos with $1M Sublimit, Professional Fees with $2M Sublimit, and Contingent Business Interruption / Extra Expense with $35M Sublimit. All Sub-limits are part of and not in addition to the Loss Limits and are per occurrence.

Recommendations

After reflecting on the financial burden and stress caused by the significant damages of Hurricanes Irma and María, the bureaucracy and slow progression of reimbursements, and even with PRASA's Rainy-Day Fund of

around $20 million for eventualities and the Operating Reserve Fund (which had over $40 million), PRASA should consider establishing a FUND to cover possible financial losses from any future catastrophic or any non-catastrophic, peril that might affect infrastructure and operations and, therefore, impose an unexpected financial burden.

Recommendations & Responses Unrelated to Policy Contract

The following outstanding recommendation was previously made regarding PRASA's property insurance policy. Also included is confirmation of action by PRASA or *Fedelta Insurance* of said recommendations:

1. The current Property Maximum Loss (PML) Estimates for PRASA for quantifying Catastrophic Risk Exposures were performed in 2010 by MARSH Risk Consulting, 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; therefore, it is strongly recommended that PRASA undertake a new PML Study.

   Arcadis recommends that PRASA undertake a new PML study, particularly after the impacts and lessons learned from the September 2017 major hurricanes. However, no response has been provided to confirm whether the recommendation was adopted for the 2021-2022 renewal period.

7.3.2 Crime

PRASA maintains a crime policy issued by Chubb, providing the coverage and limits shown in Table 7-2 for loss discovered during the policy period. Renewal of policy occurred in September 2020 and extended until September 2021. The policy premium remained at $50,000.

Table 7-2. FY2021 Crime Coverage, Limits and Deductibles

Coverage	Limit	Deductibles
Employee Dishonesty – Insured Indemnity	$1 million	$50,000
Employee Dishonesty – Employee benefit Plan (ERISA) Indemnity	$500,000	$0
Forgery or Alteration	$1 million	$50,000
Loss Inside Premises	$1 million	$50,000
Computer Fraud and Fraudulent Transfer Instructions	$1 million	$50,000
Audit Expense	$150,000	$0
Loss Outside Premises (In Transit)	$1 million	$50,000
Securities	$1 million	$50,000

Coverage	Limit	Deductibles
Claim Expense	$150,000	$0
Voice Initiated Transfer	$1 million	$50,000
Voice Computer System Fraud	$1 million	$50,000
Extortion Threats to Persons	$100,000	$50,000
Extortion Threats to Property	$100,000	$50,000
Counterfeit Currency and Money Orders	$1 million	$50,000
Policy Aggregate	$1 million	Not Applicable

Renewal of this policy for FY2022 should cover from September 2021 and extend until September 2022. Coverage limits and deductibles are the same but policy premium increase 10% to $55,000.

7.3.3 General Liability

7.3.3.1 General Liability

MAPFRE issues PRASA's FY2021 commercial general liability program with the limits detailed in Table 7-3 below. Renewal of policy occurred in July 2020 and extended until July 2021, with a policy aggregate limit of $20 million. Also, aggregate limits apply per location and per construction project as per ISO forms CG-2504 (03-97) and CG-2503 (05-09), attached to the MAPFRE policy. A $100,000 Deductible Liability Insurance, as per ISO form CG-0300 (01-96), which contemplates both indemnity and claims adjustment expenses for bodily injury and property damage liability combined under premises/operations coverage; applies to each occurrence. This Deductible Liability Insurance has a $750,000 Aggregate or Cap regarding claims adjustment expenses per policy year. Once PRASA pays this amount, the Insurance Company will pay these amounts from the first dollar; Self-insured Retention (SIR) would apply to indemnity payments only. Additionally, the policy includes a SIR of $5,000.00 for each occurrence or offense not covered by Underlying Insurance. The policy premium remained the same at $920,550.00.

Table 7-3. General Liability Coverages and Limits

Coverage	Limit
General Liability – Each Occurrence	$1,000,000
General Liability – General Aggregate	$2,000,000

Coverage	Limit
Personal and Advertising Injury	$1,000,000
Products - Completed Operations Aggregate	$2,000,000
Damage to Premises Rented	$1,000,000
Medical Expense	$10,000
Employer's Liability Stop-Gap (Bodily Injury by Accident)	$1,000,000
Employer's Liability Stop-Gap (Bodily Injury by Disease)	$1,000,000
Employee Benefits Liability	$1,000,000

Both the Stop-Gap Liability (Bodily Injury by Disease) and the Employees Benefit Liability have a $1M limit Aggregate. The deductible for Employees Benefits Liability is $1,000.

This policy's renewal with MAPFRE for FY2022 covers from July 2021 and extends until July 2022. Coverage and limits remain the same, as shown in **Table 7-3**, except for the *Damage to Premises Rented* coverage which is now $250,000 instead of $1M. The policy premium remained the same at $920,550.00.

Recommendations & Responses

The following pending recommendations were previously made regarding PRASA's general liability program:

1. Commercial General 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. MARSH recommended that Terrorism coverage should be considered under PRASA's Commercial General Liability program.

   Previously, PRASA has declined the recommendation.

   This was not included in the FY2021. PRASA continues to decline its inclusion, citing that it will represent an increase on premium.

   Nevertheless, Arcadis still recommends that it should be included in the policy.

2. Commercial General Liability program excludes coverage for Fungi or Bacteria (CG 2167 (12-04). Considering the lessons learned after the 2017 Hurricanes and the Insured operations there is potentially some PRASA assets vulnerable to fungi and/or bacteria as such, PRASA's employees/property may be at risk of exposure. Furthermore, Puerto Rico's tropical weather is a factor to potentially exacerbate the risk of exposure.

   Arcadis recommends that Fungi or Bacteria coverage should be considered under PRASA's Commercial General Liability program. Not included for the 2021-2022 renewal period.

7.3.4 Automobile Liability

PRASA maintains automobile liability coverage through MAPFRE. Renewal of policy occurred in July 2020 and extended until July 2021, remained at a premium of $593,700 for 2,867 units covered, and includes:

- 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 and includes a $5,000 per person Medical Expense limit for owned autos only.
- Physical Damage to owned autos of the Insured is not included in the policy except for Specific Catastrophic events, which includes 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 for Comprehensive and Collision coverage.
- Driving Other Car Coverage is included for Liability coverage on a blanket basis for up to 50 individuals.
- Policy provides automatic Physical damage coverage for Hired and Acquired Autos with a value up to $40,000 with a $500 Deductible. Any vehicle with a value greater than $40,000 must be submitted to the Company for approval. This coverage is subject to a deposit premium of $23,750.00 and an annual revision at a rate of 7.5%.
- Garage liability coverage is under the Compulsory Liability Insurance policy.
- Comprehensive and collision Trailer interchange coverage is provided for non-owned trailers under the care, custody, or control of the Insured, 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 each flatbed, chassis and "gen-set". All are subject to a $500 Comprehensive and Collision deductible. Losses to chassis will be paid on a replacement cost basis. Coverage excludes the exchange of any container, moving trailer, or related equipment between municipalities or governmental agencies.
- Rental Reimbursement coverage with a maximum payment (each covered auto) of $50.00 any one day / 30 days or $1,500.00 any one period.

Also, under MAPFRE, the following policy was included:

- Garage Keeper coverage is included on a Direct Primary 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; and for Theft or Mischief or Vandalism". In addition, 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 $500 deductible. The premium for this coverage totaled $18,000.

Renewal with MAPFRE of the commercial auto policy for FY2022 covers from July 2021 and extends until July 2022. Coverage and limits remain the same as presented above for 2,799 units. Premium stayed the same at $593,700.

The Garage Keeper's coverage for FY2022 remained the same except the collision coverage deductible is $250 for each auto insured. The premium stayed the same at $18,000.

7.3.5 Umbrella and Excess Liability

PRASA maintains an umbrella policy which provides a $60M limit excess of the primary general, automobile, and employer's liability policies for each occurrence and aggregate. The umbrella is otherwise subject to a $5,000.00 SIR for each occurrence of bodily injury, property damage, and personal and advertising injury losses not covered

by the underlying insurance. Renewal of policy occurred in July 2020 and extended until July 2021. Coverage is provided through MAPFRE on a $850,000.00 premium.

Renewal with MAPFRE of the umbrella policy for FY2022 covers from July 2021 and extends until July 2022. Coverage is the same with a $60M limit excess and same underlying insurance. Also, the same SIR of $5,000 applies. Policy premium stayed the same at $850,000.

7.3.6 Directors and Officers Liability

PRASA maintains one primary and one excess layer of directors & officers (D&O) liability insurance. Coverage provided through Chubb. Renewal of policy occurred on July 1, 2020 and extended until July 31, 2021. Coverage is written on a claims-made basis and is subject to a prior litigation date of July 1, 2007, on the primary policy, July 31, 2020, on the first excess issued by Berkley, Liberty and AIG. The D&O carriers and limits are shown in Table 7-4.

Table 7-4. FY2021 Directors and Officers Liability

Insurer	Limit	Premium	Add Premium*
Chubb Insurance Company (Primary)	$15 million	$183,600	$14,145
Berkley Insurance Company (First Excess Layer)	$10 million excess of $15 million	$137,671	$3,781
Liberty Mutual Insurance (Second Excess Layer)	$5 million excess of $25 million	$68,630	$4,884
AIG Insurance Company (Third Excess Layer)	$10 million excess of $30 million	$127,500	$2,550
Liberty Mutual Insurance (Fourth Excess Layer)	$5 million excess of $40 million	$46,668	$3,148
Total D&O Limit	$45 million	$578,214	$28,778

***Additional Premium covers a 1-month extension from July 1, 2020 to July 31, 2022.**

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. Due to current market conditions and agreements with the insurance companies, the total D&O limit for this year was $45M, $5M less than the $50M required for the D&O policy.

Renewal of this policy for FY2022 covers from July 1, 2021 and extends until July 1, 2022. Primary policy coverage remains at $15M subject to a $500,000 SIR and premium increase to $200,000. Additionally, there are four excess layers.

7.3.7 Employment Practices Liability

PRASA maintains primary and excess employment practices liability (EPL) policies providing total limits of $5M 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. Coverage is written on a claims-made basis and is subject to a prior litigation date of November 30, 2007, on the primary policy. Primary coverage is $5M provided through Chubb. Excess EPL coverage is through Berkley Insurance Company for $5M for each claim in excess of $5M but in no event exceeding $5M in the aggregate for all claims. Also, it is subject to a prior litigation date of July 1, 2014. Renewal of this policy occurred on July 1, 2020 and was extended until July 1, 2021. PRASA's premium for the primary policy remained at $155,681 but its excess policy increased 163% to $100,000.

A benchmarking study, shown in Figure 7-1 based on limits carried by other public corporations in the industry class with a similar level of corporate and economic characteristics showed that on average, limits of $6.8M were carried. The study also shows a 75th percentile with limits of $10M and a 25th percentile with limits of $3M with a median of $5M. PRASA decided a couple of years ago to reduce the EPL limits from $10M in FY2015 to the median, based on data from previous years, and has maintained those limits.

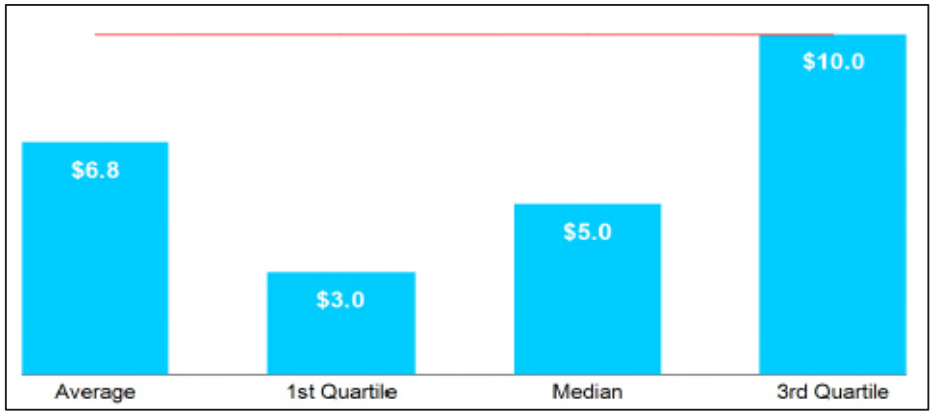

Figure 7-1. Employment Practices Liability Benchmarking Analysis

Renewal of the EPL for FY2022 with Chubb covers from July 1, 2021 and extends until July 1, 2022. Primary coverage, limits remained the same, with same $100,000 SIR per each claim and subject to same prior litigation date of November 30, 2007. However, primary premium increased 5% to $163,465. Renewal has an excess EPL policy remains the same with same insurance company and conditions but its premium increased 5% to $105,000.

7.3.8 Premises Pollution Liability

Chubb provides pollution liability coverage on a claims-made basis at $10M per pollution condition, $10M annual aggregate limits. Coverage is subject to a $250,000 per accident SIR. The policy was renewed on July 1, 2020 and extended until July 1, 2021. A retroactive date of July 1, 2002, applies. PRASA's premium for this policy was $253,740. An added coverage for "Terrorism Risk Insurance Act" was offered but not accepted by PRASA due to higher premiums.

Renewal of this policy for FY2022 covers from July 1, 2021 and extends until July 1, 2022. Coverage, limits and premium remain the same.

Recommendations

PRASA should consider adding the "Terrorism Risk Insurance Act" policy.

7.3.9 Accident Liabilities for Travel and Divers

PRASA's FY2021 accident coverage program for travel was issued by Chubb with the limits detailed in Table 7-5 below. Renewal occurred on July 1, 2020 and covers until July 1, 2021. The policy has a $2.5M annual aggregate limit. Coverage is available for PRASA employees named as Insured. PRASA's premium for this policy was $1,000.

Table 7-5. FY2021 Accident (Travel) Liabilities

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

*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 $100.00 deductible.

Renewal of this policy for FY2022 covers from July 1, 2021 and extends until July 1, 2022. Coverage, limits and premium remained the same.

In addition, PRASA maintains an accident coverage program for divers, as issued by Chubb. Renewal covers from July 1, 2020 until July 1, 2021. 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 was $19,900. Same caveat for Accidental Medical Expense reimbursement as for Accident (travel).

Renewal of this policy for FY2022 covers from July 1, 2021 and extends until July 1, 2022. Coverage, limits and premium remained the same.

7.3.10 Cyber Liability

7.3.10.1 Cyber Liability

PRASA does not currently purchase cyber liability insurance. 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 includes social security numbers, driver's license numbers, bank account numbers (with or without access codes), among other things. There have been many well publicized breaches, and cybersecurity awareness continues to grow. This new cyber consciousness has impacted litigation, cyber claims, and how companies respond to data breach attacks. A privacy breach or cyber-attack can affect any company.

Recommendations & Responses

The following outstanding recommendation was previously made regarding PRASA's cyber liability policy:

1. **Consider cyber liability coverage.** It was previously recommended that PRASA complete a self-assessment to determine potential areas of weakness compared to international standards and determine the potential frequency and severity of a breach. These two studies will help to gauge limits. With this information in hand, it was recommended that PRASA purchase a Privacy & Cyber Liability policy to insure against liability arising from potential allegations such as PRASA failed to adequately secure customer data and the associated identification theft costs needed to repair customer credit.

   In the recent renewals PRASA has not added the recommendation.

   Instead, PRASA indicated that they request such professional policy from subconsultants (IBM, Accenture, etc.), however PRASA is still exposed to liability for all work not performed by subconsultants. Arcadis agrees with previous recommendations that PRASA should purchase a Privacy & Cyber Liability Policy.

7.4 Owner Controlled Insurance Program

PRASA maintains an OCIP for its multi-year Capital Improvements Program - CIP. In addition to covering PRASA, the OCIP is designed to insure enrolled contractors, subcontractors (and design professionals for General Liability only) of all tiers working on the CIP. The OCIP does not cover vendors, installers, truckers, delivery persons, concrete/asphalt haulers, and/or contractors who do not have dedicated on-site payroll, except as otherwise endorsed into the policy. In addition, the OCIP program provides builder's risk, general liability, umbrella, pollution liability insurance, and miscellaneous errors & omissions professional liability insurance. Each of these coverages is 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 Insurance Company is the insurer. Policy period from April 23, 2020, to April 23, 2021. Coverage applies to all risks of direct physical loss, except as excluded by the policy. The estimated value of all projects is $52,897,036. The maximum contract value per contract is US$18,000,000.00. The Limit of Liability in any one occurrence and the annual aggregate for the policy term is US$100,000,000.00. Policy period Aggregate Limits of Liability are $30,000,000.00 for earthquakes, storm surges, and windstorms; and $10,000,000.00 for Flood.

Certain sub-limits apply to additional exposures, such as off-site storage, inland transit, and debris removal. Still, these sub-limits are part of and not in addition to the Limit of Liability and are subject to the per-project reported value as the maximum limit of liability. PRASA's premium for this policy was $317,382.00 and includes sub-limits as shown in Table 7-6.

Table 7-6. FY2021 OCIP Builder's Risk Sublimits of Liability

Coverage	Sublimit
Maximum Physical Loss of or damage to insured Property per Insured Project	Contract Value
Professional Fees	$1,000,000 or 10% of the loss in any one occurrence, whichever is less.
Property in Transit	$1,000,000 any one conveyance
Principal's Existing Property	$1,000,000- each and every loss in the annual aggregate
Offsite Storage	$1,000,000 any one storage location
Expediting Expense	$1,000,000 or 20% of the physical loss of or damage to insured property in any one occurrence, whichever is less.
Fire Brigade Charges/ Extinguishing Expenses	$250,000 – any one occurrence
Debris Removal	$1,000,000 or 25% of the amount of loss
Plans, Blueprints, Drawings, or Other Documents	$250,000

The Physical Loss of or damage to property insured deductible is US$10,000.00 for any one occurrence. Other deductibles are 2% for Flood and Windstorm, and 5% for Earthquake of the total insured values at risk at the time and place of loss any one occurrence, with a minimum of US$50,000.00 any one occurrence for projects with a contract value of less than or equal to US$10,000,000.00. Conversely, deductibles of 2% for Flood and Windstorm, and 5% for Earthquake of the total insured values at risk at the time and place of loss any one occurrence, with a minimum of US$100,000.00 any one occurrence for projects with a contract value of more than US$10,000,000.00. In addition, a US$20,000.00 deductible in any one occurrence applies for damage to Principal's Existing Property; and a $50,000.00 deductible for Property insured while undergoing Testing and Commissioning.

Renewal of the OCIP Builder’s Risk policy for FY2022 with CHUBB covers from June 23, 2021 and extends until June 23, 2022. The premium is $1,629,272.00, which more than quadrupled because the value of all projects under the insurance also increased significantly (5x) to $346,033,317.22 The maximum contract value per contract/project remained at US$27,822,490.00. The Limit of Liability in any one occurrence/project and in the

annual aggregate for the policy term is US$27,822,490.00. Policy period Aggregate Limits of Liability are $30,000,000.00 for Earthquake, Windstorm ensuing Flood and Storm Surge and $10,000,000.00 for Flood. Sublimit are the same as shown in **Table 7-6**.

Recommendations & Responses

The following outstanding recommendations were previously made regarding PRASA's OCIP builder's risk policy:

1. 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.

   This was not included in the FY2019 nor FY2020 policy renewals. Arcadis requested confirmation from PRASA for FY2021 renewal. No response was provided for the FY2021 policy and no response has been provided to confirm whether the recommendation was adopted for the 2021-2022 renewal period.

2. It was previously recommended negotiating coverage for: 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.

   Previous BOR stated that this kind of sublimit would require additional premium. To be discussed with PRASA for the next renewal presentation.

   It was not included in previous policy renewals. No response was provided for the FY2021 policy and no response has been provided to confirm whether the recommendation was adopted for the 2021-2022 renewal period.

7.4.2 Commercial General Liability

The OCIP general liability policy is a "per occurrence" policy provided by Chubb and includes the limits shown in Table 7-7. Coverage remained the same as the previous year, but the premium increased 102% to $201,009.00. The policy period covers from April 23, 2020 to April 23, 2021.

Table 7-7. FY2021 OCIP General Liability Coverages and Limits

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

A US$5,000 per claim deductible applies for bodily injury, and a US$5,000 per claim deductible applies to property damage for each loss. The policy is silent as to who is responsible for deductibles. The OCIP Manual states the Contractor should assume this deductible.

In addition, the Policy includes a $25M aggregate for each “Incident” with an “Incident” retained limit of “Underlying Insurance” or $10,000. The aggregate premium was $105,794.00.

This policy covers PRASA/AAA and contractors and all tiers of subcontractors and consultants performing operations at or from the project site in connection with the work for PRASA under the contract documents.

Renewal of this policy for FY2022 covers from June 23, 2021, until June 23, 2022. Coverage, limits remain the same as presented above, however, premium for this coverage increased 169% to $541,662.00. Could not confirm if policy includes an additional aggregate, as information was not provided.

Recommendations & Responses

The Completed Operations coverage extension is for five (5) years from the termination date of the policy or its renewal(s). It was recommended changing it to ten (10) years to cover the full statutory limit (Statute of Limitations Law).

Previous BOR stated that this kind of amendment will require additional premium. PRASA maintained the five years Completed Operations coverage extension period for the FY2021 policy, as it is cautious to increase premium costs due to the dire fiscal situation.

Could not confirm for the FY2022 policy renewal, as PRASA did not provide response and policy was not provided.

7.4.3 Commercial Umbrella Liability

The OCIP commercial umbrella liability policy is provided by Chubb. The limit of insurance of US$25,000,000.00. Each incident retained limit is the underlying insurance or US$10,000.00 SIR. Each Incident and US$25M Policy aggregate, in excess of the primary OCIP commercial general liability limits of insurance. PRASA's premium for this policy increased 103% from FY2020 to $105,794.00. The policy period covers from April 23, 2020, until April 23, 2021.

The Completed Operations coverage extension is for five years from the policy's termination date or its renewal(s). Should consider requesting change to ten years to cover the full statutory limit (Statute of Limitations Law).

Renewal of this policy for FY2022 should cover from June 23, 2021 until June 23, 2022. Coverage, limits and SIR remain the same as presented above with same US$25M policy aggregate. However, premium for this coverage increased 169% to $285,085.00.

7.4.4 Contractor's Pollution Liability

The OCIP contractor’s pollution liability insurance is provided by Chubb. Coverage applies on an occurrence basis and covers pollution arising from construction activities involving PRASA's wrap-up program. Coverage should extend from April 23, 2020, to April 23, 2021. The policy provides a $20M limit per occurrence and $20M annual aggregate, subject to a $25,000 SIR per pollution condition. The policy covers PRASA and OCIP contractor participants. PRASA’s premium for this policy was $66,121.00.

There were extensions to the policy, up to June 23, 2021 while FY2022 renewal was completed. Renewal of this policy for FY2022 covers from June 23, 2021 until June 23, 2022. Coverage, limits and SIR remain the same as presented above, however, premium increase significantly, about 169%, to $178,178.00.

7.4.5 Professional Liability

PRASA maintains a miscellaneous errors and omissions liability policy through Chubb, providing a $25M per claim limit and a $50M annual aggregate limit, subject to a $150,000 per claim deductible, an increase of $50,000 (50%) in the deductible. Renewal of policy occurred on July 30, 2020 and extended until June 30, 2021. 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. 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 Board of Directors from time to time. PRASA’s premium for this policy was $857,510.00 plus a 1-month extension to cover the 12-month period, with a $56,579.00 premium. Total expended on premium was $914,089.00.

Renewal of this policy for FY2022 covers from June 23, 2021 until June 23, 2022. Coverage, limits and SIR remain the same as presented above, however, premium increase, about 20%, to $1,100,000.00.

7.5 Conclusions

In the opinion of Arcadis, the insurance program covering PRASA's exposures to risks of accidental property and liability losses arising from ongoing operations, pertaining to the received policies, provides reasonable coverage. However, several recommendations to PRASA's insurance program are provided.

Particularly, PRASA should address the following key recommendations:

1. Conduct a PML Study considering new CAT Modellings and parameters. Especially after the lessons learned in the aftermath of the September 2017 Hurricanes, the 2020 earthquakes and more recently the COVID-19 pandemic.
2. PRASA should consider establishing a fund to cover possible financial losses from any future catastrophic or non-catastrophic peril that might affect infrastructure and operations and, therefore, impose an unexpected financial burden.
3. Consider Cyber Security Coverage, which is excluded under all current PRASA's Insurance Programs. Also, complete a self-assessment to determine potential areas of weakness compared to international standards and determine the potential frequency and severity of a breach.
4. Consider Terrorism Coverage, which is excluded under all current PRASA's Insurance Programs.
5. PRASA should consider including Fungi and/or Bacteria coverage, which is excluded under General liability and umbrella coverage, and other programs.
6. PRASA should consider requesting an endorsement to include a "Partial Occupancy Provision" to grant permission for partial occupancy of project areas in the OCIP Builder's Risk Policy. Therefore, coverage will not cease or expire due to the partial occupation of any project area or due to the project's substantial completion.
7. PRASA should consider changing the "Completed Operations" coverage extension to ten years to cover the full statutory limit (Statute of Limitations Law) in the OCIP Commercial General Liability Policy. Currently, the

policy coverage is for five years from the it's termination date or its renewal(s). Should also consider the same action for the OCIP Commercial Umbrella Liability Policy.

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 FY2021. The statement relies on the most recent preliminary data provided by PRASA. Also, Arcadis evaluated PRASA's financial forecast as included in the 2021 PRASA Fiscal Plan as certified by the Oversight Board on May 27, 2021 (2021 PRASA Fiscal Plan) and assessed 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, 2020. 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 $5,782.2M (net of accumulated depreciation).

Table 8-1. Preliminary Fixed Assets Balance through June 30, 2020 ($, Millions)

	Book Value	Accumulated Depreciation	Net Book Value[1]
Fixed Assets	$10,720.1	($5,412.1)	$5,308.0
Construction (Work) in Progress	399.1	-	399.1
Land and other Non-Depreciable Assets	75.1	-	75.1
Total Capital (Fixed) Assets	$11,194.3	($5,412.1)	$5,782.2

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

Table 8-2 summarizes the fixed assets changes from FY2019 to FY2020.

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

	FY2019[1] to FY2020[1]
Fixed Assets (Net of Accumulated Depreciation)	($266.1)
Construction (Work) in Progress	92.4
Land and other Non-Depreciable Assets	0.1
Total Fixed Asset Changes	($173.6)

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

8.3 PRASA's Rate Structure

PRASA's base and volumetric rate structures for Residential customers and Non-Residential customers (commercial, industrial and certain government customer classes) were approved on July 15, 2013. On December 18, 2013, PRASA amended the rate structure for Non-Residential accounts. These are summarized in Tables 8-4 through 8-10. PRASA is currently in the process of reviewing its current rate structure and a revised rate schedule is expected to be implemented in July 2022. To cover all projected operating expenses, CIP needs, debt service obligations, and to maintain certain reserves required by the MAT, the 2021 PRASA Fiscal Plan includes a series of moderate rate adjustments (as required by the Oversight Board), the first of which was implemented on January 1, 2018, followed by additional increases on July 1, 2018, 2019, and 2020. The latest rate adjustment was implemented on July 1, 2021.

The 2021 PRASA Fiscal Plan adjustments are calculated separate from the base and volumetric amounts as compounded percentages of the total customer invoice amount. Additional adjustments are projected to be implemented annually on July 1st of each year through FY2026.

Table 8-3. 2013 Residential Monthly Base Charge per Account

Water Service Line	Water	Wastewater	Water & Wastewater
1/2" & 5/8"	$10.60	$9.11	$19.71
3/4"	18.40	15.86	34.26
1"	30.23	20.36	50.59
1-1/2"	57.12	31.32	88.44
2"	97.24	53.56	150.80
3"	149.15	89.23	238.38
4"	335.50	156.69	492.19
6"	894.72	731.19	1,625.91
8"	1,431.55	835.64	2,267.19
10"	2,290.50	1,337.02	3,627.52
12"	3,664.80	2,139.25	5,804.05

(includes first 10 cubic meters of monthly consumption)

Table 8-4. Residential Volumetric Rate per Cubic Meter

Use Block (m^3)	Water	Wastewater	Water & Wastewater
>10 – 15	$1.25	$1.02	$2.27

Use Block (m^3)	Water	Wastewater	Water & Wastewater
>15 – 25	1.99	1.59	3.58
> 25-35	2.69	2.14	4.83
>35	2.84	2.27	5.11

Table 8-5. Residential Environmental Compliance and Regulatory Charge (ECRC)

Use Block (m^3)	Water	Wastewater	Water & Wastewater
Base Charge (0 – 10)	$1.00	$1.00	$2.00
>10 - 15	6.50	6.50	13.00
>15 - 25	10.50	10.50	21.00
>25 - 35	17.50	17.50	35.00
> 35	31.50	31.50	63.00

Table 8-6. Non-Residential Monthly Base Charge per Account

Water Service Line	Water	Wastewater	Water & Wastewater
1/2" & 5/8"	$24.37	$20.10	$44.47
3/4"	36.09	31.85	67.94
1"	61.10	44.85	105.95
1-1/2"	122.43	75.23	197.66
2"	194.62	117.32	311.94
3"	436.87	243.86	680.73
4"	725.75	459.81	1,185.56
6"	1,858.58	1,474.93	3,303.51
8"	2,939.80	2,288.04	5,227.84
10"	4,703.70	3,660.87	8,364.57
12"	7,525.91	5,857.39	13,383.30

Table 8-7. Commercial and Government Volumetric Rate per Cubic Meter

Use Block (m^3)	Water	Wastewater	Water & Wastewater
>0 – 100	$1.74	$1.44	$3.18
>100 – 200	2.16	1.73	3.89
> 200	2.84	2.27	5.11

Table 8-8. Industrial Volumetric Rate per Cubic Meter

Use Block (m^3)	Water	Wastewater	Water & Wastewater
>0	$2.27	$1.82	$4.09

Table 8-9. ECRC for Non-Residential Customers

Commercial and Government ECRC Meter Size Equal to or Less than 2-inches			
Use Block (m^3)	**Water**	**Wastewater**	**Water & Wastewater**
>0-100	$1.18	$0.98	$2.16
>100-200	1.22	1.01	2.23
>200	1.26	1.04	2.30
Industrial ECRC Meter Size Equal to or Less than 2-inches			
>0	$1.54	$1.22	$2.76
Non-Residential ECRC Meter Size Greater than 2-inches			
Meter Size	**Water**	**Wastewater**	**Water & Wastewater**
3"	$482.00	$482.00	$964.00
4"	839.50	839.50	1,679.00
6"	2,340.00	2,340.00	4,680.00
8"	3,703.00	3,703.00	7,406.00
10"	5,924.50	5,924.50	11,849.00

Commercial and Government ECRC Meter Size Equal to or Less than 2-inches			
12"	9,479.50	9,479.50	18,959.00

Table 8-11 summarizes the proposed annual adjustment amounts by customer type. Note, the 2021 PRASA Fiscal Plan assumes a 2.0% rate adjustment across all customer types starting in FY2023 through FY2026, a change from the individualized annual rate adjustments by customer type assumed in the projections for fiscal years 2020 through 2022. To cover all projected operating expenses, CIP needs, and debt service obligations and to maintain certain reserves required by the MAT, the 2021 PRASA Fiscal Plan included moderate annual rate increases (as required by the Oversight Board). Assuming that all initiatives will be implemented and based on the debt relief achieved through recent debt refunding negotiated by PRASA, the rate increases included in Table 8-11 shall be effective on July 1st annually through FY2026.

Table 8-10. PRASA's Proposed Fiscal Plan Annual Rate Adjustments by Customer Type

Customer Type	Annual Rate Increase FY2020 – FY2022	Rate Increase FY2023-FY 2026
Residential	2.5%	2.0%
Commercial	2.8%	2.0%
Industrial	3.5%	2.0%
Government	4.5%	2.0%

The rate increases due on July 1st, 2021, have been implemented in compliance with the 2021 PRASA Fiscal Plan. PRASA implemented the rate changes through FY2022 as permitted by the provisions, as amended, approved under Resolution No. 2167. To implement the rate increases shown in FY2023 and beyond, PRASA expects to follow the formal rate increase approval process required under Act 21 of 1985. The impact of these rate increases is further discussed in the next section. Additionally, PRASA charges customers for other services summarized in Table 8-12. These rates became effective as of July 1, 2016.

Table 8-11. PRASA's Other Customer Service Charges

Activity	Charges
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

Activity	Charges
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 Service Connection ⅝"	$800.00
Meter Testing In-Situ ½" a 1½"	$30.00
Meter Testing In-Situ >= 2"	$80.00

8.3.1 Additional Provisions for Rate Increase

As approved by PRASA's Governing Board, future rate increases shall follow the provisions, as amended, that had been previously approved under Resolution No. 2167 (dated October 6, 2005) as follows:

a. Adjustments and increases after July 1, 2017, will be calculated according to a specified formula (Coefficient of Annual Adjustment [CAA] described below).
b. Beginning July 1, 2017, there is a cap or limit on future annual increases of 4.5% and a limit on the cumulative increases of 25% (as approved by PRASA's Governing Board).
c. If PRASA requires an increase in excess of 4.5% in any single year, or once the 25% cumulative limit is reached, PRASA must follow the formal approval process required under Act 21 of 1985 (Act 21-1985) requesting a rate increase.

Adjustments and increases implemented after July 1, 2017, are limited by the calculation of the CAA described in the Resolution and as presented herein. There are three steps to determining the CAA as follows:

1. Calculate the Coefficient of Deficiency (CD) for the applicable year:
   CD = Operating Expenses and Debt Service / Operating Revenues
2. Calculate the Coefficient of Annual Base (CAB) for the Base Year:
   CAB = Operating Expenses and Debt Service (FY2007) / Operating Revenues (FY2007)
3. Calculate the CAA:
   CAA = CD/CAB

If the CD for any year is greater than the CAB from FY2007, i.e., CD for FY2017 greater than CAB, then the rates can be increased by the lesser of the CAA minus one (CAA-1) or 4.5% until the 25% cumulative maximum is reached. If the cumulative maximum is reached or should PRASA in any given year require a higher rate increase than maximum annual adjustment amount of 4.5%, PRASA shall then follow the rate increase process required by Act 21-1985, as amended.

- The first step under Act 21-1985 requires review, ratification, and approval of the proposed rate structure by PRASA's Governing Board to initiate the rate modification/increase process.
- Next, an independent Official Examiner is appointed to conduct an independent review of the proposed changes and increases in addition to leading public hearings.
- The third step is developing a report by the Official Examiner that would include their findings and recommendations, to be considered by PRASA's management and Governing Board before final approval of the proposed rate structure modifications and increases. Following this, the report is published for public comment.
- The final step is the review and final approval by PRASA's Governing Board, considering the Official Examiner's recommendations.

8.4 FY2021 Preliminary Results and FY2022-FY2026 Forecast

Arcadis reviewed the financial information provided by PRASA, the 2021 PRASA Fiscal Plan and the FY2022 Annual Budget certified and approved on June 30, 2021, by the Oversight Board. This section summarizes Arcadis's review and provides an assessment of PRASA's financial condition, particularly as it relates to assessing PRASA's financial preliminary results for FY2021 and the reasonableness of PRASA's assumptions in the preparation of the five-year financial projections (the forecast period or the Forecast) from FY2022-FY2026, to assess the sufficiency of the revenues necessary to support the projected operations and capital costs as shown in Exhibit 1; including 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 FY2021
- Revenue and expense projections for FY2022
- PRASA's May 27, 2021, certified Fiscal Plan (2021 PRASA Fiscal Plan)
- PRASA's FY2022 Annual Budget was certified and approved on June 30, 2021, by the Oversight Board
- Debt service schedules for all currently outstanding debt service and preliminary projected debt obligations, and DSCs
- The amount, if any, required to be deposited in the Operating Reserve Fund to make the amount on deposit therein equal to the Operating Reserve Requirement
- The amount, if any, 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 FY2022-FY2026
- The amount received and expected to be received from the Federal Emergency Management Agency (FEMA) as a result of the impacts from the 2017 Hurricanes Irma and María for expense reimbursement

- The amounts expected to be received from federal programs to fund PRASA's Capital Improvement Program (CIP) such as the State Revolving Fund and Rural Development Programs
- The amounts expected to be received from FEMA and other federal agencies to fund PRASA's CIP

On August 25, 2021, PRASA closed on a series of bonds including the Series 2021A, 2021B, 2021C, and 2022A bonds (2021 Bonds). The financial forecast and information reflected in the financial section of this CER utilizes the 2021 PRASA Fiscal Plan as certified by the Oversight Board on May 27, 2021 as its source. Thus, any financial benefits or impacts experienced by PRASA as a result of the 2021 Bonds are not 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 Commonwealth 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 FY2021 through FY2026 net of the 2021 PRASA Fiscal Plan revenue-enhancing initiatives, presented on a cash basis in accordance with the MAT, are summarized in Table 8-13.

Table 8-12. PRASA Operating Revenues ($, Millions)

Fiscal Year	Operating Revenues
FY2021 Projection based on Preliminary Results	$1,048.1
FY2022 Annual Budget[1]	$1,030.2
FY2023 Projected	$1,042.8
FY2024 Projected	$1,055.3
FY2025 Projected	$1,068.8
FY2026 Projected	$1,084.6

[1] As certified by the Oversight Board on June 30, 2021.

PRASA's Operating Revenue assumptions are discussed below:

1. Service Billings, Net of Subsidies (Exhibit 1, Line 1) – PRASA's single largest source of revenue is Service Billings, which includes monthly base charges, volume rate charges for services, an Environmental Compliance and Regulatory Charge (ECRC), a $2.00 Special Charge, and the FY2021 PRASA Fiscal Plan Rate Adjustments (annual rate adjustment). Table 8-14 provides a breakdown of PRASA's Service Billings (Net of Subsidies) for FY2021 through FY2026, including rate increases that were implemented starting in 2018 future projected rate increases.

   Table 8-13. PRASA Service Billings, Net of Subsidies ($, Millions)

Service Billings Category	FY2021 Preliminary[3]	FY2022 Annual Budget	FY2023 Projected	FY2024 Projected	FY2025 Projected	FY2026 Projected
Base Fee, Volume Charges, and ECRC and Special Charges[1]	$925.2	$896.2	$890.5	$886.0	$881.6	$878.4
Rate Increases[2]	108.4	128.6	144.1	159.6	175.9	193.2
Total (Net of Subsidies)	**$1,033.6**	**$1,024.8**	**$1,034.6**	**$1,045.6**	**$1,057.5**	**$1,071.6**

[1] Based on existing rates as of 2013 (excluding rate adjustments starting on January 2018) and projected reductions due to consumption reduction.
[2] Accumulated revenues generated from rate adjustments implemented starting in January 2018, in accordance with the 2021 PRASA Fiscal Plan; net of new electronic bill discount.
[3] Preliminary projections as presented in the 2021 PRASA Fiscal Plan.

Table 8-15 summarizes the number of Residential customers that are provided a subsidy for water and wastewater bills as of June 30, 2021.

Table 8-14. Water and Wastewater Subsidized Customer Accounts FY2021

Subsidy	Number of Customers	Percent of Total Residential Customers[1]
PAN Subsidy	77,357	6.5%
TANF Subsidy	10,755	0.9%
ASES Subsidy	5,773	0.5%
Fixed Tariff (Public Housing)	48,908	4.1%

[1]Based on a total number of Residential customers of 1,193,544 provided by PRASA as of June 30, 2021.

PRASA's Service Billings projections are based on certain assumptions, including growth and consumption assumptions that could be affected by numerous factors:

- The continued strain on the economy, as well as the continued population outmigration, could cause a further decline in the consumption patterns of PRASA customers. 2020 Census data shows a total net population decline of about 440,000 when compared to the 2010 Census results for an approximately -11.8% change in population[20].
- While revenue adjustments were calculated using the best information PRASA has available at this time, the full extent of the impacts to Service Billings going forward due to the COVID-19 pandemic are 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 2021 PRASA Fiscal Plan may differ from projections.

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

Growth and Consumption Assumptions

PRASA had experienced a compound annual reduction in its customers or accounts by approximately 0.1% per year in the four fiscal years leading up to FY2021. However, as shown in Table 8-16 from FY2020 to FY2021 the number of customer accounts increased by 1.6% primarily because of an increase in residential accounts assumed to be driven by a surge in second homes real estate.

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

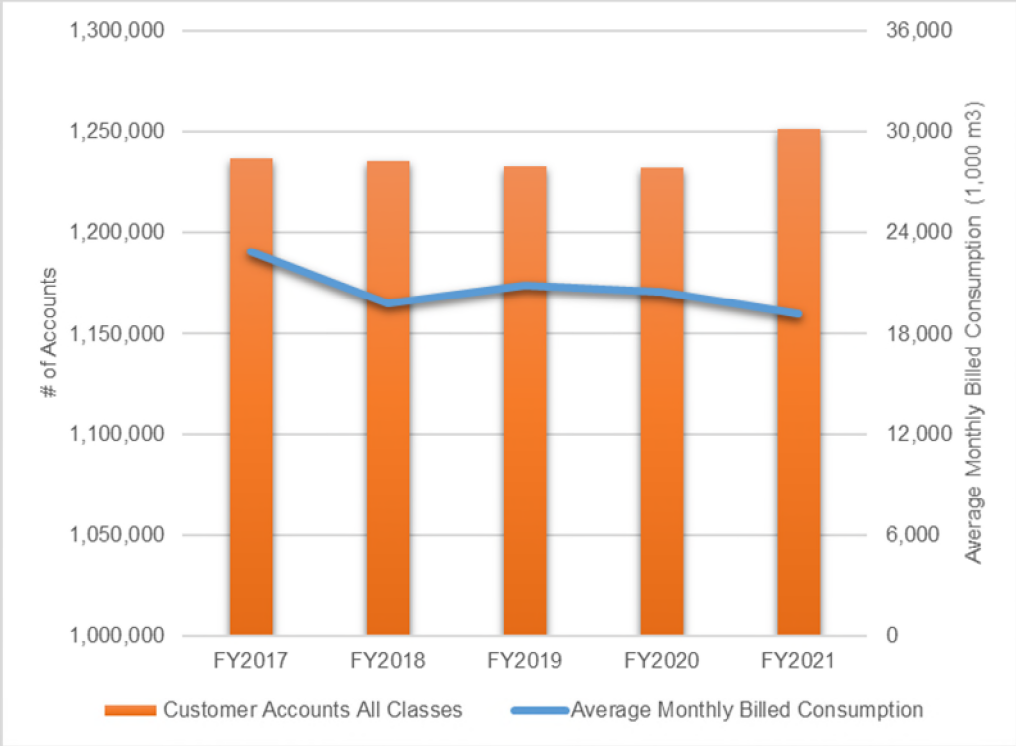

Figure 8-1. Customer Accounts and Average Monthly Billed Consumption FY2017-2021

Table 8-15. PRASA Customer Accounts

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2020[1]	1,173,681	48,909	742	8,864	1,232,196
FY 2021[2]	1,193,544	48,459	743	8,760	1,251,506
% Difference	**1.7%**	**-0.9%**	**0.1%**	**-1.2%**	**1.6%**

[1] Number of accounts by customer class through June 30, 2020.
[2] Number of accounts by customer class through June 30, 2021.

In 2015 Puerto Rico experienced a drought that impacted island-wide water consumption trends. By FY2017, PRASA's average monthly billed consumption per account increased as customer consumption stabilized after the 2015 drought ended. That said, FY2020 and FY2021 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 FY2020 and FY2021, it was 16.6 m^3 and 15.4 m^3, respectively, suggesting customer consumption has not reached pre-drought conditions and, further, may not reach pre-drought conditions in future years as average monthly consumption has leveled out at lower average monthly consumption levels in the years since the 2015 drought, as can be seen in Figure 8-1 above.

In FY2021, the total average monthly billed consumption decreased by approximately 6.1% compared to FY2020, while the average billed consumption per account decreased by 7.5% compared to FY2020, as shown in Tables 8-17 and 8-18.

Table 8-16. Average Monthly Billed Consumption by Class (1,000 Cubic Meters)

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2020[1]	14,644	2,390	1,138	2,292	20,463
FY 2021[2]	14,433	1,836	1,123	1,825	19,216
% Difference	**-1.4%**	**-23.2%**	**-1.3%**	**-20.4%**	**-6.1%**

[1] Based on billed consumption through June 30, 2020.
[2] Based on billed consumption through June 30, 2021.

Table 8-17. Average Monthly Consumption per Account (Cubic Meters)

Fiscal Year	Customer Class				Equivalent Average
	Residential	Commercial	Industrial	Government	
FY 2020[1]	12.5	48.9	1,533.6	258.5	16.6
FY 2021[2]	12.1	37.9	1,511.0	208.3	15.4
% Difference	**-3.1%**	**-22.5%**	**-1.5%**	**-19.4%**	**-7.5%**

[1] Based on information through June 30, 2020.
[2] Based on information through June 30, 2021.

According to the U.S. Census Bureau, there was a 1.4% annual decline in Puerto Rico's population between 2012 and 2020.[21] The Oversight Board projects that Puerto Rico's population dropped by approximately 9.1% since FY2017 due to the outmigration from the 2017 Hurricanes [22]. Before the 2017 Hurricanes' impact, the Oversight Board projected that Puerto Rico's population would continue to decline over the next ten years at an estimated annual rate of 0.25%. After the 2017 Hurricanes, the Oversight Board aggressively updated the population projections to account for the population outmigration experienced and to be endured, because of the 2017 Hurricanes. The updated estimates project an average 1.5% annual population decline through FY2026, an approximate decline of 7.2% from FY2021 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

[2] 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).

[22] The Central Government's Revised New Fiscal Plan for Puerto Rico (April 23, 2021) estimates the population for FY2020 to be at approximately 3.03 million.

of FY2016; and declined even further because of the 2017 Hurricanes. However, this level of population decline is not reflected in PRASA's numbers of active accounts.

Table 8-19 contains the projected macroeconomic indicators provided used by the Oversight Board for the 2021 Fiscal Plan:

Table 8-18. Macroeconomic Indicators Assumption for Service Revenue Projection

FY	Population Change (compared to prior year)	GNP Change (compared to prior year)
2022	-1.6%	0.8%
2023	-1.6%	0.4%
2024	-1.5%	1.2%
2025	-1.5%	1.8%
2026	-1.2%	1.7%

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

Rate Increases Assumptions

PRASA has included a rate increase for each customer class in accordance with the 2021 PRASA Fiscal Plan and presented in Table 8-11. PRASA expects to obtain a total of approximately $910M additional revenues by FY2026 from the annual rate increases, from which $128.6M additional revenues are projected and included in the FY2022 Annual Budget, as presented in Table 8-14. This amount is net of the electronic bill discount initiative which would give a monthly $1.00 credit to those customers who subscribe to electronic billing and forego paper billing.

Arcadis believes that PRASA's assumptions for Service Billings are reasonable based on historical results and the assumptions listed above. Nevertheless, the following should be noted:

- While residential and industrial accounts' average monthly billed consumption remained relatively unchanged, large decreases were observed in government and commercial accounts' average monthly billed consumption due to COVID-19 pandemic shutdowns, which started in March 2020. The continued strain on the economy, the high unemployment rate in Puerto Rico[23], and the reduction in new construction permits and economic activity index[24], among other economic factors, could continue to materially affect consumption profiles, resulting in further declines in the 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 2021 PRASA Fiscal

[23] Based on the U.S. Bureau of Labor Statistics, as of July 2021 the unemployment rate in Puerto Rico was 8.2%; Source: www.bls.gov/eag/eag.pr.htm

[24] Source: Puerto Rico Economic Indicators; Puerto Rico Planning Board

Plan. With that being said, alternative revenue enhancing, and cost saving measures would be attempted prior to PRASA adjusting the currently planned rate increases.

- Although collections have shown an upward trend since the easing of lockdown measures due to the COVID-19 pandemic, the full extent of the impact that the COVID-19 pandemic will have on PRASA's water consumption, billings, and collections in the future is unknown. The COVID-19 pandemic remains an on-going situation. PRASA will need to continue to adapt and take proactive action to support its liquidity and overall revenue stability during the ever-evolving situation surrounding the pandemic.

Adjustment for Billings Not Collected

Adjustments for billings not collected are netted from PRASA's FY2021 preliminary results and Forecast Service Billings presented in Exhibit 1, Line 1.

Since FY2012, PRASA's rate of adjustment for billings not collected (including collections from prior years) has stabilized below 6% of Service Billings.

During FY2021, collection rates as of the end of the third quarter for government, industrial, and commercial accounts averaged above 100% (includes a portion of collections on outstanding accounts receivables from prior fiscal years), while the collection rate for residential accounts was 95%. PRASA experienced slight increases in its outstanding residential receivables partially resulting from Act 39-2020, which was implemented in response to the COVID-19 global pandemic and is still active as of the date of this Report. In its FY2022 Annual Budget, PRASA has projected a 96% recovery in collections for residential, commercial, and industrial accounts and remain at that level through FY2026. For government accounts, PRASA projected a 91% collections rate for FY2022, increasing by 0.5% each fiscal year thereafter and reaching 93% by FY2026.

Arcadis finds PRASA's forecasted amount reasonable. PRASA should closely monitor changes in economic indices, COVID-19 impacts, and collection results given the uncertain economic and fiscal situation for Puerto Rico as a whole. Also, the assumed rate of billings not collected could be materially affected: 1) if the proposed rate increases cause customer's payment delinquency rate to increase, 2) if collections from Government accounts are affected as a result of cost controls and budgetary actions imposed under PROMESA or by the Central Government, or 3) there are worsening economic conditions in Puerto Rico.

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. This account is established within the Surplus Fund, which contains any remaining money after all required deposits are made. Equivalent monthly deposits during the fiscal year must be made into the account equal to the balance 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 fiscal year. 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, even considering the recovery funds inflow Puerto Rico is receiving to restore its infrastructure after the impact of Hurricanes Irma and María.

PRASA's Other Income revenues for FY2021 preliminary projections totaled $2.0M, of which approximately $1.0M are from Miscellaneous Income and $1.0M from Special Assessments. PRASA is projecting $2.5M from Miscellaneous Income annually during the forecast period. Special Assessment revenues are projected to increase to $1.5M in FY2022 then hold steady at that amount for each fiscal year in the forecast period. Miscellaneous revenues are projected to remain steady at $1.0M per year. Thus, PRASA projects an average of approximately $2.5M 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. 2020 PRASA Fiscal Plan Revenue Enhancing Initiatives (Exhibit 1, Line 4) – In addition to the annual rate increases and electronic bill discount previously discussed, PRASA has also included the benefits of the following revenue-enhancing initiatives as presented in the 2021 PRASA Fiscal Plan: adjustment policy revision, disconnection fee, and government accounts collections. Additional revenues from these initiatives are expected to be obtained every year of the Forecast, thereafter, as summarized in Table 8-20.

Table 8-19. 2021 PRASA Fiscal Plan Revenue Enhancing Initiatives ($, Millions)

	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026
Initiatives[1]	**Preliminary Projections**	**Annual Budget**	**Projected**	**Projected**	**Projected**	**Projected**
Adjustment Policy Revision	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2
Disconnection Fee	0.0	0.0	1.0	0.8	0.6	0.5
Government Accounts Collections	11.2	1.7	3.5	5.2	7.0	8.8
Total Additional Revenues	**$12.4**	**$2.9**	**$5.7**	**$7.2**	**$8.8**	**$10.5**

[1] 2021 PRASA Fiscal Plan Revenue Enhancing Initiatives also include: Annual Rate Increase and Electronic Bill Discount (See Table 8-14), included under Base Fee and Service Charges for the effect of this report.
[2] Numbers may not add up due to rounding.

Adjustment Policy Revision

In February 2017, PRASA's Governing Board Approved Regulation 8901, which among other customer service updated requirements and measures, states that adjustments made for bills where a hidden leak is detected will only apply to the sewer bill portion (not both water and sewer) as the water has already been consumed or lost in the system and PRASA has already incurred in its production cost. Since FY2018, PRASA projected to reduce current adjustments by 60% or $2M per year. In FY2021, PRASA is projecting $1.2M and has included $1.2M in savings in its FY2022 Annual Budget and for each year of the Forecast thereafter.

Disconnection Fee

Also, Regulation 8901 creates a $15 charge to recover the cost of disconnecting service (in addition to the reconnection fee already in place). PRASA expects that the disconnection charge will deter clients from having their services suspended, thereby reducing the projected amount of annual disconnections performed.

It is important to note that at the time in which this report is being written, Act 39-2020 (which prevents PRASA from disconnecting residential customers' water services due to non-payment) is still in effect, with no specific end date identified; it may delay or have a negative impact on the revenues collected from the disconnection fee policy initiative in FY2023 and beyond.

Thus, PRASA's FY2021 preliminary projections and the FY2022 Annual Budget project no revenue collected from the disconnection fee. The FY2021 PRASA Fiscal Plan projects disconnection fees to return in FY2023 at $1.0M, then drop to $0.8M in FY2024, $0.6M in FY2025, and $0.5M in FY2026.

Government Accounts Collections

Historically, collections of government accounts have been a challenging process for PRASA. During the last several years, PRASA has worked jointly with the Government to reconcile balances of accounts receivables and speed up the collection process. As a result of these efforts, PRASA's collections rate for government accounts between FY2018 and FY2020 averaged about 94% (including high collection periods due to recovery of past due amounts), with the total recovered amount over that time period equating to $134.4M. FY2021 preliminary results have PRASA collecting $11.2M worth of aged accounts receivable, while the FY2022 Annual Budget reflects an improvement on government account collections worth approximately $1.7M. The 2021 PRASA Fiscal Plan projects continued improvement on government account collections resulting in revenue enhancements of $3.5M in FY2023, $5.2M in FY2024, $7.0M in FY2025, and $8.8M in FY2026.

Support from the Central Government and Puerto Rico Fiscal Agency and Financial Advisory Authority (Spanish Acronym AAFAF) is crucial to continue the successful implementation of this initiative.

8.4.2 Authority Revenues (Other Sources of Revenues)

Based on 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 Commonwealth 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 revenues. Therefore, PRASA's Authority Revenues shall equal Operating Revenues for the forecast period from FY2021 through FY2026.

8.4.3 Operational (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 FY2021 and operating expense projections for FY2022 to FY2026 net of (i) capitalized expenses, (ii) the 2021 PRASA Fiscal Plan expense reduction initiatives, and (iii) the September 2017 Hurricanes impact recoveries, are presented in Table 8-21.

Table 8-20. PRASA Operating Expenses ($, Millions)

Fiscal Year	Operating Expenses w/o FEMA Reimbursements	Operating Expenses net of FEMA Reimbursements
FY2021 Preliminary	$711.1	$683.1
FY2022 Annual Budget	$705.9	$685.9
FY2023 Projected	$720.7	$720.7
FY2024 Projected	$729.0	$729.0
FY2025 Projected	$733.7	$733.7
FY2026 Projected	$740.4	$740.4

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 2021 PRASA Fiscal incorporates the Oversight Board's inflation rates projections, averaging about 1.38% for the forecast period (FY2022 through FY2026), from 1.12% in FY2022 to

1.52% in FY2026. However, Puerto Rico's inflation rate during the last quarter of FY2021 was recorded at about 2.7% (June 2021) and projections show a projected decrease to approximately 1.4% by the end of FY2022[25] .

1. Payroll and Benefits (Exhibit 1, line 11) – Payroll and Benefits continues to be PRASA's largest expense category. Since FY2009, PRASA has implemented cost control methods to reduce its staff levels and, in turn, Payroll and Benefits costs.

   Prior to 1) expense reductions due to the 2021 PRASA Fiscal Plan expense savings initiatives, and 2) capitalization:

   - PRASA's FY2021 Payroll and Benefits preliminary results amounts to $325M.
   - For FY2022, PRASA is projecting Payroll and Benefits in the amount of $327.3M.
   - For the remainder of the forecast period, the 2021 PRASA Fiscal Plan is projecting the Payroll and Benefits expense to remain mostly level.
     - FY2022 = $327.1M
     - FY2023 = $327.3M
     - FY2024 = $327.3M
     - FY2025 = $327.3M

   The Payroll and Benefits cost assumptions include the cost of PRASA's pension on a pay-go basis, net of expected savings with the implementation of Act 26-2017. The 2021 PRASA Fiscal Plan is projecting a headcount of 4,700 employees by the end of FY2022, which was reduced to 4,677 due to the cost control measures as recommended by the Oversight Board. Arcadis finds that the Payroll and Benefits budgeted amount is reasonable based on the historical results and the assumptions made by PRASA in its projections, as discussed below. However, the proposed budget will likely not allow PRASA to recruit the necessary staff to fill critical open positions in operations, including plant operators and other specialized maintenance staff, which could, in turn, further increase overtime costs or negatively impact system operations.

   Headcount and Overtime Assumptions

   PRASA has gradually reduced its headcount by over 1,000 employees, or around 20%, during the last 10 years to become more operationally efficient. As of June 30, 2021, PRASA had a total headcount of 4,670 employees (including 292 employees qualified under the Voluntary Pre-Retirement Program, discussed below).

   The FY2022 Annual Budget, as presented to the Oversight Board, assumes a total of 4,700 employees, or a net increase of 30 employees. The 2021 PRASA Fiscal Plan holds the headcount steady at 4,700 for each remaining year of the forecast period. However, the Oversight Board decreased the assumed number of employees for FY2022 to 4,677 via the organization optimization cost-saving initiative included by the FOMB in its certified FY2022 Budget. This will be further explained later on in Section 8.4.3.

   Based on FY2021 preliminary results through June 30, 2021, the current overtime level is at approximately 9% of total payroll costs, similar to what PRASA had estimated in its FY2021 Annual Budget. Therefore, PRASA has assumed a rate of overtime of 9% (as a percentage of payroll) in the FY2022 Annual Budget. For

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

the remainder of the forecast period, PRASA assumes a rate of overtime of approximately 9% of total payroll costs.

Legislated Acts Assumptions

Act 26-2017 & 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 PROMESA 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. During FY2021, PRASA employees' benefits include:

- Vacation licenses accumulate at a rate of 1.25 days per month of service and may be accumulated to up to a maximum of 60 days by the end of each natural year.
- Sickness licenses accumulate at a rate of 1.5 days per month of service and may be accumulated to up to a maximum of 90 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 the Christmas bonus, which shall have a maximum of $600.
- Extra hours will be compensated at a maximum rate of 1.5x regular hourly rate.

The impact of Act 26-2017, as amended, was incorporated in PRASA's Payroll and Benefits costs for the Forecast. However, following the Central Government's public policy, PRASA and Puerto Rico Fiscal Agency and Financial Advisory Authority (PRFAFAA) consider local laws, such as Act 26-2017, to have supremacy over any other stipulation. As such, PRASA expects to pay the Christmas bonus to its employees. In addition, PRASA has indicated that, as performed in FY2021, efforts will be made to identify savings from other Operating Expense categories to achieve the bottom line total Operating Expenses as budgeted and required by the Oversight Board for the forecast period.

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, thus allowing the economy to undergo a transition process. 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 OMB might authorize to maintain positions, if certified to be essential and in accordance with the plan submitted by PRASA. PRASA has included the projected benefits from this program as part of the 2021 PRASA Fiscal Plan cost savings initiatives discussed in line 17 of Exhibit 1.

Some of the eligible PRASA employees occupied managerial or supervisory positions, which may create organizational challenges. As of June 30, 2021, over 292 employees are retired under the Voluntary Pre-Retirement Program.

Collective Bargaining Agreements Assumptions

In FY2012, PRASA and its larger employee union, the *Unión Independiente Auténtica de la Autoridad de Acueductos y Alcantarillados* (UIA-AAA by its Spanish acronym), signed a new Collective Bargaining Agreement (CBA), effective from January 2012 through December 2015. It included certain retroactive and future economic agreements that have an impact on PRASA's payroll and benefits expense projections, which started in FY2013. Also, PRASA and its second employee union, the Hermandad Independiente de *Empleados Profesionales de la Autoridad de Acueductos y Alcantarillados* (HIEPAAA by its Spanish acronym), signed a new CBA effective from May 2012 through June 2016. It also contains certain economic agreements (i.e., salary increases) that impact PRASA's Payroll and Benefits expenses. Under Act 66-2014, PRASA negotiated some terms included under the CBAs with both UIA-AAA and HIEPAAA. Both UIA-AAA and HIEPAAA unionized personnel agreed with PRASA that the CBAs would continue as stipulated except for certain terms, which include: the saving plans, salary increases, holiday, and sick day benefits, among others. Act 3-2017 (A) prohibits (i) increases in economic benefits to employees, with minor exceptions, (ii) monetary liquidation of vacation days and no monetary liquidation of vacation days in excess of 60 days for employees who are separating from service, (iii) liquidation of sickness days, except for employees separating from service and only in relation to sickness days accrued before January 23, 2017, at the rate of their salary as of June 30, 2014, and (iv) negotiation of CBAs through June 30, 2021, (B) suspends the effectiveness of non-economic clauses under existing CBAs that have an economic impact on the operating budgets, and (C) reduces positions of trust or appointed employees (*empleados de confianza*) by 20% unless specifically approved by the OMB.

On June 30, 2021, Act 9-2021 ("Act 9-2021") was enacted to guarantee the collective labor agreement negotiation process and allow for essential services continuity. Act 9-2021 stipulates that any collective agreement expired as of June 30, 2021, will be extended in terms of non-economic clauses or other clauses not affected by Act 9-2021 until the parties conclude the negotiation of a new agreement. The extension of these agreement terms will preclude the holding of representation elections or the disqualification of an exclusive bargaining representative. If the exclusive representative of an appropriate unit covered by Act 9-2021 wishes not to extend the applicable collective bargaining agreement and to begin negotiations without an extended agreement, notice must be given to the appointing authority under which the appropriate unit operates not later than 15 days after the enactment of Act 9-2021. This will not prevent the parties from agreeing to extend the collective bargaining agreement in such negotiations, subject to any other legislation applicable to such agreement. PRASA did not receive notice regarding the commencement of negotiations without an extended agreement within such 15-day period from any exclusive representative of an appropriate unit to any of PRASA's collective bargaining agreements covered by Act 9-2021.

Pension Costs Assumptions

The Central Government's ERS has been facing many 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 FY2021 preliminary projections and FY2022 Annual Budget 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 (COLA) 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 FY2021, PRASA preliminarily projects $92M to cover employees' retirement benefits on a Pay-Go basis. In its FY2022 Annual Budget, PRASA forecasts $94M in pension Pay-Go costs per the Oversight Board's projection. PRASA projects pension Pay-Go costs to be $94M in FY2023, $93M in FY2024, $92M in FY2025 and $91M in FY2026.

2. Electric Power (Exhibit 1, line 12) – PRASA's FY2021 preliminary projections for Electric Power total $126.7M, prior to 1) reductions due to the 20201 PRASA Fiscal Plan expense savings initiatives, and 2) the impact of the 2017 Hurricanes. The FY2022 Annual Budget assumes an electric power expense of $128.4M for FY2022. The FY2022 Annual Budget is based on electric rates as projected by the Oversight Board and not agreed to by PRASA, of a standard PREPA rate of $0.196 per kilowatt-hour (kWh) ($0.006 per kWh decrease from the FY2021 rate) and a more consistent projected electric power consumption as PREPA's service interruptions reduce. Per the 2021 PRASA Fiscal Plan, electricity consumption is expected to slightly increase in FY2023 then hold steady for the remainder of the Forecast. However, with annual electric rate increases projected during the remaining years of the Forecast, costs are expected to increase. PRASA's electricity cost is highly sensitive to PREPA rates, with an approximate $6.5M per year impact on PRASA's expense per $0.01 variation in the PREPA rate. The PREPA rate per kWh is projected to increase to $0.236 in FY2023, $0.243 in FY2024, and $0.247 in FY2025, resulting in increasing electric power expenses of $156.3M, $161.0M, and $164.0M, respectively. By FY2026, the PREPA rate is projected to escalate to $0.256 per kWh resulting in an electric power expense of $169.6M (a total cost increase of $42.9M from the FY2021 preliminary projections). PRASA's projected results of electric power cost consider the projected and expected reductions in consumption from Energy Performance Contracts (EPCs) and reductions in cost from Power Purchase Agreements (PPAs, i.e., renewable energy) 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, PRASA is susceptible to varying prices. Therefore, close monitoring of electric energy usage must continue and PRASA shall adjust its projections. Additional discussion on PRASA's Electric Power assumptions is provided below.

   Electric Energy Tariff Assumptions

   As stated previously, PRASA's PREPA rate for FY2021 was $0.202 per kWh. PREPA's projected rate applicable to PRASA for FY2022 is $0.196 per kWh. In recent months, PRASA has indicated that the average PREPA (blended) rate cost has been between $0.182-$0.225 per kWh. For FY2023 through FY2026, PRASA is projecting PREPA (blended) rate costs of $0.235, $0.241, $0.246, and $0.254 per kWh, respectively. The annual increases in the projected PREPA (blended) rates are consistent with the annual increases estimated

for the standard PREPA rates discussed in the previous section. The resulting average PREPA (blended) rate cost during the forecast period is $0.234 per kWh.

Comprehensive Energy Management Program and Regional Initiatives Assumptions

PRASA has included projected savings in consumption and costs due to its Comprehensive Energy Management Program, which PRASA undertook to help manage and reduce its electricity expense. In addition, PRASA implemented separate processes to engage the private sector in investing in energy related projects with Demand Side Projects through EPCs and Supply Side Projects through PPAs, and other internal measures such as Regional Initiatives. However, due to PRASA's fiscal situation, the status of such projects has been impacted since FY2016. A description of the different initiatives and their current status is provided below:

- **EPCs**: EPCs have been placed on hold since FY2016. Three out of the six EPCs under the contract were completed (Caguas, Barceloneta, and Bayamón Wastewater Treatment Plants or WWTPs). However, the third-party contract for the execution of the measurement and verification phase and the operation and maintenance of these three completed EPCs were placed on hold due to the September 2017 Hurricanes and subsequently canceled. The other three EPCs (Sergio Cuevas, Superaqueduct, and Puerto Nuevo) have been canceled. Thus, PRASA has not budgeted any additional savings from EPCs in FY2022.
- **Regional Initiatives**: PRASA has implemented a Regional level commitment to execute energy conservation measures in its WTPs and WWTPs, as in other facilities, and find savings at the operational level (with minimum or no investment). PRASA also leverages hydraulic modeling analyses and optimization efforts to reduce energy consumption in the water distribution and wastewater collection systems (i.e., pump stations facilities). Some of the measures include, for example, simplifying and providing more flexibility to the system, reducing and optimizing the hours of operation at the facilities, identifying energy conservation measures in the operation of the equipment, among others.
- **PPAs**: For FY2022, PRASA projects that the PPA initiative will generate 11.4 million kWh at a $0.15 per kWh blended rate. For the remainder of the Forecast, PRASA assumes the $0.15 per kWh blended rate to remain constant. The consumption generated by the PPA initiative will slightly decrease year over year (11.26M kWh in FY2023, 11.18M kWh in FY2024, 11.10M kWh in FY2025, 11.02M kWh in FY 2026). Additional consumption from PPAs is included as cost-saving initiatives further explained below.

Consumption Growth Rate Assumptions

PRASA has reduced the electric power consumption from PREPA from 743 million kWh (FY2013) down to 648 million kWh in FY2021. For FY2022, PRASA is projecting that its total consumption will be 655 million kWh, of which 643 million kWh will be power consumption bought from PREPA, net of the physical losses' initiative (refer to the 2021 PRASA Fiscal Plan cost savings initiative in Line 17 of Exhibit 1). This PREPA consumption projection also considers the Regional Initiatives expected to be achieved in FY2022 and does not consider any additional contribution from EPCs. For the forecast period, PRASA is projecting that its total consumption will be at an average of 656 million kWh, of which an average of 644 million kWh will be power consumption bought from PREPA, net of the physical losses' initiative (refer to the 2021 PRASA Fiscal Plan cost savings initiative in line 17 of Exhibit 1).

3. Maintenance and Repair (Exhibit 1, Line 13) – The FY2022 Annual Budget for Maintenance and Repair is $58.2M, which is about $4.1M more than the FY2021 preliminary projections to cover System needs from deferring required repair and maintenance of the assets due to: (1) lack of funds and (2) redirection of efforts and funding to address service recovery and continuity following natural disasters and the COVID-19

pandemic. The 2021 PRASA Fiscal Plan projects Maintenance and Repair expenses of $59.0M, $59.9M, $60.7M, and $61.7M for FY2023 through FY2026, respectively.

Arcadis believes PRASA's forecast period projections for Maintenance and Repair expenses are reasonable, with the understanding that PRASA's actual Maintenance and Repair expenses have consistently come in below budget over the last few years. However, it should be noted that this is likely a result of the lack of available capacity by professional services and contractors on the island to perform the work at the levels budgeted by PRASA and does not reflect PRASA's actual spending needs. Thus, aside from the increase in FY2022, Arcadis believes the projected increases during the Forecast are somewhat optimistic, averaging only about 1.5% per year. Considering the state and condition of the System, regional operational challenges previously discussed, and to avoid any unexpected increases in the future, Arcadis recommends revisiting the inflation assumptions applied to the Maintenance and Repair expenses.

4. Chemicals (Exhibit 1, Line 14) – PRASA's FY2021 preliminary projections for Chemical costs amount to $44.8M, prior to the 2021 PRASA Fiscal Plan expense savings initiatives. As chemical costs are usually affected by inflation and worldwide demand, as they are considered commodities, PRASA's chemical costs have increased over the past few years. PRASA's chemical costs have been on a steady rise during recent years due to the cost increases and increased chemical consumption related to ensuring compliance with environmental and health standards. In FY2022, PRASA is projecting approximately $47.5M in Chemical costs prior to the 2021 PRASA Fiscal Plan expense savings initiatives and the September 2017 Hurricanes impact. For FY2023 through FY2026, PRASA has applied an annual increase based on the assumed inflation rate (1.4% average over the forecast period) on Chemical expenses, resulting in Chemical expenses of $48.2M in FY2023, $48.9M in FY2024, $49.6M in FY2025, and $50.3M in FY2026 (prior to the 2021 PRASA Fiscal Plan expense savings initiatives).

   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 2021 PRASA Fiscal Plan, consumption increases due to new requirements from the regulatory agencies, or inefficient chemical dosing.

5. Insurance (Exhibit 1, Line 15) – Preliminary projections for Insurance expenses in FY2021 total $21.2M. PRASA has budgeted $22.2M for Insurance expenses in FY2022. This year-over-year increase includes adjustments to PRASA's insurance premiums due to the FY2017 Hurricanes emergency claims. PRASA has applied an annual increase based on the assumed adjusted inflation rate (1.4% average over the forecast period) on Insurance expenses throughout the forecast period, resulting in Insurance expenses of $22.5M in FY2023, $22.8M in FY2024, $23.2M in FY2025, and $23.5M in FY2026.

   Arcadis believes the projections for Insurance expenses are reasonable and its coverages are adequate. Several recommendations 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.

6. Other Expenses (Exhibit 1, line 16) – Other Expenses includes, for example: the Superaqueduct O&M contract, professional services (e.g., the NRW recovery office and call centers), materials and supplies, security, sludge treatment and disposition, rentals, and water transport.

   FY2021 preliminary projections for Other Expenses total $155.1M prior to the 2021 PRASA Fiscal Plan expense savings initiatives and the September 2017 Hurricanes impact. PRASA has included $161.40M for Other Expenses in its FY2022 Annual Budget, prior to the 2021 PRASA Fiscal Plan expense savings

initiatives and the September 2017 Hurricanes impact, which assumes a return to the normal level of operations and requirements after the September 2017 Hurricanes impact. PRASA is projecting that Other Expenses, as adjusted by non-recurrent expenses projected in FY2022, will increase year-over-year based on the adjusted assumed inflation rate (1.4% average over the forecast period), resulting in Other Expenses of $159.1M in FY2023, $161.4M in FY2024, $163.7M in FY2025, and $166.3M in FY2026.

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 fiscal year.

7. The 2021 PRASA Fiscal Plan Operating and Capital Expense Savings Initiatives (Exhibit 1, Line 17) – The Operating and Capital Expense Savings initiatives as included in the 2021 PRASA Fiscal Plan comprise: reduction of physical water losses, organization optimization, elimination of the Christmas bonus, health plan savings, chemical expense reduction, pension reform, electricity cost reduction, pre-retirement program, and new financing for CIP. However, as previously discussed, the elimination of the Christmas bonus and the reduction in pension payments were included by the Oversight Board and not agreed to by PRASA.

   As discussed further below, in lieu of carrying out these initiatives, PRASA intends to identify savings from other Operating Expense categories upholding the Central Government's and PRASA's public policy of not reducing benefits to its employees. Table 8-22 presents the financial projection of these initiatives for the forecast period.

   Table 8-21. 2021 PRASA Fiscal Plan Operating and Capital Expense Savings Initiatives ($, Millions)

	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026
2021 PRASA Fiscal Plan Initiatives	Preliminary	Annual Budget	Projected	Projected	Projected	Projected
Physical Water Losses	$0.0	$(1.5)	$1.1	$2.5	$4.0	$6.0
Electricity Cost Reduction	0.0	0.6	1.5	3.2	4.9	7.2
Christmas Bonus Elimination[2]	0.0	3.1	3.1	3.1	3.1	3.1
Chemical Expense Reduction	0.0	0.0	1.0	1.0	1.0	1.0
Organization Optimization	0.0	0.5	0.9	0.9	0.9	0.9
Health Plan Savings	1.6	2.9	3.1	3.2	3.4	3.5
Pension Reform[2]	0.0	0.0	5.0	5.0	4.9	4.8

	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026
Pre-Retirement Program	7.5	6.7	5.8	4.8	3.7	2.5
New Financing for CIP	20.1	114.6	138.7	66.3	9.6	3.7
Total Expense Savings[1]	**$29.2**	**$126.9**	**$160.2**	**$90.0**	**$35.5**	**$32.7**

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

[2] Following the Central Government's and PRASA's public policy, in lieu of implementing these initiatives, PRASA intends to identify savings from other Operating Expense categories.

While PRASA is committed to these initiatives, excluding the elimination of Christmas bonus and the reduction of the pension benefits, 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. Arcadis finds most of the Forecast expense savings initiatives reasonable. However, projected savings for the organization's optimization and electricity cost reduction initiatives are optimistic, considering PRASA's existing operational needs, the current condition of its assets, and the budgeted electric power costs. Also, the new financing for CIP appears optimistic based on the recent execution rate of capital projects due to a lack of availability of professional services and contractors on the island to meet and perform the work scheduled in the CIP.

Physical Losses Reduction Initiative

As previously discussed, physical losses are the largest component of NRW in PRASA's water balance. 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 expects the initial costs to install master meters and start the leak detection measure deployment to exceed the expected return by $1.5M in FY2022, with net savings expected to start by FY2023. PRASA projects a net savings of $1.1M in FY2023, $2.5M in FY2024, $4.0M in FY2025, and $6.0M in FY2026. The projected net savings for the forecast period is $12.2M.

PRASA's long-term goals include reducing water production in the System by approximately 52.1 MGD by FY2026, annual cost savings up to $6M in electricity and chemical costs, and reducing or eliminating the need for water rationing.

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 2021 PRASA Fiscal Plan:

- Performing further operational improvements focused on conservation measures in its WTPs and WWTPs.
- Leveraging hydraulic modeling analyses and optimization efforts to reduce energy consumption in the water distribution and wastewater collection system (i.e., pump station facilities).

- Providing more flexibility to the System and reducing and optimizing the hours of operation at the facilities.
- Identifying energy conservation measures in equipment operation.

The actual cost savings from this measure will depend on the cost of electricity produced by PREPA. Based on current projected electricity rates, the projected cost savings amount to $0.6M in FY2022, $1.5M in FY2023, $3.2M in FY2024, $4.9M in FY2025, and $7.2M in FY2026. Total project savings during the forecast period equate to $17.4M.

Organization Optimization

As of June 30, 2021, PRASA's workforce consisted of 4,670 employees, 30 less than PRASA's FY2021 target of 4,700 employees. Since its most recent labor capacity and productivity assessment conducted in 2014, PRASA has struggled to achieve its target employee headcount on an annual basis. In addition, the 292 employees currently part of the Pre-Retirement Program do not render any services to PRASA. Thus, the level of active employees is 4,378 versus the 4,670 indicated by the total workforce numbers. As stated in the 2021 Fiscal Plan, this situation is unsustainable, affecting PRASA's operations and performance by requiring increases in overtime and greater reliance on more expensive third-party services.

PRASA engaged a firm in FY2021 to perform a labor capacity and productivity assessment to determine the optimal staffing level.

While PRASA originally requested a target headcount of 4,700, under the guidance of the FOMB and until the assessment results are available, the headcount level is projected to be held at 4,677 for the FY2022 Annual Budget. PRASA believes that operating at a lower headcount than the requested amount of 4,700 will lead to operational inefficiencies and negatively affect performance optimization.

Cost savings for the organization optimization initiative are projected to be $0.5M in FY2022, then $0.9M annually from FY2023 through FY2026. Total projected savings amount to $4.2M during the forecast period.

Christmas Bonus

The Oversight Board has requested PRASA to include in its Fiscal Plan the elimination of the Christmas bonus starting in FY2022 to achieve cost savings in the amount of $3.1M in its FY2022 Annual Budget. However, following the Central Government's public policy, PRASA will consider local laws, such as Act 26-2017 and Act 176-2019, to have supremacy over any other stipulation. Therefore, PRASA paid the Christmas bonus to its employees in FY2021 and plans to pay it each year thereafter throughout the forecast period.

Nonetheless, PRASA has indicated that, as done in the past, efforts will be made to identify savings from other Operating Expense categories to account for the rejected initiatives and achieve the bottom line total Operating Expenses as budgeted and required by the Oversight Board.

Chemical Expense Reduction

Chemical expenses are PRASA's fourth-largest operating expenditure for FY2022 at $47.5M. While there is an opportunity to reduce these costs, any kind of chemical cost-savings measures need to be carefully reviewed to ensure PRASA would be able to remain in compliance with environmental regulations. In addition, droughts, hurricanes, and climate change have altered water quality and supply, which have created challenges for effective chemicals application and optimization.

As reported in the 2021 PRASA Fiscal Plan, PRASA has identified four areas to reduce chemical spending and usage while ensuring high water quality:

- Chemicals Inventory and Application Optimization – Consists in the establishment of a detailed inventory for chemicals use and application to improve chemical consumption visualization, increase supplier provision accuracy, detect and prevent unallowed chemical uses, optimize chemical inventory levels, control and monitor chemical consumption by region, and provide continuous updates and monitoring to program technologies.
- Coagulant and Flocculant Cost Reduction – Procurement process to consolidate purchase of coagulants and flocculants for all treatment plants. The centralized RFP process is expected to maximize opportunities for price reductions through bulk purchasing. Furthermore, the single supplier must provide guidance to PRASA for the adequate type of chemicals, thereby further increasing efficiency in chemicals application.
- Chlorine and Permanganate Cost Reduction – A bidding process for chlorine and permanganate is underway to provide for the requirements for all of PRASA's facilities based on various levels of concentration and sizing.
- Improve Carraízo Reservoir Water Availability – A Professional Engineer Report has been procured to determine the best option to increase water availability at the Carraízo Reservoir.

While PRASA cannot currently and reasonably estimate the benefit of the chemical cost savings initiatives, the Oversight Board projected in the 2021 PRASA Fiscal Plan a benefit from an estimated $1M in annual cost savings starting in FY2023 if these initiatives are implemented successfully.

Health Plan Savings

Per the 2021 Fiscal Plan, the goal of this initiative is to standardize health insurance contributions at PRASA by calculating a total health medical plan budget. In FY2021, PRASA entered into a new medical health plan agreement to lower costs while providing adequate, market-based medical coverage for its employees. In addition to the savings realized in FY2021 as a result of implementing the new health plan agreement, PRASA must ensure through a procurement process that it is receiving optimal market price and benefits for its employees consistent with uniform employer contributions as set forth by Act 26-2107. Cost savings for the health plan savings initiative is projected in the amount of $1.6M in FY2021 and budgeted at $2.9M in FY2022. The savings for the remainder of the forecast period are projected to be $3.1M in FY2023, $3.2M in FY2024, $3.4M in FY2025, and $3.5M in FY2026. The total savings projected for the forecast period is $17.6M.

Pension Reform

PRASA's pension contributions will be reduced by a maximum of 8.5% depending on participants with no reduction to those with benefits less than $1,500 per month starting in FY2023 following the Oversight Board projections. PRASA, in alignment with Puerto Rico public policy, does not expect to implement the pension reform initiative. The Oversight Board projected annual savings of approximately $5M for FY2023 through FY2026.

Pre-Retirement Program

As stated in the 2021 PRASA Fiscal Plan, the Government created a Voluntary Pre-Retirement Program in FY2016 in response to the fiscal crisis. The program provides incentives to certain eligible government employees to voluntarily retire early from service. The program was implemented to progressively reduce the

workforce, allowing employees to retire with an orderly transition process. The resulting vacant positions created from the retirement program must be closed with certain allowed exceptions (if approved by FOMB).

The FY2021 preliminary projections for the cost savings achieved via the Pre-Retirement Program equate to $7.5M, while the FY2022 Annual Budget assumes a cost savings of $6.7M. The 2021 PRASA Fiscal Plan projects cost savings of $5.8M in FY2023, $4.8M in FY2024, $3.7M in FY2025, and $2.5M in FY2026.

New Financing for CIP

After reprogramming the Federal Debt, PRASA recovered access to future funding from USEPA SRF Loans and the USDA RD Program once again. As a result, the FY2021 preliminary projections expect new financing for CIP through these two programs in the amount of $20.1M and $114.6M in the FY2022 Annual Budget. For the remainder of the forecast period, the 2021 PRASA Fiscal Plan projects to receive $138.1M in FY2023, $66.3M in FY2024, $9.6M in FY2025, and $3.7M in FY2026 from these programs for their CIP.

8. 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%. FY2021 preliminary results for Capitalized Expenses amount to $6.8M, reflecting a reduced level of CIP investments. PRASA has included in its FY2022 Annual Budget $26.4M for Capitalized Expenses based on the capitalization rate of 3.7% of operating expenses. For FY2023 through FY2026, PRASA is projecting Capitalized expenses of $28.6M, $28.9M, $29.2M, and $29.5M, 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 outside, 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 has contracted Arcadis for FY2022 to review and update the amount of annual operating costs that are eligible to be capitalized to CIP. Such analysis is currently in process and expected to be finalized in the first quarter of 2022.

9. Hurricanes' Impact on Operational Expenses (Exhibit 1, line 20) – In the 2021 PRASA Fiscal Plan, PRASA estimated a total hurricane impact to operational expenses in the amount of $214M. The projection of the total incremental expenses due to the 2017 Hurricanes' impact reflects the best estimate of PRASA based on information submitted to FEMA. The major components included as part of this immediate incremental expenses estimate include:

   - overtime payroll for employees working during the emergency
   - maintenance, diesel refueling and logistics for emergency power generators
   - investment on auxiliary backup generators (not included in CIP)
   - water distribution services (i.e., oasis)
   - security measures

This amount is subject to the final actual expenditures to address the 2017 Hurricanes' impact. PRASA is forecasting to receive FEMA funding reimbursement at a 90% recovery rate of the total estimated incremental expenses of $232.7M.

Arcadis reviewed the MAT, as amended, to determine the adequacy of the allocation of both insurance proceeds and FEMA reimbursements/grants to be obtained due to the impact of the 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 PRASA receives FEMA funds, 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 the repair, replacement, or reconstruction of the damaged or destroyed property should be applied to the Capital Improvement Fund, as discussed in more detail below.

In its FY2021 projections and FY2022 Annual Budget, PRASA includes a net deposit of $28M and $20M from FEMA funds to the credit of the Current Expense Fund, respectively. No additional deposits are included in FY2023-FY2026.

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 will be calculated annually no later than six months after the end of each fiscal year 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 fiscal year;
- 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 fiscal year;
- 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 fiscal year; and
- 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 in accordance with the Annual Budget for the current fiscal year.

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 8-22. Summary of 2012 MAT DSC Requirements, 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, & 2019 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.
- Commonwealth Guaranteed Indebtedness (CGI) and Commonwealth Supported Obligations (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 things, 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 and the maintenance of debt service reserve funds for all such Indebtedness, if any, with amounts on deposit in the Current Expense Fund not being available to make up shortfalls in the balance required to be on deposit in the Bond Funds to pay debt service on the Senior Bonds, the Senior Subordinate Bonds and the Subordinate Bonds, respectively.*

2. *Revise the definition to "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, many of these will not become effective unless and until all bondholders of Outstanding Senior Bonds and the Federal Lenders have consented to it. PRASA cannot give any assurance whether it will continue to seek all such consents, when all such consents will be obtained, or if such consents 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 FY2021 through FY2026 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, and 2020 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 Rural Development Loans starting in July 2019, after the federal debt modification.

Commonwealth Guaranteed Indebtedness (CGI) includes those of PRASA's existing obligations which are guaranteed by the Commonwealth of Puerto Rico. 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 as of 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 Stated 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 (new paragraph regarding Trustee notifications to each Fiduciary for, and Holder of (as applicable), 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 as of July 26, 2019, are summarized in Table 8-24.

Table 8-23. Renegotiated Terms for SRF and RD Debt

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

As reported on the 2021 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 $1,351.3M and $18.8M, respectively, for the purpose of refunding a portion of its outstanding senior bonds. The proceeds of the 2020 Senior Bonds were used to:

1. 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.
2. Refinance all of PRASA's currently outstanding Revenue Refunding Bonds, 2008 Series A, and 2008 Series B, each guaranteed by the Commonwealth of Puerto Rico.
3. Pay costs of issuance of the 2020 Senior Bonds. The par amount of the refunded bonds amounted to $1,427.6M (the 2020 Senior Bonds were issued at a premium to par).

The issuance of the 2020 Senior Bonds to refund a portion of PRASA's senior bonds resulted in a reduction in total debt service payments over the next 27 years of approximately $348.2 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 $13M.

The 2020 Senior Bonds are classified as Senior Debt and are not guaranteed by the Commonwealth. Therefore, no CGI remains outstanding after the Federal Debt modification in July 2019 and the issuance of the 2020 Senior Bonds.

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 Commonwealth Supported Obligation (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.

A summary of PRASA's debt service obligations and projections for FY2021 and the forecast period are presented in Tables 8-25 and 8-26, respectively. FY2021 debt service obligations, including CSO debt, totaled $272.9M, of which $256.8M were Senior lien obligations. As shown, PRASA did not make payments for CSO debt.

Table 8-24. FY2021 Debt Service Obligations and Preliminary Results ($, Thousands)

Debt Category	FY2021 Obligations[1]	FY2021 Preliminary Results[2]
Senior Debt	$256,756	$256,756
Senior Subordinated Debt	-	-
Subordinated Debt	-	-
Commonwealth Guaranteed Indebtedness (CGI)	7,178	7,178
Commonwealth Supported Obligations (CSO)	8,999	-
Total	**$272,933**	**$263,934**

[1] Considers the full debt service obligations due in FY2021 per amortization schedule.

[2] Considers no payment of CSO (PFC Superaqueduct related debt, payable form Commonwealth appropriations). 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.

Table 8-25. FY2022-FY2026 Debt Service Obligations ($, Thousands)

Debt Category[1]	FY2022 Projection	FY2023 Projection	FY2024 Projection	FY2025 Projection	FY2026 Projection
Senior Debt	$270,633	$276,700	$284,300	$282,100	$282,800
Senior Subordinated Debt	-	-	-	-	-
Subordinated Debt	-	-	-	-	-
Commonwealth Guaranteed Indebtedness (CGI)	-	-	-	-	-
Commonwealth Supported Obligations (CSO)	-	-	-	-	-
Total Debt	**$270,633**	**$276,700**	**$284,300**	**$282,100**	**$282,800**

[1]Assume 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 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.

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 8-26. FY2021 - FY2026 Debt Service Coverage

Debt Service Level	DSC Requirement	FY2021 Preliminary DSC	FY2022 DSC	FY2023 DSC	FY2024 DSC	FY2025 DSC	FY2026 DSC
Senior Debt[1]	**2.50**	4.08	3.81	3.77	3.71	3.79	3.84
Senior Subordinated Debt[1]	**2.00**	4.08	3.81	3.77	3.71	3.79	3.84
Subordinated Debt [1]	**1.50**	4.08	3.81	3.77	3.71	3.79	3.84
All Obligations[2]	**1.00**	1.01	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, FY2021 preliminary DSC results consider that PRASA will not pay the CSO debt (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 FY2021 will be recalculated after the issuance of the FY2021 Audited Financial Statements to determine if PRASA was able to meet Rate Covenant Requirements.

8.6 Reserve and Fund Deposit 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 fiscal year 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 originally 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 $150M until March 1, 2013, and thereafter:

(i) If there is a line of credit (LOC) on deposit in the reserve fund, the reserve shall mean for the term of line of credit an amount equal to at least ninety (90) days of current expenses determined on the first day of the fiscal year in which such line of credit is delivered or renewed as set forth in the annual budget for such fiscal year; or

(ii) If the reserve fund is funded from revenues, the reserve shall mean an amount equal to not less than ninety (90) days of current expenses determined annually based on the current expenses relating to the fiscal year of such calculation as set forth in the annual budget for such fiscal year.

The Sixth Supplemental Agreement to the MAT, amended Section 5.10 (a) and (c) of the Operating Reserve Fund to read as follows:

(a) In each month, the Trustee shall deposit to the Operating Reserve Fund (i) beginning on the first Business Day of the month and after making the deposits required by Section 5.02 (b) (i) through (vii), an amount of the Authority Revenues equal to 1/60 of the amount, if any, necessary to restore the amount on deposit therein to the Operating Reserve Requirement and to pay interest on any reimbursement obligations due with respect to an Operating Reserve Facility. Earnings on moneys held in the Operating Reserve Fund shall be retained therein.

(b) *In lieu of or in addition to cash or investments, at any time, the Authority may cause to be deposited to the credit of the Operating Reserve Fund, an Operating Reserve Facility, in the stated amount equal to all or a portion of the application Operating Reserve Requirement. Any withdrawals from the Operating Reserve Fund made in accordance with the above paragraph (b), shall be made first from any cash or investments on deposit therein and then to the extent no such cash or investments are available, from a draw on any Operating Reserve Facility.*

PRASA had a loan agreement (the Government Development Bank for Puerto Rico (GDB) Loan Agreement) with the GDB under which the GDB provided a revolving line of credit to PRASA in the amount of $180M (previously $150M) that satisfied the balance that PRASA is required to maintain in the Operating Reserve Fund under the MAT. The maturity of such line of credit was extended to June 30, 2018, contingent upon PRASA's successful completion of the 2015 Senior Bond issuance. Given that bonds were not issued on or before August 31, 2015, the facility matured on June 30, 2016. Therefore, PRASA is required to fund the Operating Reserve Fund at its requirement from Operating Revenues in accordance with the flow of funds (as defined in the MAT) or obtain a new line of credit to satisfy the Operating Reserve Fund Requirement.

Therefore, in accordance with the Sixth Supplemental Agreement to the MAT, PRASA deposited $34.2M in the Operating Reserve Fund during FY2021 (funding approximately 1/5 of the Operating Reserve Fund requirement). PRASA fully funded the reserve fund requirement of three months of current expenses by the end of FY2021. As of June 30, 2021, the Operating Reserve Fund balance stood at $175.2M (inclusive of the $34.2M deposit made in FY2021). For FY2022, PRASA is projecting to deposit $1.4M in the Operating Reserve Fund to account for adjustments to current expenses during FY2022. In future years, PRASA is projecting to make smaller deposits 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 fiscal year in an amount equal to the greater of:

(i) The amount set forth in the annual budget for such fiscal year, or
(ii) The amount recommended by the Consulting Engineer.

Equal monthly deposits over the fiscal year 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:

(iii) The proceeds of any condemnation awards,
(iv) The proceeds of insurance (other than use and occupancy insurance),
(v) The proceeds of sales of property constituting a part of the Systems, and
(vi) The proceeds of any termination or similar payment received by PRASA under any interest rate swap or similar hedge agreement.

PRASA deposited $60.6M from Operating Revenues in the Capital Improvement Fund during FY2021 to finance a portion of its projected CIP. This deposit is net from the FEMA/Insurance proceeds and other restricted funds, and the PRASA FY2021 Fiscal Plan New Federal Funds initiative estimated at $20.3M (excluding the costs related to such funds as they are already included as a part of the debt service) for FY2021.

In its FY2022 Annual Budget, PRASA projects to make a deposit to the Capital Improvement Fund of $72.2M from Operating Revenues, net from FEMA/Insurance proceeds and net from the PRASA FY2021 Fiscal Plan New

Federal Funds initiative estimated at $119.9M (excluding the costs related to such funds as they are already included as a part of the debt service).

From FY2023 through FY2026, PRASA projects to make deposits in the Capital Improvement Fund in the amounts of $38.9M, $39.7M, $51.2M, and $59.0M from Operating Revenues. Also, PRASA projects additional federal funds (SRF and RD) of $149.8M, $80.3M, $24.3M, and $19.1M, 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.

Additionally, 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.

In its FY2022 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 2021 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 FY2021 projections and the FY2022 Annual Budget do not include any deposits to the Rate Stabilization. PRASA does not plan on making any deposits during the forecast period.

8.7 Conclusions

PRASA's Forecast (Exhibit 1) reflects the financial projections included in the 2021 PRASA Fiscal Plan certified by the Oversight Board on May 27, 2021. With PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total surplus of $6.6M.

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. 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 2021 PRASA Fiscal Plan initiatives.
- Lower funding than expected from insurance, FEMA proceeds, SRF, or RD federal funds.
- Higher overtime expenses than currently planned because of further delays in filling vacant positions, the headcount cap determined by the Oversight Board and the extended impacts from COVID-19 pandemic.
- Higher energy costs because of higher electric costs (per kWh) and/or lower savings achieved through the PRASA Comprehensive Energy Management Program.
- Higher expense costs because of not eliminating the Christmas bonus or reducing the pension costs without identifying other savings sources to compensate for not implementing these initiatives proposed by the Oversight Board.
- Higher annual inflation rates.
- Higher capital costs due to lower supply of professional and construction workforce and higher materials and parts costs.
- Prolonged effects of the COVID-19 pandemic beyond PRASA's expected recovery period

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

1. **PRASA's ability to maintain its Service Revenues, billings, and collections in a continuing challenging economic environment** – A continued declining trend in customer accounts, uncertainty on the economic recovery of the island, population shifts, and unforeseeable changes in consumption patterns could cause further strain on PRASA's billings and collections.
2. P**RASA's ability to implement the necessary annual rate increases** – PRASA is projecting to implement annual modest rate increases that will generate about $909.9M between FY2021 and FY2026. However, the actual amount of the rate increases to be implemented by PRASA will depend on their financial results, planned CIP investments, customer base and consumption trends, among others.
3. **PRASA's ability to continue to successfully implement the 2021 PRASA Fiscal Plan initiatives** – The 2021 PRASA Fiscal Plan Forecast includes additional revenue-enhancing and cost reduction initiatives. Any changes to the funding, framework and execution of these initiatives may significantly alter PRASA's projected financial results. Although PRASA has made a commitment to implement the initiatives described in

this Report (except for the ones proposed by the Oversight Board and noted throughout the Report), there is a possibility that the projected results and, more specifically, the timing of those results may not be achieved.

4. **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. If System needs exceed the levels assumed by PRASA in its Forecast, expenses could be materially affected.
5. **PRASA's ability to secure and receive expected funding for the execution of the forecasted CIP** – PRASA has forecasted capital investments of approximately $2.3 billion over the forecast period to be funded by federal funds, including FEMA, CDBG, SRF and RD. The CIP implementation, particularly the recovery projects, depends on timely reimbursements and disbursements of funding sources (i.e., FEMA funds). Therefore, lower than anticipated FEMA/insurance or other expected federal funding, or the exclusion of these proceeds from PRASA's Authority Revenues, will impact PRASA's ability to meet DSC obligations.

EXHIBIT 1

	PRASA FINANCIAL FORECAST PRO FORMA[a] ($, Thousands)	FY2021 PRELIMINARY [b]	FY2022 ANNUAL BUDGET	FY2023 PROJECTION	FY2024 PROJECTION	FY2025 PROJECTION	FY2026 PROJECTION
	OPERATING REVENUES						
1.	Service Billings (Base Fee and Service Charges, Net of Subsidies) [c]	$1,033,625	$1,024,827	$1,034,600	$1,045,600	$1,057,500	$1,071,600
2.	Transfer from / (to) Rate Stabilization Account	0	0	0	0	0	0
3.	Other Income (Miscelaneous/Special Assessments)	2,000	2,500	2,500	2,500	2,500	2,500
4.	Fiscal Plan - Revenue Enhancing Initiatives [d]	12,444	2,916	5,700	7,200	8,800	10,500
5.	**Total Operating Revenues [Sum Lines 1-4]**	**$1,048,069**	**$1,030,243**	**$1,042,800**	**$1,055,300**	**$1,068,800**	**$1,084,600**
	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]**	**$1,048,069**	**$1,030,243**	**$1,042,800**	**$1,055,300**	**$1,068,800**	**$1,084,600**
	OPERATING EXPENSES						
11.	Payroll and Benefits	$324,952	$327,259	$327,100	$327,300	$327,300	$327,300
12.	Electric Power	$126,730	$128,405	156,300	161,000	164,000	169,600
13.	Maintenance and Repair	$54,179	$58,237	59,000	59,900	60,700	61,700
14.	Chemicals	$44,833	$47,541	48,200	48,900	49,600	50,300
15.	Insurance	$21,181	$22,199	22,491	22,816	23,156	23,507
16.	Other Expenses	$155,091	$161,043	159,109	161,384	163,744	166,293
17.	Fiscal Plan - Cost Saving Initiatives [e]	($9,100)	($12,381)	(22,900)	(23,400)	(25,600)	(28,800)
18.	Capitalized Operating Expenses	($6,769)	($26,355)	(28,600)	(28,900)	(29,200)	(29,500)
19.	**Total Operating Expenses [Sum Lines 11-18]**	**$711,097**	**$705,948**	**$720,700**	**$729,000**	**$733,700**	**$740,400**
	ADDITIONAL EXPENSES						
20.	Expected FEMA Reimbursements[f]	(28,000)	(20,000)	0	0	0	0
21.	**Total Additional Expenses [Line 20]**	**-$28,000**	**($20,000)**	**$0**	**$0**	**$0**	**$0**
22.	**Total Operating Expenses [Line 19 + Line 21]**	**$683,098**	**$685,948**	**$720,700**	**$729,000**	**$733,700**	**$740,400**
	DEPOSITS						
23.	Deposit to the Senior Bond Fund	$256,756	$270,633	$276,700	$284,300	$282,100	$282,800
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	34,155	1,402	6,400	2,200	1,700	2,400
31.	Deposit to the Capital Improvement Fund (Net of Projected New Federal Funds and FEMA Reimbursement)	60,629	72,225	38,900	39,700	51,200	59,000
32.	Deposit to the Construction Fund	0	0	0	0	0	0
33.	Deposit to the Commonwealth Payments Fund	7,178	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]**	**$358,718**	**$344,260**	**$322,000**	**$326,200**	**$335,000**	**$344,200**
36.	**Net Authority Revenues After Obligations and Deposits [Line10-Line 22-Line 35-Line 30]**	**$6,253**	**$34**	**$100**	**$100**	**$100**	**$0**
	DEBT SERVICE PAYMENTS DUE						
37.	Senior (S)[g]	$256,756	$270,633	$276,700	$284,300	$282,100	$282,800
38.	***DS Coverage Required = 2.50***	***4.08***	***3.81***	***3.77***	***3.71***	***3.79***	***3.84***
39.	Senior Subordinated (SSUB)	0	0	0	0	0	0
40.	***DS Coverage Required = 2.00***	***4.08***	***3.81***	***3.77***	***3.71***	***3.79***	***3.84***
41.	Subordinated (SUB)	0	0	0	0	0	0
42.	***DS Coverage Required = 1.50***	***4.08***	***3.81***	***3.77***	***3.71***	***3.79***	***3.84***
43.	Commonwealth Guranteed Indebtedness (CGI)	7,178	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**	**$263,934**	**$270,633**	**$276,700**	**$284,300**	**$282,100**	**$282,800**
47.	***DS Coverage on All Obligations (Coverage Required = 1.00)***	***1.006***	***1.000***	***1.000***	***1.000***	***1.000***	***1.000***

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

[b] Based on projected results as presented in PRASA's May 27th, 2021 Fiscal Plan.

[c] Includes additional revenues from rate increases and elecronic bill discount, net additional billings from on-going intitiatives, and the adjustment for billings not collected (net of collections from prior years).

[d] Projected additional revenues from initiatives included in 2021 PRASA Fiscal Plan.

[e] Projected operating and capital expense reductions from initiatives included in Fiscal Plan: reduction of physical water losses, organization optimization, elimination of the Christmas bonus, health plan savings, chemical expense reduction, pension reform, electricity cost reduction, and pre-retirement program. Excludes New Financing for CIP initiative as it is included in line 32. In FY2022 through FY2026, 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.

9 Conclusions and Recommendations

9.1 Considerations and Assumptions

In preparation for this Report and the conclusions contained herein, Arcadis has relied on certain assumptions and information provided by PRASA regarding the conditions that may exist or future events. 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 herein or provided by others, the actual results will vary from those forecasts.

Arcadis has made several considerations and assumptions (as provided throughout this Report); some of the most notable are as follows:

1. 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. However, for purposes of this report, Arcadis has assumed that all such contracts, agreements, laws, rules, and regulations will be fully enforceable in accordance with their terms.
2. PRASA will continue the current policies of employing qualified and competent personnel; properly operating and maintaining the System according to generally accepted industry practices; and operating the System in a prudent and sound businesslike manner.
3. The proposed CIP reflects the general needs of the System; the CIP will be largely implemented as planned and reflected in this report. However, PRASA will make modifications to the CIP investment forecast if the overall System condition is negatively affected by the investment levels projected in future years.

Set forth below are the most relevant opinions which Arcadis has reached regarding the review of PRASA's System, CIP, and financial projections as per the 2021 PRASA Fiscal Plan.

1. PRASA's headcount is below the optimum staffing level stipulated by the Executive Management Team but its staffing mix is not yet optimal as there are numerous vacant positions that must be filled to address O&M of the System. For example, 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. PRASA shall further assess its staff mix and implement a more targeted training and workforce development program to allow internal staff re-assignments, thereby decreasing current staffing needs. Also, PRASA should consider the impact of the employee retirement programs and workforce challenges on the island, which will continue to affect its existing staff and their ability to recruit capable and experienced staff. Moreover, PRASA may need to reevaluate their compensation package to critical positions in need, such as plant operators and electromechanical, to compete with the market and retain personnel. Lastly, PRASA has hired V2A to reevaluate the optimal staffing levels considering all recent events and the magnitude of the Capital Improvement Program.
2. PRASA continues to assess organizational and operational performance and implement organizational and policy changes, focusing on customer service, System performance, and budget controls. New KPIs and metrics were established and measured, and stronger management oversight contributes to operational and organizational improvements.

3. Arcadis visited 180 facilities throughout PRASA's five Operational Regions between February and July of 2021 to conduct a condition assessment of PRASA's facilities. Of the inspected facilities, 80 (44%) were treatment (WTP and WWTP) facilities. The data indicates that only 7% of the facilities inspected in FY2021 are in the Good range, and 66% are in the Adequate range. However, almost half of the facilities rated as Adequate (40 of 118, 34%) are rated 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. Moreover, the physical condition continues to deteriorate as capital improvements and R&R actions are limited due to fiscal and budget limitations.

   Overall, the WTPs inspected are mostly in adequate condition. To the extent that the physical structures and operational/process controls are maintained or improved, they are expected to continue to serve their intended purpose of providing a potable water supply in compliance with applicable regulations. Facility ratings increased in operations/ process control, Equipment/Maintenance and staffing/training criterion compared to the 2020 inspections. Conversely, facility inspection decreased in overall rating compared to the 2020 inspections. The greatest concern continues to be the physical condition of the facilities, which continues to deteriorate year over year, evidenced by the lack of capital improvement and R&R programs due to the fiscal situation and budget limitations, further exacerbated by the damage caused to the treatment facilities by the 2017 Hurricanes.

   Regarding compliance, even though the rating was Good, PRASA acknowledges that it has some challenges ahead with the Stage 2 D/DBPR compliance and has performed water quality modeling to identify the root cause of these non-compliance events and establish corrective actions and control measures to improve compliance. PRASA has developed an action plan to address exceedances to TTHM and HAA, which consists of but is not limited to the combination of the following corrective measures: elimination/reduction of pre-chlorination; increasing frequency of process tanks/systems wash; WST oscillation monitoring; more frequent drainage of systems; change in coagulants; hydraulic modeling to reduce retention time in tanks; lowering pH; and increase of testing frequency in non-compliance areas to verify the progress of corrective measures, among others. PRASA must continue to implement these corrective measures to mitigate the production of disinfection by-products. Moreover, PRASA should address the shortcomings identified during inspections to improve the physical condition of its facilities, achieve/maintain continuous and consistent compliance, and optimize O&M expenses.

   The WWTPs generally range from Poor to Adequate condition, with the equipment condition being the primary driver under this criterion. The average overall rating for this criterion was 1.6, which is barely Adequate. Of the 23 facilities inspected, six facilities (26%) received a Poor rating under this criterion, and the remaining facilities were rated as Adequate. These facilities include: Dorado WWTP, Caguas WWTP, Aguas Buenas WWTP, Río Grande Estates WWTP, Yabucoa WWTP, and Isabela WWTP. Despite 17 (57%) of the facilities being rated as Adequate at the time of inspection, 15 (65%) 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. Process control is also a challenge in some facilities, even though plant operators indicated that standard operating procedures and control strategies are followed. The compliance criterion was 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 treat to meet permanent limits.

   The facility criteria rating of WPS increased significantly to Adequate. At the same time, wells, WSTs, and WWPSs remain in the lower end of Adequate and, if left unattended, could continue to deteriorate. WSTs

facility criteria rating did not materially change, remaining as Adequate; however, they do not have that much equipment, so they do not deteriorate at the same rate as wells or WPSs, but recently we have observed more signs of corrosion on the pipelines, air vents or float valves than previous years. Moreover, corrosion is also showing signs that WSTs need maintenance or improvements. Overall, most of the deficiencies noted in ancillary facilities can be addressed through PRASA's R&R program and may not require major capital. Lastly, future regulatory requirements may require either the implementation of significant capital improvements to include and achieve additional treatment capabilities at well facilities or the closure of certain wells.

4. The number of water leaks and sanitary overflows continue to be high when compared to U.S. benchmarks. PRASA continues efforts to improve its leak detection, leak repair, and monitoring practices and aggressively address leak occurrences. By applying the established NRW reduction initiatives, PRASA has helped reduce water production, water losses, and NRW reported. Furthermore, the 2021 PRASA Fiscal Plan WRO 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. Moreover, the provision of meters or mechanisms to measure the water discarded as part of the System's programmed drains 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 U.S., 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. Additionally, adding pre-treatment (screens, comminutors) and preventive maintenance to facilities would help lessen overflows.

5. PRASA's O&M costs are within industry standards per the 2020 AWWA benchmarks. Reducing NRW is a high-priority goal for PRASA, and it is one of the key focus areas of the 2021 PRASA Fiscal Plan. PRASA is redefining its NRW goals and metrics to phase out calculations that still use estimation methods, moving towards using actual measurements. Furthermore, the provision of meters or other mechanisms to measure the water discarded as part of the programmed drainages will further improve accounting for the volume of NRW in the System. Additionally, the Physical Losses Reduction initiatives, water production reduction, and the Meter Replacement Program will further support PRASA's efforts to reduce NRW.

   The Water Recovery Office (WRO) has established an NRW team ("TeamORA") that integrates not only WRO staff but also operations personnel for a more comprehensive approach to address the 2021 Fiscal Plan NRW initiatives 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. However, significant capital investments and R&R funded budgets are required to accelerate the NRW program and address leak occurrences in both a corrective and preventive manner. PRASA activated the CIP during FY2021 and anticipates the implementation of projects will address some of the major System needs and issues. Also, the Strategic Plan was completed and approved during FY2021.

6. Except for buried infrastructure improvement needs not visible and not identified after the 2017 Hurricanes and 2020 Earthquakes, PRASA's six-year CIP and the O&M initiatives align with the System needs and adequately address all mandated requirements, existing consent decrees and agreements with Regulatory Agencies. The six-year CIP also includes funding for minor and major repair projects and PRASA's R&R program, for recovery efforts and for System resilience/strengthening. Most of the projected six-year CIP investment is related to Reconstruction & Recovery, R&R and Compliance projects. However, as noted in

previous reports, given PRASA's high rate of leaks and overflows and continuing aging infrastructure, additional funds and an acceleration of the R&R program are required to reduce/minimize these incidences. Furthermore, PRASA's six-year CIP includes funding for quality improvements and other necessary infrastructure projects (i.e., meters, fleet, technological improvements, safety and growth, emergencies and contingencies and others) essential to maintaining and preserving the utility assets.

In addition, after continuous efforts, PRASA was able to reach a debt restructuring agreement with the funding programs of USDA's Rural Development (RD) Program ($52.2 Million) and USEPA's State Revolving Fund (SRF) Program ($241 Million). Also, PRASA was able to secure an obligation of $3.7 Billion from the Federal Emergency Management Agency (FEMA) for the CIP. Likewise, PRASA was able to restructure the debt and improve its rating, thus gaining access to the Bond Market for additional funding. Moreover, PRASA is actively requesting and searching for additional federal funding, like ARPA. It will allow PRASA to access these funding sources to execute compliance-driven projects. PRASA will need to perform additional assessments and implement operational changes or additional capital improvements to bring non-compliant facilities into compliance. Also, as the impact of future regulations becomes more defined, CIP modifications will be required to adequately accommodate resulting needs. Note that one of these future regulations is the Lead and Copper Rule, which is currently under revision to become more stringent. Lastly, additional CIP needs identified during the 10-year Master Plan development or by other means will need to be prioritized and the implementation schedules will depend on PRASA's funding sources. PRASA will identify the funding for new projects and add to the current CIP and depending on its priority assign to the one of the Program Management Consultants (PMCs) overseeing the Program.

7. The insurance program covering PRASA's exposures to risks of accidental property and liability losses arising from ongoing operations provides reasonable coverage. Also, the Owner Controlled Insurance Program (OCIP) covering PRASA's exposures to risks of accidental property and liability losses arising from construction activities provides reasonable coverage. PRASA should address the following key recommendations:
    - Conduct a PML Study considering new CAT Modeling and parameters. Especially after the lessons learned in the aftermath of the September 2017 Hurricanes, the 2020 earthquakes and the COVID-19 pandemic.
    - PRASA should consider establishing a fund to cover possible financial losses from any future catastrophic or non-catastrophic events that might affect infrastructure and operations and imposes an unexpected financial burden.
    - PRASA should consider Cyber Security Coverage, which is excluded under all PRASA Insurance Programs. PRASA should also complete a self-assessment to determine potential areas of weakness compared to international standards and determine the potential frequency and severity of a breach.
    - PRASA should consider Terrorism Coverage, which is excluded under all PRASA Insurance Programs.
    - PRASA should consider including Fungi and/or Bacteria coverage, which is excluded under General liability and umbrella coverage, and other programs.
    - PRASA should consider requesting an endorsement to include a "Partial Occupancy Provision" to grant permission for partial occupancy of project areas in the OCIP Builder's Risk Policy. Therefore, coverage will not cease or expire due to the partial occupation of any project area or due to the project's substantial completion.

- PRASA should consider changing the "Completed Operations" coverage extension to ten years to cover the full statutory limit (Statute of Limitations Law) in the OCIP Commercial General Liability Policy. Currently, it is for five years from the policy's termination date or its renewal(s). Should also consider the same action for the OCIP Commercial Umbrella Liability Policy.

8. PRASA's Forecast (Exhibit 1) reflects the financial plan certified by the Oversight Board on May 27, 2021: the FY2021 PRASA Fiscal Plan. With PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total surplus of $6.6M.

   Operating Revenues are projected to be sufficient to meet Senior Lien debt service payments and meet Rate Covenant DSC requirements for Senior Lien Debt. In addition, Authority Revenues are projected to be sufficient in every year of the forecast period to meet All Obligations per the MAT, including 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. In meeting these requirements, PRASA must consider the overall sustainability and affordability of its rates given the overall economic situation affecting Puerto Rico and recent trends affecting customer consumption profiles.

   The probability of PRASA meeting its Forecast is conditioned on the following key assumptions:

   - PRASA's ability to maintain its Service Revenues, billings, and collections in a continuing challenging economic environment – A continued declining trend in customer accounts, uncertainty on the economic recovery of the island, population shifts, and unforeseeable changes in consumption patterns could cause further strain on PRASA's billings and collections.
   - PRASA's ability to implement the necessary annual rate increases – PRASA is projecting to implement annual modest rate increases that will generate about $909.9M between FY2021 and FY2026. The actual amount of the rate increases to be implemented by PRASA will depend on their financial results, planned CIP investments, customer base and consumption trends, among others.
   - PRASA's ability to continue to successfully implement the 2021 PRASA Fiscal Plan initiatives – The 2021 PRASA Fiscal Plan Forecast includes additional revenue-enhancing and cost reduction initiatives. Any changes to the funding, framework and execution of these initiatives may significantly alter PRASA's projected financial results. Although PRASA has made a commitment to implement the initiatives described in this Report (except for the ones proposed by the Oversight Board and noted throughout the 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. If System needs exceed the levels assumed by PRASA in its Forecast, expenses could be materially affected.
   - PRASA's ability to secure and receive expected funding for the execution of the forecasted CIP – PRASA has forecasted capital investments of approximately $2.3 billion over the forecast period to be funded by federal funds, including FEMA, CDBG, SRF and RD. The CIP implementation, particularly the recovery projects, depends on timely reimbursements and disbursements of funding sources (i.e., FEMA funds). Therefore, lower than anticipated FEMA/insurance or other expected federal funding, or the exclusion of these proceeds from PRASA's Authority Revenues, will impact PRASA's ability to meet DSC obligations.

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