ARCADIS

Puerto Rico Aqueduct and Sewer Authority

Fiscal Year 2020 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority

Final Report

November 2020

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

Fiscal Year 2020 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority

November 2020

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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
AWWA	American Water Works Association
B	Billion
BOD	Biological Oxygen Demand
BOR	Broker of Record
BPR	Biannual Progress Report
CAA	Coefficient of Annual Adjustment
CAGR	Compound Annual Growth Rate
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
DSC	Debt Service Coverage
ECRC	Environmental Compliance and Regulatory Charge
EPC	Energy Performance Contract
EPL	Excess Employment Practices Liability
ESCO	Energy Service Companies

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
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
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) 2020 Certified Fiscal Plan dated June 29, 2020 (the 2020 PRASA Fiscal Plan), PRASA's FY2021 Annual Budget and certain restructured debt service obligations.

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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 wastewaters in Puerto Rico. PRASA serves a population of approximately 3.2 million residents[1] plus over 5 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 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 water and wastewater systems (the System). Also, PRASA must maintain a continuous disclosure policy with its Fiscal Agent (Puerto Rico Fiscal Agency and Financial Advisory Authority, or AAFAF by its Spanish acronym) and satisfy certain reporting requirements throughout the fiscal year (FY). To comply with this reporting requirements, Arcadis has prepared this CER for FY2020 (2020 CER or the Report). PRASA's fiscal year begins on July 1st and ends June 30th. FY2020 is the fiscal year from July 1, 2019 through June 30, 2020.

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 fiscal situation has been further exacerbated by the devastation caused by Hurricanes Irma and María (the 2017 Hurricanes), delays in recovery efforts, impacts of the 2020 Earthquakes and, most recently, the COVID-19 pandemic.

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 water and wastewater utilities to achieve a break-even operation while maintaining affordable service rates. Because of the complexity of the System it operates, PRASA has inherently high operating costs and a significant need for capital investments with limited financial resources.

The Government's fiscal situation and ratings downgrades by the Rating Agencies had a major impact on PRASA, as each downgrade also resulted in a downgrade for PRASA's bonds, thereby limiting its ability to

[1] Source: U.S. Census Bureau as of July 1, 2019.

access the capital markets to obtain financing to cover its immediate capital improvement program (CIP) related expenses. In FY2016, after exhausting its surplus operating income and reserves to cover a portion of its unfunded CIP, PRASA was forced to essentially postpone and eventually terminate the execution of all CIP projects.

On May 25, 2016, the United States (U.S.) Congress enacted 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. Among other mandates, the Oversight Board oversees the development of budgets and fiscal plans for Puerto Rico's Central Government and its instrumentalities, including PRASA.

On June 29, 2020, the Oversight Board certified a revised version of PRASA's Fiscal Plan, pursuant to Section 201(d)(2) of PROMESA (the 2020 PRASA Fiscal Plan). For this Report and the analysis included herein, Arcadis used the Oversight Board's certified 2020 PRASA Fiscal Plan with modifications as noted in the Report. The 2020 PRASA Fiscal Plan covers a period of six years (preliminary results for FY2020 and projections for FY2021 through FY2025) and has been developed to promote PRASA's mission which is to provide 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 2017 Hurricanes impact and ensure compliance with required standards while promoting a 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 2020 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 key 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.

E.3. Organizational Updates and Changes

PRASA is organized into five operational Regions (North, South, East, West and Metro), is managed by an Executive Management Team that provides the day-to-day management oversight and coordination for all institutional activities and 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 leadership includes PRASA's 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 FY2020 and the first quarter of FY2021 regarding its organization and changes in leadership and management: Eng. Doriel Pagán was appointed as Executive President in replacement for Eli Díaz Atienza who resigned during FY2020; Eng. Luis G. Gonzalez Delgado was appointed as Operations Vice President in replacement of Eng. Doriel Pagán; and lastly, the position of Executive Director of Finance became vacant after the passing of Mr. Efraín Acosta Reyboras, who provided 18 years of leadership, guidance and service to PRASA.

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, comprising 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 fields related functions delegated to PRASA
- One Puerto Rico Fiscal Agency and Financial Advisory (AAFAF by its Spanish acronym) 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 FY2020 and the first quarter of FY2021: Alberto Castañer Padró, Esq. replaced Gerardo Lorán Butrón, Esq as Vice-President, who in turn was appointed as AAFAF Representative; Félix Aponte Ortiz completed his term and functions as Consumer Representative; and one Board position remains vacant (Independent Director with expertise in any fields related functions delegated to PRASA).

In FY2020, PRASA's customer accounts per employee ratio (436) slightly increased by 0.5% from FY2019 (434) but remained within the industry's range, which can be attributed to the slight reduction of staff and customer accounts. Although PRASA has reduced staff levels below the established optimum staffing presented in the 2020 PRASA Fiscal Plan, 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 capable replacement workforce. Filling certain vacant position could help PRASA reduce overtime costs and address critical System Operation and Maintenance (O&M) needs.

Also, the COVID-19 pandemic, its associated mitigation policies, and the resulting economic impacts have 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. PRASA has taken proactive actions 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. PRASA also took steps to address operational challenges, including providing necessary personal protection equipment to staff, limiting staff at facilities, and enhancing tools and promoting remote working for staff.

E.4. Condition of System

During FY2020, Arcadis assessed the condition of PRASA's System through an inspection program that included a selection 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 all eight regulated dams and a selection of WTP and WWTP facilities that were highly impacted during the 2017 Hurricanes and were not inspected in the FY2019 Asset Condition Assessment Report (ACA Report), as well as a different sample of auxiliary 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 WTPs and WWTPs for the period of January 1, 2019 through December 31, 2019. The dams were inspected in January 2020 after the earthquakes. The rest of the facilities inspections were performed between June 2020 and September of 2020, as there was a delay due to the impact of the COVID-19 pandemic and performing safe and protected inspections. In addition to the inspection of all eight regulated dams, approximately 39% and 55% of the WTP and WWTPs respectively, were inspected. In addition, Arcadis performed asset condition assessments of a sample of auxiliary facilities (about 3% of wells, water storage tanks, and water and wastewater pump stations). In total, 181 facilities were assessed out of the 3,884 facilities that comprise the System, excluding active raw water intakes (RWIs) and raw water pump stations.

PRASA operates approximately 167 water distribution systems[2], 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[3] 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.

Overall, the condition of PRASA's regulated dams are rated as Adequate to Poor condition. Many of the recommendations from the 2018 and prior inspections saw little or no progress, which resulted in the overall depreciation of ratings all across the board, and on all of the inspected dams. Four were rated as Poor and four

[2] The Metropolitano Urbano System includes Sergio Cuevas WTP, Enrique Ortega WTP, Los Filtros WTP, Canóvanas Nueva WTP, Guaynabo Superaqueduct transference and Bayamón Superaqueduct transference.

[3] 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.

as Adequate. Furthermore, all dams appear to have deteriorated to varying degrees since the last inspection was performed. Exception being made for some actions that took place thanks to PRASAs Integrated Maintenance Program, many of PREPAs recommendations, and most recommendations issued by Arcadis in the 2016 and 2018 reports, were not addressed. We also found that the Integrated Maintenance Program, while commendable, has a generalized difficulty in keeping up with the maintenance needs of PRASAs dam portfolio. Condition ratings of each regulated dam could be improved by addressing the outstanding PREPA priority action items, as well as other deficiencies noted in this report.

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 FY2020 was approximately 485 MGD.

Overall, the WTPs are mostly in adequate condition and, 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 potable water supply in compliance with applicable regulations. Facility ratings decreased in staff/training criterion compared to the 2019 inspections and still remain in the lower end of the scoring range (score below 2.0) for equipment/maintenance and operations/process control criteria. The greatest concern continues to be the physical condition of the facilities, which continues to deteriorate year over year evidenced by the lack of the capital improvement and R&R programs due to the fiscal situation and budget limitations. Even more so after the damaged caused to the treatment facilities by the 2017 Hurricanes. Regarding the compliance, even though rating was Good, PRASA acknowledges that it has some challenges ahead with the Stage 2 D/bR 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 Haloacetic Acid (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 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 island-wide design treatment capacity is approximately 378 MGD and the treated wastewater for FY2020 was approximately 207 MGD. In level of treatment, PRASA has seven plants designed to provide tertiary or advanced treatment, 38 plants are designed to provide secondary treatment, and the remaining six facilities (which account for 230 MGD of treatment capacity) provide primary treatment only under existing 301 (h) waivers with the United States Environmental Protection Agency (USEPA). The WWTPs generally range from poor to adequate condition in overall rating, with equipment/maintenance as the category of primary concern. Out of the 28 facilities inspected, eight (29%) received an overall poor rating and 20 (71%) received an adequate rating, with six of those eight facilities with a poor rating in terms of equipment/maintenance. 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 WPSs deteriorated significantly to Poor, while wells 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 WPS but recently we have observed more signs of concrete deterioration, cracks, bugholes, spalling than previous years. Moreover, although concrete deteriorates at a slower rate it 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 their STS systems and make the necessary improvements so that when the National Pollutant Discharge Elimination System (NPDES) interim/monitoring limits are lifted, they have the necessary tools and conditions to meet the permanent limits established in each WTP's NPDES permits. In addition, PRASA should continue to standardize processes and providing more tools and training to operators regarding process controls and actions to facilitate and improve plant operations and performance, as well as optimize O&M expenses. Moreover, PRASA should consider operational improvements including new process control equipment and system automation considering that operators continue to depend on manual operation for several processes. Also, based on the ratings and interviews to the operational staff during the site visits, it is evident that the lack of treatment plant operators is a concern. Also, as mentioned, there are other staffing needs identified for WTPs, WWTPs and Ancillary facilities.

In general, PRASA continues efforts to improve its leak detection, leak repair and monitoring practices. By applying the established NRW reduction initiatives PRASA has helped drive the reduction in the volume of water production, water losses, and in NRW reported. Furthermore, the 2020 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 mechanism 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, and 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 are 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 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 adequately accommodate resulting needs. These CIP needs, as negotiated or as currently being negotiated with Regulatory Agencies, 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. Complement that with the detrimental impact caused by the 2017 Hurricanes and improvements are needed to repair, modernize and/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 that the CIP will be fully reactivated in FY2021 and some of the issues highlighted in this Report will start to be addressed.

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 2020 asset condition assessments. Overall, Arcadis found PRASA's O&M practices continue to be adequate, despite identified challenges. The staff vacancies in the Operations Department and process control issues continue to affect PRASA's operations.

Despite of the challenges faced by PRASA since FY2017, the slow recovery from the impact of the 2017 Hurricanes, the 2020 Earthquakes and the COVID-19 pandemic, most of the facilities continue to be operational and 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.

PRASA's FY2020 O&M expenses preliminary projection for the water and wastewater system (combined) prior to expected reimbursement from the 2017 Hurricanes is approximately $721M, of which $641M are directly related to the O&M of the System. The other $81M 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 FY2020 approximately 73% of its System's O&M budget ($468M) was allocated to the water system and the remaining 27% ($173M) to the wastewater system. As presented in **Table ES-1**, PRASA's FY2020 O&M budgets are within the industry standards, mostly around the median benchmark results published by the American Water Works Association in 2019.

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

Benchmark Category	2019 Benchmarks[1]			PRASA[2]
	Top Quartile	Median	Bottom Quartile	
Water O&M Cost per Account	$313	$428	$618	FY2017: $319 FY2018: $461 FY2019: $411 FY2020: $379
Water O&M Cost per MG Processed	$1,738	$2,468	$3,519	FY2017: $2,100 FY2018: $3,074 FY2019: $2,561 FY2020: $2,379

Benchmark Category	2019 Benchmarks[1]			PRASA[2]
	Top Quartile	Median	Bottom Quartile	
Water O&M Cost per 100 miles of pipe	$1,988,318	$2,891,000	$4,062,825	FY2017: $2,652,680 FY2018: $3,855,281 FY2019: $3,404,467 FY2020: $3,144,527
Wastewater O&M Cost per Account	$276	$378	$527	FY2017: $194 FY2018: $275 FY2019: $246 FY2020: $227
Wastewater O&M Cost per MG Treated	$1,679	$2,489	$3,953	FY2017: $1,848 FY2018: $2,798 FY2019: $2,460 FY2020: $2,290
Wastewater O&M Cost per 100 miles of pipe	$1,917,681	$2,868,950	$3,834,601	FY2017: $2,745,356 FY2018: $3,509,624 FY2019: $3,130,358 FY2020: $2,886,220

[1] Source: 2019 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.

Table ES-2 presents a summary of PRASA's FY2020 Key Performance Indicators (KPIs) goals and results. In FY2020, PRASA's KPI results did not improve from FY2019, as PRASA had a challenging fiscal year. Operations have also been impacted by attending critical issues for providing service and the COVID-19 pandemic, the 2020 Earthquakes, and drought events.

Table ES-2. FY2020 KPI Goals and Results

Strategic Plan Initiative	Key Performance Indicator	FY2020 Goals	Results as of June 2020
Fiscal Health	Employees per Connection	3.34 or less Employees per 1,000 connections	3.61
Fiscal Health	Overtime[2]	Reduce to 7% or Below	14%
	Budget Compliance (Excludes Electricity Costs)	Below 100%	95%

Strategic Plan Initiative	Key Performance Indicator	FY2020 Goals	Results as of June 2020
	Collection vs. Billings	Increase to 96% or Above	90.4%
Operational Efficiency	Compliance - Water System[2]	Increase to 100% or Above	99.4%
	Compliance - Wastewater System[2]	Increase to 98% or Above	96.7%
	Billing Adjustments	Reduce to 2% or Below	.04%
	Complaints in Customer Service (per 1000 Actives Accounts)	Reduce to 14.5 or Below	11.61
	Monthly Average of Customers with Service Interruptions (as a Percentage of Total Customers) [2]	Reduce to 5% or Below	23.8%
	Customer Service Attention Time (Commercial Office)	Maintain below 30 min.	22:45 min
	Vehicle Availability	Increase to 92% or Above	72%
	Average Processing Time of Purchase Orders[2]	Less than 40 days	55 days
	Preventive vs. Corrective Maintenance Ratio	Increase to 80%	78%
	Average Time for Equipment Repairs	Less than 25 days	49.35 days
	Reported Leaks	Reduce to 4,598 monthly	4,629
	Reported Overflows	Reduce to 2,298 monthly	2,206
	Repair Time for Leaks[2]	Reduce to 53.0 hrs	136.81 hrs.
	Repair Time for Overflows[2]	Reduce to 32.0 hrs	54.66 hrs.
	Average Water Production (MGD)	Reduce to 505 MGD	539 MGD
	Percent of NRW[1]	Reduce to 53.2%	-
Infrastructure and Sustainability	Energy Consumption (Annual)	Reduce to 660.34 MkWh	623.87 MkWh
	Project Progress (CIP)[3]	Greater or equal to 0.9	-
	Cost Performance (CIP)[3]	Greater or equal to 0.9	-

Strategic Plan Initiative	Key Performance Indicator	FY2020 Goals	Results as of June 2020
Organizational Transformation	Training (Cumulative Hours per Employee) [2]	More than 26 hrs. per year	9.4 hrs.
	Unplanned Work Effectiveness (Absenteeism)	Reduce to 2.0 days	2.13 days
	Planned Work Effectiveness	Reduce to 2%	2.23%

[1] This Percent of NRW KPI is not being measured, PRASA is in the process of redefining a new KPI to assess NRW.

[2] The KPI results were impacted by earthquakes, drought, and the COVID-19 pandemic.

[3] Due to the suspension of the CIP, the Project, and Cost Performance KPIs for FY2020 are not being measured.

PRASA's Operational Initiatives address critical aspects of PRASA's operation such as NRW, operational efficiency, and revenue stream. During FY2020, PRASA's main O&M efforts and practices were focused on continuing working with the Federal Emergency Management Agency (FEMA) and the insurance companies to obtain recovery funds, and restarting some of the key initiatives and planned O&M. However, several initiatives were delayed or suspended due to the slow recovery efforts, the 2020 Earthquakes, and the COVID-19 pandemic. Therefore, there were modifications to previous commitments which were included in the 2020 PRASA Fiscal Plan.

E.6. Capital Improvement Program and Regulatory Compliance

PRASA has developed a multi-year CIP to improve and maintain its water and wastewater infrastructure. The CIP's main objectives are to maintain, modernize 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 back 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 2020 PRASA Fiscal Plan and public policies endorsed by PRASA's Governing Board includes financing of the CIP with federal funds and self-financing via PRASA's Operating Revenues.

As of September 30, 2020, execution of almost all capital projects remain on hold, except for about 27 projects that are regulatory-driven, and for R&R and emergency recovery. There is still a strong concern that the lack of capital investment will accelerate infrastructure deterioration and lead to a critical situation. However, PRASA is projecting that the CIP will be fully reactivated in FY2021.

The suspension of CIP projects has resulted in both short and long-term effects on PRASA's operations and infrastructure, and on Puerto Rico's economy. In the short-term, PRASA is facing continuing deterioration of their infrastructure, and potential non-compliance with regulatory mandates or administrative orders. In the long-term,

PRASA may see an increase in cost of capital projects as vendors price-in the risks associated with delays in payment or non-payments to contracted projects as well as increasing risks related to asset failures or operational challenges that could affect the quality and continuity of service, ultimately leading to reduced Operating Revenues and increased Operating Expenses.

The 2020 PRASA Fiscal Plan includes a modified six-year CIP covering the planning period from FY2020 through FY2025 which includes adjustments resulting from negotiations with Regulatory Agencies, Emergency/Permanent Work projects, and the necessary investment to address PRASA's infrastructure needs to ensure adequate operation and sustainability of the System. The approval and execution of this six-year CIP is contingent upon funding access and availability. The six-year CIP for FY2020 through FY2025, as included in the 2020 PRASA Fiscal Plan, consists of a total of 421 projects totaling $1,704M.

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. Also, the R&R and Emergency projects resulting from the damages of the 2017 Hurricanes. 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 or due to aging infrastructure, 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.

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. One of these future regulations is the Lead and Copper Rule, which is currently under revision to become more stringent. Lastly, additional CIP needs to be identified through the 10-year Master Plan development (expected to start in FY2022) or by other means, will need to be prioritized and implementation schedules will depend on PRASA's funding sources.

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 and determined its adequacy considering the type and value of PRASA's fixed assets. Also, provided are some outstanding recommendations to PRASA's insurance coverage from a previous evaluation made by MARSH Saldaña, Inc. (MARSH) and validated or commented on by AON, PRASA's Broker of Record (BOR) in FY2016. The BOR for FY2017 and FY2018, Lone Star Insurance Producers, LLC (Lone Star), was consulted to verify if the recommendations were addressed in the policy renewals or if they were not adopted. For FY2020 PRASA changed its BOR from Goas & Associates, Inc (GOAS) to Fedelta Insurance, who currently remains as PRASA's BOR.

Furthermore, despite the stricter subscription, risk assessments and premium increases to FY2019 policies (as an effect of the upshot of the hurricanes that struck Puerto Rico on September 2017, other catastrophic events, and the impact to the insurance market), there are some changes to FY2020 policies. 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.

In recent years, PRASA was adversely impacted, and implementation of the Property Insurance Policy was warranted and put forth. PRASA was able to collect the $300M coverage in the policy from the Insurance for the Hurricane Maria event in addition to the SIR of $25M. About half went to cover Business Interruption and the remaining will be used for projects. Moreover, PRASA is still in the process of negotiations with the Insurance for the claims regarding Hurricane Irma and post hurricane heavy rains; and investigation of damages due to the 2020 earthquakes in excess of the $100M SIR. PRASA can claim up to the limit of $300M for each event. Furthermore, it is important to note that PRASA has claimed FEMA for assistance to pay for the damages not covered by the Insurance. The claim amounts are subject to verification, adjustments, and acceptance by the insurance companies. After the 2019 premium increase (tripled) for coverage under this policy, the renewal for FY2021 had a 7% decrease in premium to $15,000,000.00 with the same $100M deductible. Also, under the Owner Controlled Insurance Program (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 103% to $105,794.00 for similar coverage but with a US$30M policy aggregate.

The insurance program covering PRASA's exposures to risks of accidental property and liability losses arising from on-going operations provides reasonable coverage. However, several recommendations to PRASA's insurance program are provided. Several recommendations have been provided as part of the evaluation and summarized in the conclusions of this Report.

E.8. System Assets and Financial Analysis

PRASA's capital assets include depreciable capital assets, "Construction (Work) in Progress", land, and easements. PRASA's preliminary ending book value of capital (fixed) assets as of June 30, amounts to $6,236.3M (net of accumulated depreciation), while the preliminary ending book value of capital (fixed) assets as of June 30, 2020 amounts to $6,062.7M (net of accumulated depreciation).

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, to cover all projected operating expenses, CIP needs, and debt service obligations (assuming debt restructuring, or new external financing is attained), the 2020 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 another on July 1, 2018 and again on July 1, 2019. The latest rate adjustment implemented was as of July 1, 2020. The 2020 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 FY2025. Note, the 2020 PRASA Fiscal Plan assumes a 2.5% 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 – FY2025
Residential	2.5%	2.5%
Commercial	2.8%	2.5%
Industrial	3.5%	2.5%
Government	4.5%	2.5%

Arcadis reviewed the financial information provided by PRASA and the 2020 PRASA Fiscal Plan. Arcadis assessed financial preliminary results for FY2020 and the reasonableness of PRASA's assumptions in the preparation of the financial projections from FY2021-FY2025 (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.

PRASA's annual Operating Revenues are presented on a cash basis as required by the MAT. PRASA's preliminary Operating Revenues for FY2020 and Operating Revenues for FY2021 through FY2025 net of 1) the 2020 PRASA Fiscal Plan revenue enhancing initiatives and 2) the expected insurance reimbursement from revenue loss from the September 2017 Hurricanes impact range from $1,038.4M in FY2020 to $1,239.8M in FY2025.

PRASA's Operating (Current) Expenses are presented on an accrual basis as required by the MAT. PRASA's preliminary Operational Expenses for FY2020 and operating expense projections for FY2021 to FY2025 net of 1) capitalized expenses, 2) the 2020 PRASA Fiscal Plan expense reduction initiatives, and 3) the September 2017 Hurricanes impact, range from $714.1M in FY2020 to $793.4M in FY2025.

PRASA's debt service includes: Senior Bonds (the 2008 Series A and B Senior Lien Revenue Bonds and the 2012 Series A and B Senior Lien Revenue Bonds), as well as the USDA RD and USEPA SRF loan debts, among others.

Commonwealth Guaranteed Indebtedness (CGI) includes those of PRASA's existing obligations which are guaranteed by the Commonwealth of Puerto Rico, which currently are the 2008 Revenue Refunding Bonds.

Upon execution of the Seventh Supplemental Agreement of Trust dated as of July 26, 2019, the following amendments were made regarding 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 2088 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), amendment to Section 8.10 of the MAT regarding Waivers of Events of Default.
3. 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).
4. 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
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

A summary of PRASA's debt service obligations and projections for FY2020 and the forecast period are presented in **Tables ES-5 and ES-6**, respectively.

Table ES-5. FY2020 Debt Service Obligations and Preliminary Results ($, Thousands)

Debt Category	FY2020 Obligations[1]	FY2020 Preliminary Results[2]
Senior Debt	$251,206	$251,206
Senior Subordinated Debt	-	-
Subordinated Debt	-	-
Commonwealth Guaranteed Indebtedness (CGI)	20,920	20,920

Debt Category	FY2020 Obligations[1]	FY2020 Preliminary Results[2]
Commonwealth Supported Obligations (CSO)	8,999	-
Total	**$281,125**	**$272,126**

[1] Considers the full debt service obligations due in FY2020 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. FY2021-FY2025 Debt Service Obligations ($, Thousands)

Debt Category[1]	FY2021 Projection	FY2022 Projection	FY2023 Projection	FY2024 Projection	FY2025 Projection
Senior Debt	$253,271	$260,532	$265,786	$267,540	$268,676
Senior Subordinated Debt	-	-	-	-	-
Subordinated Debt	-	-	-	-	-
Commonwealth Guaranteed Indebtedness (CGI)	25,956	27,935	28,360	31,962	32,047
Commonwealth Supported Obligations (CSO)	-	-	-	-	-
Total Debt	**$279,227**	**$288,467**	**$294,145**	**$299,502**	**$300,724**

[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. FY2020 - FY2025 Debt Service Coverage

Debt Service Level	DSC Requi-rement	FY2020 Preliminary DSC	FY2021 DSC	FY2022 DSC	FY2023 DSC	FY2024 DSC	FY2025 DSC
Senior Debt[1]	**2.50**	4.13	4.24	4.23	4.33	4.48	4.61
Senior Subordinated Debt[1]	**2.00**	4.13	4.24	4.23	4.33	4.48	4.61
Subordinated Debt [1]	**1.50**	4.13	4.24	4.23	4.33	4.48	4.61
All Obligations[2]	**1.00**	0.94[3]	0.99	0.99	0.99	0.99	1.01

[1] DSC calculated with respect to Operating Revenues.

[2] DSC calculated with respect to Authority Revenues.

[3] Preliminary the coverage of all obligations per MAT is estimated at less than 1.0 as a result of the COVID-19 pandemic impact on the financial results, but final coverage will be calculated once the audited financial statements are available.

FY2020 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. However, PRASA does not project to meet the 1.0x DSC on All Obligations most years of the forecast period. In FY2020, PRASA's preliminary DSC on All Obligations was 0.94, which is attributable to the extraordinary circumstances involving the COVID-19 pandemic which drastically impacted the billing collections rate and PRASA's system operations in FY2020 and has the potential to have a lasting impact on PRASA throughout the forecast period. Final DSC for FY2020 will be recalculated after the issuance of the FY2020 Audited Financial Statements to determine if PRASA was able to meet Rate Covenant Requirements.

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 the 2020 PRASA Fiscal Plan financial projections.

1. PRASA's headcount are below the optimum staffing level stipulated by the Executive Management Team and the staffing mix is not yet optimal and 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. Also, PRASA should 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, to compete with the market and retain personnel.

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. KPI and metrics being measured, along with stronger management oversight continue to contribute to operational and organizational improvements, although FY2020 KPI results were below established goals, mostly due to the COVID-19 pandemic.
3. Arcadis visited a total of 181 facilities throughout PRASA's five Operational Regions, including the 8 regulated dams, between January and September of 2020 to conduct a condition assessment of water and wastewater facilities. Overall, facilities were found to be in the adequate range, however, almost half of the facilities rated as adequate (63 of 133) were scored below 2.0. If identified issues are not addressed in a timely manner the condition of these facilities could continue to deteriorate causing the rating to fall in the future from Adequate to Poor or even Unacceptable. Furthermore, 25% of the visited facilities are in the unacceptable to poor range. 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.
    - In FY2020, all eight of PRASA's regulated dams were inspected. Overall, a declining tendency of ratings for all indicators and on all dams was observed. The condition of PRASA's regulated dams was rated as Adequate to Poor condition. Minor improvements were noticed compared to the 2018 and prior inspections, which resulted in the overall depreciation of ratings across the board. Special consideration should be given to maintaining the dams' instrumentation and keeping records of its readings for further evaluation, strengthening of its Integrated Maintenance Program (IMP) and the development of targeted rehabilitation actions to meet the needs of the critical aspects of these structures, the development of Potential Failure Modes Analysis for each dam, and investing in training in dam safety for all relevant PRASA staff.
    - Overall, the WTPs were rated within the adequate condition and, 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 potable water supply in compliance with applicable regulations. Facility ratings decreased in staff/training criteria compared to the 201 inspections. The greatest concern currently is the physical condition of the facilities, which continues to deteriorate as capital and R&R improvements are delayed. Also, even though there were no changes for the WTPs in performance with respect to compliance with limits of the SDWA and effluent discharge parameters, 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 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 in overall rating with equipment/maintenance as the categories of primary concern. Out of the 28 facilities inspected, eight (29%) received an overall poor rating and 20 (71%) received an adequate rating, with six of those eight facilities with a poor rating in terms of equipment/maintenance. As observed, the greatest concern currently is the physical condition of the facilities, which continues to deteriorate as capital and R&R improvements are delayed. 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. The regulatory compliance rating showed an increase in the assessment scoring. Although some of it could be attributed to operations adjustments, most

is due to having interim limits and/or monitoring only parameters associated to waivers requested. Improvements are necessary not only to meet current interim limits but also future permanent, and more stringent limits. Furthermore, PRASA should verify the flood zone levels at all WWTPs to identify vulnerabilities of assets in these facilities and determine if the potential flood risks merit mitigation actions. A detrimental trend may continue to be observed if projects are not executed or continue to be delayed.

- Overall rating for ancillary facilities continues to decrease to different degrees for wells, WPS, and WWPS. WPSs deteriorated significantly to Poor, while wells and WWPSs remain in the lower end of Adequate, and if left unattended could continue to deteriorate. WSTs facility criteria rating did not have a significant change as it remained within the Adequate rating. Although, considering the minimal equipment installed on WSTs and the slower deterioration rate compared to the rest of the ancillary facilities is was observed more signs of concrete deterioration, cracks, bugholes, and spalling than previous years. Notwithstanding, a number of the deficiencies identified for ancillary facilities can be addressed through PRASA's R&R program and may not require major capital improvements. Finally, 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. However, PRASA has continued to improve its response time and attention/repair effectiveness, after the impacts and the after effect of the 2017 Hurricanes. PRASA continues to work on and improve its leak detection and monitoring practices and continues to aggressively address leak occurrences (as allowed by the current pandemic situation). Currently, PRASA is remotely monitoring levels of a number of tanks in the distribution system to avoid tank overflows and improve the water distribution balance and continues conducting periodic water audits which are used to implement the necessary controls and develop action items to address NRW. Also, PRASA is implementing the 2020 PRASA Fiscal Plan WRO initiatives, which shall help reduce physical water losses. Additionally, PRASA is implementing sanitary sewer evaluations and repair plans to reduce levels of I/I that must be treated in their WWTPs. However, the progress of this initiative has been affected by the slow recovery from the impact of the 2017 Hurricanes and most recently the COVID-19 pandemic, in addition to the ongoing fiscal and budgetary situation affecting PRASA.

5. PRASA's O&M costs are within industry standards despite its higher degree of System complexity. Reducing NRW is a high priority goal for PRASA, and it is one of the three key focus areas of the 2020 PRASA Fiscal Plan. PRASA is redefining their NRW goals and metrics to phase out calculations that still use estimation methods, moving towards use of real 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 PRASA's Public Private Partnership (P3) project will further support PRASA's efforts to reduce NRW. Furthermore, PRASA has established an NRW team (TeamORA) that integrates not only WRO staff, but also operations personnel for a more comprehensive approach to address the 2020 Fiscal Plan NRW initiatives. 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 expects that the CIP will be reactivated during FY2021 and anticipates the implementation of projects will address some of the major issues. Also, the Strategic Plan is expected to be completed and published during FY2021. Lastly, the FY2020 PRASA's KPI results remained low because of the delays in the recovery efforts, the fiscal situation hindering the implementation of certain initiatives, the 2020 earthquakes and the COVID-19 pandemic impacting PRASA's operations.

6. Except for buried infrastructure improvement needs not visible and not identified after the 2017 Hurricanes, 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 Renewal & Replacement and Emergency/Permanent Work projects. However, as noted in previous reports, given PRASA's high rate of leaks and overflows and continuing aging infrastructure, additional funds and a reactivation and acceleration of the R&R program are required to reduce/minimize these incidences. Furthermore, when PRASA's upcoming 10-year Master Plan update 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, as well as for other necessary infrastructure projects (i.e., fleet and building renovation, safety, NRW reduction and technological improvements) essential to maintaining and preserving the utility assets.

   In addition, after continuous efforts of PRASA to explore and find opportunities for funding of compliance projects, on July 26, 2019, PRASA was able to reach a debt restructuring agreement with the funding programs of USDA RD, and USEPA CWSRF and DWSRF. This has allowed PRASA to access new funding sources through these programs 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. One of these future regulations is the Lead and Copper Rule, which is currently under revision to become more stringent.

7. The insurance program covering PRASA's exposures 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 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 Modellings and parameters. Specially after the lessons learned in the aftermath of the September 2017 Hurricanes, the 2020 earthquakes and more recently the COVID-19 pandemic.
   - In addition to their Rainy-Day Fund, 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.
   - Consideration to 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.
   - Consideration to Terrorism Coverage, which is excluded under all current PRASA's Insurance 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 is for five years from the termination date of the policy or its renewal(s). Should also consider same action for the OCIP Commercial Umbrella Liability Policy.

8. PRASA's Forecast (see Exhibit 1) reflects the financial projections included in the Fiscal Plan certified by the Oversight Board on June 29, 2020. Despite PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total deficit of approximately $96.1M. PRASA plans to cover this need with funds in deposit in the Current Expense Fund. To bridge any remaining gap, PRASA should identify and secure additional revenue sources or financing, implement higher rate increases, implement additional controls in Operating Expenses, modify the projected deposits to the Capital Improvement Fund, or use a combination of these actions.

9. While 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 not 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 not projecting to meet its Rate Covenant requirement of 1.0x coverage of its current obligations throughout the Forecast. PRASA may need to reduce its projected CIP investments, increase projected annual rate adjustments, or implement additional operational cost controls to meet its obligations. Furthermore, 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:

   a) **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.

   b) **PRASA's ability to implement the necessary annual rate increases –** PRASA is projecting to implement annual modest rate increases that will generate about $920M between FY2020 and FY2025. 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.

   c) **PRASA's ability to continue to successfully implement the 2020 PRASA Fiscal Plan initiatives –** The 2020 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.

   d) **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.

   e) **PRASA's ability to secure and receive expected funding for the execution of the forecasted CIP** – PRASA has forecasted capital investments of more than $1.7 billion over the forecast period. The implementation of the CIP, particularly of the recovery projects, depend on timely reimbursements and disbursements of funding sources (ie., FEMA funds).

10. PRASA shall continue monitoring the receipt of FEMA/insurance reimbursements related to 2017 Hurricanes. Lower than anticipated FEMA/insurance reimbursements, or the exclusion of these proceeds from Authority Revenues, will impact PRASA's ability to meet DSC obligations. In addition, FEMA/insurance reimbursement receipts have been lower than budgeted. PRASA should increase efforts to maximize reimbursements from FEMA or insurance, specifically reimbursements related to Operating Expenses which are included as Authority Revenues.
11. PRASA shall closely monitor its level of billings and collections and adjust its budget if material deviations are experienced, particularly as it relates to population projections, customer accounts, consumer trends, and possible temporary adjustments in reaction to rate increases and the COVID-19 pandemic.
12. PRASA should consider implementing a higher rate adjustment to increase the coverage for All Obligations above a 1.0x. This will provide further confidence to PRASA in meeting its FY2021 debt service obligations as required by the MAT

1 Introduction

1.1 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 wastewaters in Puerto Rico. PRASA serves a population of approximately 3.2 million residents[4] 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, which has 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[5].

1.2 Consulting Engineer's Report Purpose and Requirement

Arcadis Caribe, PSC (Arcadis) has been retained by PRASA 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. As a result of the credit downgrades of PRASA's bonds to non-investment grade level in FY2013 and FY2014 and on-going

[4] Source: U.S. Census Bureau as of July 1, 2019 (https://www.census.gov/quickfacts/PR).

[5] Source: PRASA Geographical Information System (GIS), updated June 26, 2020, considers RWIs.

fiscal challenges affecting the Government of Puerto Rico, and in compliance with the MAT, Arcadis prepared this CER for FY2020 (2020 CER or the “Report”).

1.3 Conventions

PRASA’s fiscal year begins on July 1st and ends June 30th. Throughout this 2020 CER, fiscal year is identified as “FY” followed by the calendar year in which the fiscal year ends, i.e., FY2020 is the fiscal year from July 1, 2019 through June 30, 2020.

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 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 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 water and wastewater utilities 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 investments needs than other utilities in North America.

The Government's on-going fiscal situation continues to impact PRASA. Except for a number of critical projects identified by PRASA, the CIP has not been re-activated and important renewal work such as replacing inefficient meters and failed/leaking pipelines are still 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 has been 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 Funds (SRF) Program and the Rural Development (RD) Program, respectively. PRASA has also continued to work with the Federal Emergency Management Agency (FEMA) to secure the assignment of funds for recovery efforts related to 2017 Hurricanes Irma and María and the 2020 earthquakes. Finally, PRASA is working on a transaction to refund a part of its outstanding debt, expected to be completed in December 2020.

2.2 Natural Disasters

On September 2017, Puerto Rico was impacted by Hurricanes Irma and María that caused catastrophic impacts on the island and which, to this date, PRASA and the Government of Puerto Rico continue to work on related recovery efforts. The total estimated damages to PRASA's infrastructure caused by these hurricanes exceeded $750 million (M).

Also, on January 7, 2020, Puerto Rico was struck by a 6.4 magnitude earthquake that caused major damage to infrastructure (mainly in the southern portion of Puerto Rico), as well as power outages and water shortage issues island wide. Per a preliminary assessment of the damages caused by the earthquake and subsequent aftershocks by the U.S. Geological Survey, the estimated total economic impact of the damages totaled approximately $838M. PRASA estimates that its System incurred approximately $6.7M worth of damages in the affected areas, 75% of which is expected to be eligible for federal funding to offset the cost of repairs. Furthermore, PRASA also experienced temporary impacts on billings and collections, particularly for customers located in the South Region.

2.3 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. 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. On April 9, the Government approved Act 39-2020, which prevents PRASA from disconnecting residential customer's water services due to non-payment. This prohibition will extend for as long as the public emergency with respect to 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 have 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.

PRASA has taken proactive actions 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.

PRASA also took steps to address operational challenges, including:

- Maintaining on-site employees at minimum required levels to ensure an adequate and uninterrupted service while minimizing exposure (e.g., suspension of meter readings to protect the health of employees and closing customer service offices.)
- Providing Personal Protection Equipment (PPE) to all employees required to report on-site.
- Promoting remote work for administrative and support personnel, significantly expanding the number of virtual tasks performed, and increasing virtual communication among PRASA's personnel.
- Developing—in collaboration with labor unions—a Plan for Exposure Control on Return to Work, which establishes prevention and control policies to manage confirmed cases or symptomatic personnel, and security measures specific to site types (e.g., plants, commercial agencies, lab), amongst other things.

2.4 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 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 agreement of the debtor and requires a supermajority of its creditors to restructure the debt. Whereas 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 cram down power, which allows for a plan of adjustment (to be approved by only a single impaired class) for nonconsenting classes of claims. PRASA currently has not filed for either of these restructuring tools, nor has there been a request to do so by the Oversight Board or the Central Government.

Pursuant to the PROMESA's requirement for the submission of a Fiscal Plan, on June 29, 2020, the Oversight Board certified PRASA’s Fiscal Plan as developed by the Oversight Board, pursuant to Section 201(d)(2) of PROMESA (the 2020 PRASA Fiscal Plan). The 2020 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 a 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 2020 Fiscal Plan includes the implementation of the following steps:

- Enhance revenues;
- Reduce expenses;
- Improve operational performance;
- Improve customer satisfaction and experience;
- Increase water availability and reduce service rationing risks; and
- Execute a Capital Improvement Program (CIP) on time and budge

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 the purposes of this Report and the analysis included herein, Arcadis used the certified 2020 PRASA Fiscal Plan as the official fiscal plan, which includes its CIP to cover a six-year period from FY2020 to FY2025 (the six-year CIP) as well as PRASA’s six-year forecast covering preliminary results for FY2020 and projections for FY2021 through FY2025 (the Forecast). PRASA’s six-year CIP has been restructured to optimize the use of federal funding, achieving a more resilient and reliable water and wastewater system, improved water quality, ensure consistency with PRASA’s long-term goals and ultimately achieve financial sustainability.

The 2020 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), as enacted under Act No. 92 on March 31, 2004 (Act 92-2004).

Figure 3-1. PRASA's Operational Regions

PRASA is managed by an Executive Management Team that provides the day-to-day management oversight and coordination for all institutional activities. It is supported by various departments in the organization including, but not limited to, finance, customer services, emergency management, and information systems. **Figure 3-2** shows PRASA's current organizational structure.

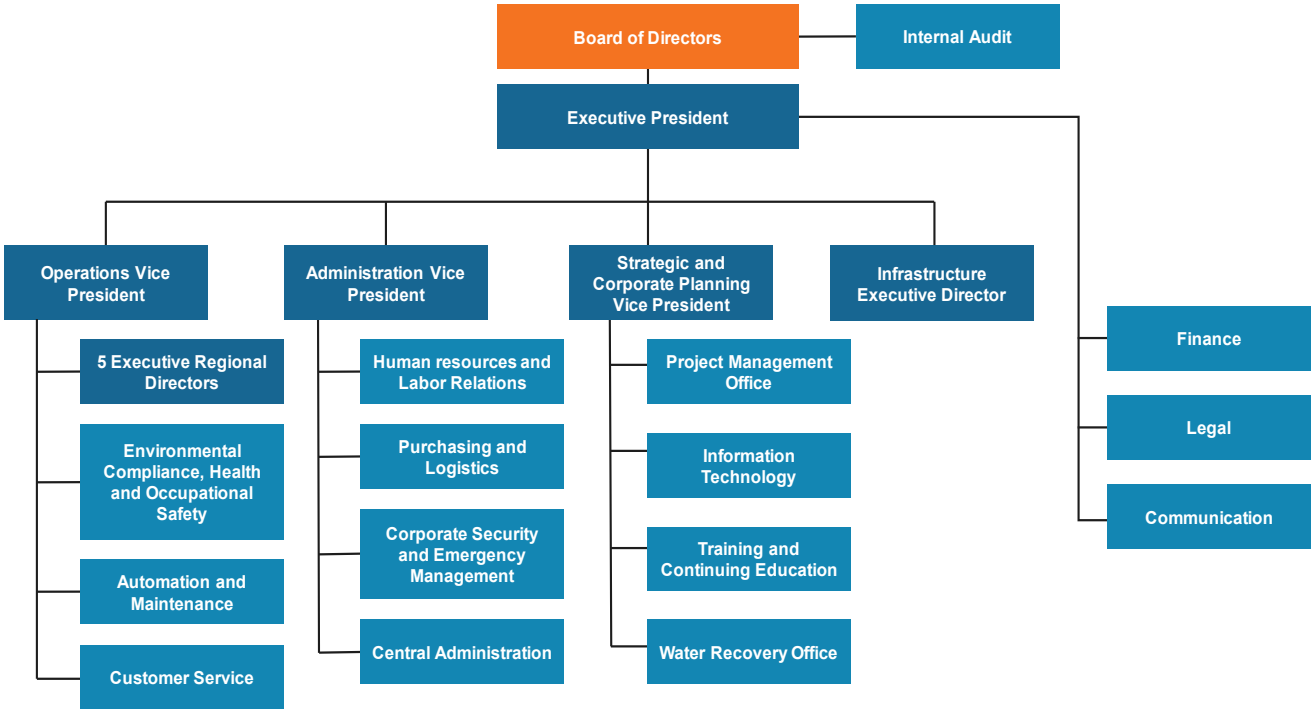

Figure 3-2. PRASA current Legislated and Executive Management Structure

3.2 Updates and Changes in PRASA's Organization and Management

3.2.1 Board of Directors (Governing Board)

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 which is responsible for conducting internal audits for the Board, and by a Board Secretary, who maintains Board records, among other responsibilities.

As presented in Error! Reference source not found. 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, comprising 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 wide knowledge and experience in the field of corporate finance,
    d. One professional with expertise in any fields related functions delegated to PRASA.

- One representative from the Puerto Rico Fiscal Agency and Financial Advisory Authority (AAFAF, for its Spanish acronym) per Act 2-2017.
- One Consumer Representative, a private citizen representing the Authority's customers.
- Two ex-officio members, the Executive Director of the Association of Mayors, and the Executive Director of the Federation of Mayors.

PRASA's Governing Board had two Consumer Representatives during FY2020 since they were selected prior to the enactment of Act 68-2016 and their current term expired in June 2020. For FY2021, as their term ended, PRASA's Governing Board will have only one Consumer Representative, as stated by Act 68-2016, bringing the total number of PRASA's Governing Board members to eight, as abovementioned.

Table 3-1. PRASA's Governing Board Members as of September 30, 2020

Name	Board Position	Position Description	Term Ends
Héctor J. del Río Jiménez, Esq.	President	Independent Director/Finance	July 12, 2022
Alberto Castañer Padró, Esq.	Vice-President	Independent Director/Legal	July 12, 2021
Memphis Cabán Rodríguez, PE	Director	Independent Director/ Engineering	July 12, 2021
Vacant	Director	Independent Director	
Gerardo Lorán Butrón, Esq.	Director	AAFAF Representative	Ex Officio
José A. Rivera Rodríguez	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, 2026

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 includes professional and educational backgrounds of the candidates. The customer representative will serve for a three-year term 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 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 FY2020 and the first quarter of FY2021: Alberto Castañer Padró, Esq. replaced Gerardo Lorán Butrón (AAFAF Representative), Esq as Vice-President; Félix Aponte Ortiz completed his term and functions as Consumer

Representative; and one Board position remains vacant (Independent Director with expertise in any fields related functions delegated to PRASA).

3.2.2 Executive Management Team

Since the enactment of 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 is presented in **Table 3-2**.

Table 3-2. PRASAs Executive Management (as of September 30, 2020)

Name	Current Role	Term Ends	Prior Role	Experience Total/PRASA
Eng. Doriel Pagán	Executive President	February 2025	Operations Vice President	29 years / 27 years
Eng. Luis Gonzalez	Operations Vice President	Indefinite[2]	Director Infrastructure – Metro Region	20 years / 10 years
Eng. Ryan Arrieta	Strategic and Corporate Planning Vice-President	Indefinite[2]	Private Sector	20 years / 4 year
Keralia Moreda, Esq.	Administration Vice-President	Indefinite[2]	Private Sector	15 years / 3 year
Deises Soler Pérez	Executive Director of Finance	Indefinite[2]	-	36 years / 16 years
Eng. José J. Rivera	Interim Executive Director for Infrastructure[1]	Indefinite[2]	Auxiliary Director for Engineering	23 years / 9 years
Eng. Roberto Martínez	Executive Director Metro Region[1]	Indefinite[2]	Deputy Exec. Director Metro Region	33 years / 27 years
José Rivera Ortiz	Interim Executive Director North Region[1]	Indefinite[2]	Toa Alta Area Director	23 years / 21 years
Cheryl Ortiz McCormick	Interim Executive Director South Region[1]	Indefinite[2]	Deputy Exec. Director South Region	22 years / 14 years
Eng. Enrique Rosario	Interim Executive Director East Region[1]	Indefinite[2]	Deputy Exec. Director East Region	22 years / 12 years
Eng. Joel Lugo	Interim Executive Director West Region[1]	Indefinite[2]	Executive Director West Region	21 years / 21 years

[1]Legislated positions.

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

The following material changes were reported by PRASA during FY2020 and the first quarter of FY2021 regarding its organization and changes in leadership and management: Eng. Doriel Pagán was appointed as Executive President in replacement of Eng. Eli Díaz Atienza, who resigned during FY2020; Eng. Luis G. Gonzalez Delgado was appointed as Operations Vice President in replacement of Eng. Doriel Pagán; and lastly, the position of Executive Director of Finance was assigned on an interim basis to Deises Soler Pérez after the passing of Mr. Efraín Acosta Reyboras, who provided 18 years of leadership, guidance and service to PRASA.

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 provide support to 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 those that 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 probationary period, they either become full-time employees or their temporary employment contract is renewed.

At the end of FY2020, PRASA had a total staff of 4,582, of which 321 are pre-retired under Act 211-2015, as further discussed below. Overall, staff was reduced by 0.2% from FY2019 to FY2020. Based on the total number of employees for FY2020, the ratios of service accounts (counting the water service and sanitary sewer service for the same client, as two separate accounts) to employees was 436, which represents a slight increase of 0.5% compared to FY2019 which was 434. Current industry averages for combined utilities operations range from 352 to 600, with a median of approximately 501 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.

[6]Source: 2019 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

Table 3-3. Staff Levels

End of FY	Appointed Employees	Management Employees	HIEPAAA Employees	UIA	Temporary Employees (UIA)	Pre-Retired Employees	Total Employees
2016	159	1,188	149	3,293	9	-	4,798
2017	163	1,195	141	3,146	9	-	4,654
2018	154	1,058	117	2,952	9	335	4,625
2019	162	1,058	123	2,915	8	327	4,593
2020	164	1,089	118	2,883	7	321	4,582
5-year CAGR	**0.78%**	**-2.15%**	**-5.66%**	**-3.27%**	**-6.09%**	**N/A**	**-1.14%**

Source: PRASA Human Resources Department

PRASA reported a net reduction of staff under 3% from FY2019 to FY2020, which includes a decrease of 32 UIA employees and 5 HIEPAA Employees and increases of two appointed employee and 31 management employees. The net reduction of employees reflects the effects of the delay in recovery from the 2017 Hurricanes and the island's financial situation on PRASA's headcount. PRASA received many resignations from employees that were, for the most part, either emigrating from Puerto Rico or hired into new jobs.

The Voluntary Pre-Retirement Program seeks to reduce the workforce progressively and voluntarily, thus allowing for the economy to undergo a transition process. This 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 the reduction of 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 for these eliminated positions. However, OMB may authorize to re-staff the position, if determined to be critical, and in accordance with the 2020 PRASA Fiscal Plan submitted by the agency. As of the date of this Report, some of the eligible employees occupy positions that are managerial or supervisory, which may result in organizational challenges.

PRASA's revised optimal staffing level to operate and maintain the System, and effectively manage the utility, as presented in the 2020 PRASA Fiscal Plan, stands at approximately 4,700 employees. As shown in **Table 3-3** above, at the end of FY2020, PRASA's staff totaled 4,582 employees (of which 321 are pre-retired), which is significantly under PRASA's target. However, this does not translate into PRASA achieving an optimum staff mix as there are critical staff needs that must be addressed such as treatment facilities operators and electromechanical staff, among others.

Furthermore, 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 and identified needs for executing the CIP which is expected to start during FY2021. The 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; 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. The deficit in operations

personnel has forced the Operations Department to incur in higher 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 key 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 next sections.

3.2.4.1 Act 3 of 2017 – Puerto Rico Financial Emergency and Fiscal Responsibilities Act (FEFRA)

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 primacy over any other 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 are applicable 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 in excess of 60 days.
3. No liquidation of sickness days[7] .
4. Suspension of non-economic clauses under previous agreements that have 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. No funding for travelling 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 maintain 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

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

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 may 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 its 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. 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 compliance of the Government 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).
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 of 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 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 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 have an impact on fleet operational costs, since they represent a potential increase in the payment of the mandatory vehicle insurance. The amount of increases are not known yet but are already approved by law. **Table 3-4** below compares and summarizes both 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.
	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 31st of each year shall be used by June 30th 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.	

Category	Act 3-2017	Act 26-2017
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.
	At the end of the term of this law the labor unions that by July 1st, 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.	
	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.	

Category	Act 3-2017	Act 26-2017
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 continues to offer varied training programs to its employees to improve work management and productivity. Training topics range from technical-oriented seminars to conflict resolution and team building sessions. During FY2020, PRASA offered over 39,646 training hours to its employees; this represents an average of approximately eight hours per employee for FY2020. The number of training hours decreased significantly because of events occurred in Puerto Rico during 2020 that affected operations, specifically the earthquakes and the COVID-19 pandemic.

Overall, about 80% (3,864) of the total employees participated in training activities offered by PRASA during FY2020. PRASA continues to invest in personnel training to increase work ownership and productivity levels, budget permitting. Also, PRASA is reducing training contracts and preparing its own employees to handle those duties whenever possible. During COVID-19 pandemic, PRASA established a digital platform, using the free open source “Moodle” to incorporate trainings via internet. PRASA’s training staff incorporated 12 courses to the digital platform and are on track to provide more in the near future. To maintain digital training, PRASA also has entered in contract with *“Oficina de Administración y Transformación de los Recursos Humanos”* (OATRH) and University of Puerto Rico (UPR), to offer 222 courses for PRASA employees. Lastly, PRASA continues to support training and certification of its treatment plant operators, in compliance with requirements established by Regulatory Agencies. **Table 3-5** presents a summary of the number of operators by the type of license held.

Table 3-5. Operator Licensing FY2020

Facility	In Training	Type I	Type II	Type III	Type IV	Total
Water	58	22	43	86	252	461
Wastewater	11	4	8	22	97	142
Total	69	26	51	108	349	603

3.3 Conclusion

The current organization continues to operate and manage the System, despite the difficult challenges it faced in FY2019 and FY2020. PRASA staff levels are materially under PRASA's established optimal headcount target level, although many critical technical and operations positions are currently vacant. PRASA must align employees' needs with available skill sets, either through recruitment or further workforce development to fill technical and operator needs while achieving its optimal staffing levels. Also, PRASA should 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 in the foreseeable future.

4 Condition of System

4.1 Introduction

In FY2020, Arcadis assessed 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 operating goals; and 3) to evaluate if PRASA's CIP is aligned with the System's identified needs. Given the significant reduction in capital and R&R investment over the past five years, Arcadis performed asset condition assessments of all eight Regulated dams and a selection of WTP and WWTP facilities that were highly impacted by the 2017 Hurricanes and were not inspected in the FY2019 Asset Condition Assessment Report (ACA Report), as well as a different sample of auxiliary facilities. Arcadis inspected facilities to assess the structural integrity and physical condition of structures and equipment; adequacy of O&M practices; as well as R&R needs among other evaluation criteria. Arcadis also evaluated the compliance performance results for all PRASA WTPs and WWTPs for the period of January 1, 2019 through December 31, 2019. The dams were inspected in January 2020 after the earthquakes. The rest of the facilities inspections were performed between June 2020 and September of 2020, as there was a delay due to the COVID-19 pandemic. The next cycle of facility inspections will resume in FY2021.

This section presents a summary of Arcadis's inspection results, findings and recommendations regarding PRASA's System based on the condition of the assets inspected during FY2020 and detailed in the FY2020 ACA Report.

4.2 Facility Inspections

A summary of the facilities inspected during 2020 is presented in ***Table* 4-1**. In total, 181 facility inspections were performed out of a total of 3,884 facilities that comprise the System, excluding active RWIs (138) and the raw water pump stations (70). Inspected facilities included: all eight dams, 39% of WTPs and 55% of WWTPs, and a selection (about 3%) of wells, WPSs, WSTs and WWPSs. 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 has been included this Report.

Table 4-1. Assets Inspected in FY2020 by Asset Category

Asset Category	Total PRASA Facilities[1]	Inspections Performed	
		Quantity	Percent
Regulated Dams	8	8	100
Water Treatment Plants	113	44	39
Wastewater Treatment Plants	51	28	55
Wells	249	20	8
Water Pump Stations	1,060	30	3
Water Storage Tanks	1,557	31	2
Wastewater Pump Stations	846	20	2
Total	**3,884**	**181**	**5**

[1]Data obtained from PRASA Geographical Information System (GIS), updated June 26, 2020. As stated above, total excludes active RWIs (138) and raw water pump stations (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. It should be noted that the total number of inspections performed in the Metro Region is lower than those performed in the other Regions because it has fewer, but larger WTPs and WWTPs. Nevertheless, it was inspected in a manner consistent with the other Regions.

Table 4-2. Summary of Inspections by Region

Asset Category	East	Metro	North	South	West	Total
Regulated Dams	3	2	1	1	1	8
Water Treatment Plants	12	1	12	11	8	44
Wastewater Treatment Plants	7	0	9	7	5	28
Wells	4	4	4	4	4	20
Water Pump Stations	6	6	6	6	6	30
Water Storage Tanks	6	6	6	6	7	31
Wastewater Pump Stations	4	4	4	4	4	20
Total	**39**	**21**	**41**	**38**	**34**	**181**

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 a number of 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 Arecibo (North Region), Coamo and Guayama (South Region), Cayey and Humacao (East Region), Aguadilla and Mayaguez (West Region), and Bayamón and Carolina (Metro Region). Since the Metro-Carolina Region did not have wells available, we visited additional wells at the Bayamón Operational Area.

Each facility was inspected using an inspection form developed by Arcadis, that included scoring criteria and criteria weighting customized for each specific asset category. Site visits were conducted in each facility. The purpose of the site visits is to determine the current state of repair and operation of the asset as influenced by age, historical maintenance, and operating environment.

The evaluation criteria used includes the following:

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

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

Within each of the evaluation criteria, the asset inspected was assigned a numerical score between 0 and 3. An overall facility rating was then determined based on the calculation of a weighted average of the ratings for each criterion. For WTP and WWTP, a weighted average was used per equipment listing in the inspection form to account for the importance of critical equipment, then 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 FY2020 ACA Report.

4.2.2 Inspection Results

According to the facilities inspections performed between January 2020 and September of 2020, an overall condition rating for each asset category was determined. The condition of each of the facilities varied mostly from adequate to those requiring certain 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 Regulated Dams

PRASA operates approximately 167 water distribution systems[8], 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[9] 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.

In addition to capacity/size classification, the regulated dams in Puerto Rico are also designated with a Hazard Classification, which is based on the downstream impacts that would result from releasing the impounded reservoir into the lower watershed as a result of a dam failure. According to this classification:

- The failure of a *low hazard* dam would result in the loss of the structure itself, but little to no additional damage to other property.
- The failure of an *intermediate hazard* dam would result in very little loss of life and significant damage to property and project operation.
- The failure of a *high hazard* dam would cause more than very little loss of life and serious damage to communities, industry, and agriculture.

Arcadis utilized the previous Arcadis 2016 and 2018 Dam inspections reports; available PREPA inspections from 2019 for Cidra, Fajardo, Loíza and Río Blanco dams and from 2017 for Isabela Regulator Lake; and PRASA's Follow-up Reports from 2017 and February 2019, which included all dams except for Loíza. Existing information was used as a baseline from which to perform independent visual inspections and operational assessments of the dam structures.

According to Puerto Rico's Dam Safety Program regulations, regulated dam facilities are to be inspected every three years. Timely and ample inspection of these dams is essential for permitting or approval required for construction, modification, repair, or removal of the dam or the appurtenant works. Aside from the daily observation and operations of the fully-staffed dam facilities, all these structures are given a cursory safety inspection annually by PREPA prior to hurricane season. Each recommendation based on an inspection, is rated indicating the priority for action.

The ratings are defined as follows:

[8] The Metropolitano Urbano System includes Sergio Cuevas WTP, Enrique Ortega WTP, Los Filtros WTP, Canóvanas Nueva WTP, Guaynabo Superaqueduct transference and Bayamón Superaqueduct transference.

[9] 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.

- Priority A – Immediate corrective actions are needed when issue/item may have an immediate impact on the safety of the dam; can potentially lead to unsafe condition of the dam; or endangers public safety.
- Priority B – Corrective action is needed within one to five years.
- Priority C – Involves routine maintenance or surveillance activity.

Table 4-3 presents the comparison of the average rating of the facilities by each category evaluated from 2008 to 2020. The overall average rating for facilities inspected in each year are also presented.

Four dams (La Plata, Cidra, Isabela, and Las Curías), one more than reported in 2018, received a Poor rating in the equipment/maintenance criterion. Two dams (La Plata and Cidra) received a rating of Poor in the Regulatory Compliance category. Cidra Dam was the only one with a Poor rating in the Operation/Process Controls category. Las Curías Dam was the only one with a Poor rating in the Staff/Training category. And, finally, four dams (La Plata, Cidra, Isabela and Las Curías), two more than what was reported in 2018, received an overall rating of Poor, while the rest received an overall rating of Adequate. No dam was awarded the rating of Good as a result of the 2020 inspections. Overall, we noticed a tendency for the decrease of ratings on all indicators and on all dams. The average rating for all eight dams combined was 1.6, which is in the lower end of Adequate, but very close to being rated Poor.

Table 4-3. Dams – Comparison of Average Inspection Results for 2008-2020

Criteria	2008[1]	2009[2]	2010	2012	2014	2016	2018	2020
Equipment/Maintenance	2.3	2.2	2.3	2.3	1.8	1.9	1.7	1.5
Regulatory Compliance	2.2	2.2	2.2	2.3	2.3	2.3	2.0	1.7
Operations/Process Control	2.2	2.1	2.1	2.2	2.1	2.1	2.0	1.6
Staffing/Training	2.1	2.1	2.3	2.3	2.4	2.4	2.2	1.9
Overall	**2.3**	**2.1**	**2.3**	**2.3**	**2.1**	**2.1**	**1.9**	**1.6**

[1] Based on seven facilities (excludes Río Blanco Dam).

[2] Río Blanco Dam, under construction at the time, was included in inspections.

From the tables above, the deterioration of all ratings on all dams is noticeable, and it is mostly related to the lack of follow-up action on past recommendations, and outstanding “Priority A” and “Priority B” issues that have not been addressed since the last reports were issued. Overall, PRASA’s regulated dams received an Adequate to Poor condition rating. Many of the recommendations from the 2018 and prior inspections saw little or no progress, which resulted in the overall deterioration of ratings across the board, and on all of the inspected dams.

All dams were reported to have an Emergency Action Plan (EAP), updated April 2019, however, the EAPs were not always kept at the site, or emergency numbers posted at the site (Fajardo Dam, Cidra Dam, and Isabela Dam).

O&M manuals for each dam were not available. In addition, the knowledge and application of the O&M manual appeared to vary by site. Based on discussion with PRASA staff we understand that at least for some dams, maintenance is conducted and documented by a separate department, the Preventative Maintenance

Department. It has also been referred by PRASA staff that maintenance crews have difficulty in keeping their work cycle in line with the dams' maintenance needs due to scarcity of resources.

PRASA dams do not appear to have comprehensive surveillance and monitoring plans (SMPs). SMPs summarize all the types of inspections, frequencies, involved personnel, types of instrumentation, measurement frequency, data collection methods, data processing and reporting for each dam. SMPs should be tailored to the critical potential failure modes for the dam. Based on the SMP, a surveillance and monitoring report should be prepared annually. This annual report summarizes data found from the surveillance and monitoring program. The annual report publishes plots of instrumentation data and overall condition of the dam based on the surveillance and monitoring program. Both the SMP and the annual report should be available for inspectors to review. This recommendation, that was already part of the last assessment performed by Arcadis in 2018, has not been implemented at the time of the dam inspections performed in 2020. Throughout the inspection, PRASA staff referred that instrument readings take place infrequently, although no records of these readings were made available and no comprehensive SMP was reported to exist for any of the dams.

Professional opinions and judgments presented in this Report were developed in accordance with generally accepted dam engineering practices following the current standard of care. They are based on review of previous inspection results, selected project documents provided by PRASA, and the field observations at the time of the site visits.

The condition of a dam can change over time, and it is important to maintain regular and routine observations. Significant changes in condition or performance should be immediately reported to PREPA or a dam safety professional. Failure to detect and report adverse conditions could impact the safety of the dam and downstream population. In addition, the inspection documented in this Report does not include an assessment of site safety as related to facility operators and the public. Hazards may exist at the site which should be addressed by PRASA.

4.2.2.2 Water Treatment Plants

PRASA operates 113 WTPs where it treats raw water to produce potable water for its customers. The island wide design production capacity of WTPs is approximately 621 MGD. The WTPs range in size from several thousand gallons per day up to 100 million gallons per day (MGD), For FY2020, PRASA reported a total water production of 539 MGD of which approximately 485 MGD came from water treatment plants.

A total of 44 WTPs (39% of total WTPs) were inspected as part of this assessment. Each assessment consisted of a site visit inspection and an interview with the operator, plant supervisor or designated personnel, and revision of available plant reports. Therefore, the information obtained was at least in part based on the understanding of the person that was being interviewed. **Table 4-4** presents the comparison of the average rating results of the facilities inspected by each category evaluated. The overall average rating of each evaluation criteria for 2009 through 2020 inspections is also provided. On average, the WTPs were rated as adequate with a score of 2.1. One of the inspected WTPs, Toa Vaca WTP, was rated as Poor, two (Orocovis Urbana WTP & Superaqueduct) were rated as Good and the rest were rated as Adequate. No WTPs were rated as Unacceptable. Even though ninety-three percent of the WTPs were classified as Adequate, ten of the 41 WTPs received a low-end rating that if not attended could deteriorate to a Poor rating.

Table 4-4. WTPs – Comparison of Average Inspections Results for 2009-2020

Criteria	2009	2010	2012	2014	2015	2017	2019	2020	Change 2020 vs 2019
Regulatory Compliance	2.3	2.1	2.5	2.3	2.0	2.5	2.6	2.6	0.0
Operations/Process Control	2.5	2.6	2.7	2.2	2.2	1.9	1.6	1.9	0.3
Equipment/Maintenance	2.3	2.3	2.3	2.4	2.1	1.8	1.7	1.8	0.1
Staffing/Training	2.6	2.4	2.9	2.7	2.1	2.1	1.9	1.7	-0.2
Overall	**2.4**	**2.3**	**2.6**	**2.3**	**2.1**	**2.1**	**2.0**	**2.1**	**0.1**

In comparison to the 2019 inspection results, the staffing/training criteria score decreased, the regulatory compliance score remained the same, and the operations/process control and equipment/maintenance score increased. 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 disinfection by-products (DBPs). The equipment/maintenance criterion, although slightly increased compared to 2019, is still in the lower end of adequate and can be attributed to projects not being executed or being postponed. Furthermore, the staffing/training criterion was mostly affected by hiring challenges, the voluntary and incentivized retirement windows the last couple of years and the headcount cap established by the FOMB in the 2020 Fiscal Plan. The stability in the regulatory compliance criterion may be due to the fact that several parameters continue to be monitored or reported using interim limits.

Nevertheless, two facilities were rated as Poor in regulatory compliance. Toa Vaca WTP (South Region), reported exceedances in disinfectant byproducts (TTHM, HAA5) for SDWA parameters and Culebrinas WTP (West Region), reported exceedances in DBPs (TTHM, HAA5) for Safe Drinking Water Act (SDWA) parameters. Neither plant reported violations in NPDES parameters. The rest were rated as good or adequate.

Three facilities, Patillas WTP and Yauco WTP (South Region) and Corozal Urbano WTP (North Region), were rated as Adequate but should be closely monitored, since they received a score between 1.5 and 1.9 because of reported exceedances during the period of evaluation. The compliance for these three plants reflects recurrent exceedances in SDWA parameters such as total coliforms, TTHM and HAA5; and exceedances in Biological Oxygen Demand (BOD), among parameters under the NPDES permit. Active monitoring of these facilities is recommended.

Operations/process controls in the majority of WTPs inspected were adequate. However, five facilities were rated as Poor and two were rated as Unacceptable. In general, the operations and process control rating increased by 0.3 when compared to the FY2019 inspections; however, it is still in the lower end of Adequate (below 2.0). The common factors in these facilities are that lack of essential process control procedures and support documents. These facilities lacked or had outdated versions of O&M manuals, equipment manuals, emergency response plans (ERP), among others. 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 44 WTPs visited, approximately 15 facilities were not performing jar tests and about seven facilities were only performing jar test on a weekly basis. Also, almost all facilities lack potable water flow meter and a significant number lack remote monitoring, control room, and proper security and housekeeping. Some had inadequate lab equipment and poor illumination.

Furthermore, one of the key operations/process control deficiencies is the absence of auxiliary power. Several facilities, such as: Quebradillas WTP, Adjuntas (Garzas) WTP, Lares Urbano WTP, Cedro Arriba WTP, Yahuecas WTP, Aguas Buenas Urbano WTP, Minillas WTP and Maricao WTP did not have a permanent working emergency generator unit (EGU). Additionally, Caguas Sur WTP, Ceiba WTP, Corozal Urbano WTP, Añasco WTP, Cubuy WTP and Cidra Urbano WTP did not have a working permanent EGU at their Intakes. Also, in Río Blanco WTP, Farallón WTP and Jayuya Urbano WTP, the EGUs do not have capacity to operate the entire plant. The latter is using a rental to complement backup power capacity. Moreover, at least six to 10 treatment facilities had issues with the EGU's transfer switch, which had to be operated manually. Lastly, the plant staff requires process control training and to improve communication of treatment strategies.

Regarding the equipment/maintenance, no facility was rated as Good or Unacceptable. In general, the condition of equipment and maintenance practices of the WTPs has deteriorated. Out of the 44 facilities inspected, one was rated Poor, San Sebastián WTP (West Region) and the rest were rated as Adequate. Of the Adequate rated facilities, 29 had a rating under 2.0 in terms of equipment and maintenance practices and should be closely monitored. The greatest concern continues to be the physical condition of the facilities, which continues to be in a low rating evidenced by the inspections and lack of investment in capital improvements and R&R programs due to the fiscal situation and budget limitations.

Pertaining to Staffing/Training, 18 facilities received a Poor rating, two rated Good and 24 received an Adequate rating in this category mostly due to need of staffing, non-certified operators and/or lack of training. It has certainly been evident that staffing is an area that has negatively impacted PRASA, in FY2019 only eight facilities were rated as Poor in this evaluation criteria compared to 18 in FY2020, about a 125% increase. Besides licensed operators, the findings show multiple vacancies in Sludge Treatment System (STS) operators, maintenance staff and operational service worker (TSOs for its Spanish acronym) and a few on lab personnel. Notwithstanding, PRASA has certain controls in place for continuing the operation of facilities which include but are not limited to: allowing current staff and operators to work overtime and reducing facility operation shifts. Most of the water operators are licensed per the Puerto Rico Department of Health (PRDOH) requirements but there are still some that need to complete the licensing process.

PRASA is striving to invest in the training of its staff, focusing on achieving greater job understanding, productivity, and ownership. However, the ongoing fiscal situation has adversely affected PRASA's efforts with respect to staff development and the provision of adequate staff in their treatment facilities.

The facilities with the lowest overall score of the 44 WTPs inspected are summarized in **Table 4-5**. As shown below, one was rated as Poor and the remaining nine facilities received a score in the lower end of the Adequate scoring range. Lastly, PRASA should address the shortcomings identified during inspections to improve the staffing, process control, and physical condition of the facilities and achieve and maintain continuous and consistent compliance.

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

WTP	2020 Score	Observations
Toa Vaca (South Region)	1.4	During the evaluation period, the Facility compliance is rated as poor. There were significant and minor non-compliance with disinfectant byproducts (TTHM & HAA5) at several sample points under the SDWA. The Facility operations and process control is rated as good. The operators perform the necessary sampling to adjust the process. Jar test performed daily. However, O&M manual not updated, missing TOC analyzing lab equipment, no potable water meter installed, and access roads need improvements. Also, some of the fence needs repairs, poor illumination and needs better housekeeping/grounds-keeping. Overall equipment / maintenance rating is adequate. However, one intake pump is out of service, stream current monitor out, and pre-sedimentation unit construction not completed. Also, one rapid mixer and two slow mixers out on flocculation / coagulation process, no sedimentation (pending pre-sedimentation construction) and one blower for filter aeration out of service. In addition, distribution tank and thickeners structures show concrete deterioration, spalling, cracks that need attention. Lastly, dewatering system with limited capacity for sludge produce, there are corrective maintenance and parts procurement process challenges and some outstanding warranty/contractor issues. Training is adequate for this facility and its operation. However, the facility needs at least 1-2 licensed operator to cover the operating hours efficiently, including vacations & sick time. Also, two operations monitors ("*Cotejadores*") and maintenance personnel needed. Finally, two non-licensed operators might help but need to take test and get their license.
Culebrinas (West Region)	1.5	During the evaluated period, the facility compliance is rated as unacceptable. There were significant non-compliances with Disinfection Byproducts (THM & HAA5) for SDWA. No discharge monitoring nor compliance required for Culebrinas system as the facility is discharging into the Aguada Wastewater System. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. Jar tests are performed once every shift. However, O&M and ERP manuals have not been updated and lab tests not conveyed to operators regularly. Also, not discharging via NPDES, but to the Aguada wastewater system and sanitary survey not performed in some time. Lastly, no potable water meter installed, illumination needs improvements, should remove from site STS eliminated equipment. Overall, the facility equipment / maintenance is rated as adequate. However, the WTP has three (3) filter and the finished water flow meter out of service. In addition, several actuators and valves installed at the filter units need to be replaced. Improvements to the degritter equipment and sludge holding tank and the elimination of the STS system were completed over the past years. Lastly, there are corrective maintenance challenges. The staffing and trainings are not adequate for the WTP and its operating hours. Need at least two licensed operators to operate the facility efficiently. Also, lacking and delays of essential trainings to maintain staff adequately trained.
Minillas (East Region)	1.6	During the evaluated period, the facility is rated as borderline good condition in terms of compliance. There were SDWA exceedances of TOC in the WTP. Also, there was a NPDES exceedances for Zn parameter. May be considered modifications to the sedimentation units to facilitate tanks cleaning and the addition of aeration technology to improve TOC levels in the WTP. The operations and process control of the WTP is rated as unacceptable. Operators perform routinely sampling, following SOPs, and perform the necessary process control adjustments. Daily jar tests, current streaming monitor are used for process control. Hydrochloric acid was replaced by Earth Tec chemical for DBPs control, no pre-Cl is added. At the time of the inspection, the EGU was out of service and no telemetry system was available. Overall housekeeping of the facility and green areas maintenance are needed. NPDES effluent discharge permit was approved. The overall condition of the equipment / maintenance of the WTP is rated as adequate. The equipment aspect was rated just below 2.0. Although there was no major process equipment out of service, concrete tanks and piping show signs of deterioration and corrosion. Two slow mechanical mixers were out of service. The holding tank only has one pump in working order (no standby operation available). TOC equipment was out of service. No EGU installed at the intake and the EGU at the WTP facility was out of service. e emergency generator diesel tank is heavily corroded, needs maintenance or replacement. There are corrective maintenance challenges. Staffing & Training was rated as poor for this facility. There are several trainings that were not offered during the evaluation period. Need at

WTP	2020 Score	Observations
		least one (1) licensed operator and one (1) at large to cover the facility operating hours effectively on 8-hour shifts.
Corozal Urbano (North Region)	1.8	During the evaluation period, the facility compliance is rated as adequate. However, there were two sample points with significant non-compliance in TTHM and one sample point with minor non-compliance also in TTHM for SDWA parameters. Also, minor non-compliance in BOD for NPDES requirements. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. However, O&M manuals and ERP not updated, no jar tests being performed, and power outages causes generator problems and have damaged multiple equipment. Also, no potable water meter installed, no additional security available and illumination is poor. Overall equipment / maintenance rating is barely adequate. However, the Equipment component is poor. Major equipment damaged or deteriorated. The Don Carlos intake is out of service, one Cibuco intake pump and its EGU are out of service, remote monitoring out as well and illumination very poor. Stream current monitor out of service and influent flow meter needs calibration. Flocculation, Sedimentation and filters tanks with concrete deterioration and spalling. Spyder system in 3 out of 4 sedimentation basins, #4 inefficient. Two filters need media replacement, surface wash pumps out of service and one IFE turbidimeter not working properly. Also, new distribution tank construction not completed, one distribution pump out of service and there is no STS system. Lastly, there are corrective maintenance and parts procurement process challenges, and no As-built drawings available. The staffing for this facility and its operating hours is not sufficient; need at least 1-2 licensed operators. Also, several trainings have not being offered and need refreshers.
Yauco (South Region)	1.8	During the evaluation period, the Facility compliance is rated in the lower end of adequate. There was significant non-compliance in TTHM is several sample points, and minor non-compliance in a sample point for SDWA parameters. Also, significant non-compliance in BOD for NPDES requirements. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. Jar tests performed daily. However, O&M manuals not updated, EGU's automatic transfer switch not working damaged by power failures cause generator problems. Also, no potable water meter installed, no additional security available, some areas need grounds-keeping and poor communication connection. Overall equipment / maintenance rating is in the lower end of adequate. Some influent instrumentation out of service, aerator with ladder safety issue and flocculation and sedimentation concrete deterioration. Also, tube settlers need cleaning, two units of membrane filters out of service and some chemical pumps out of service. Sludge holding tank needs improvements, dewatering vacuum two pumps out of service and discharge flow meter out of service. Lastly, EGU's automatic transfer switch out of service, there are corrective maintenance and parts procurement process challenges and no As-built drawings available. Staffing and training are not adequate for this facility and its operating hours. Several trainings missing. Facility needs at least 2 licensed operators and potable water technician. Also, there is a non-licensed operator in noncompliance with PRDOH requirements; pending to get license.
Lares Urbana (North Region)	1.9	During the evaluation period, the Facility compliance is rated as good. There were no exceedances reported for the SDWA Compliance parameters evaluated, however there was minor non-compliance in zinc and BOD for NPDES parameters. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. Jar test is performed weekly. However, Equipment manuals and ERP need to be updated. The EGU and its automatic transfer switch are out of service; using portable rental, which does not have enough power for entire plant. Also, no potable water meter installed, no control room, no additional security available. and roads need improvement. Lastly, the average flow is at the maximum design capacity of the plant which could create operational issues. Overall equipment / maintenance rating is adequate. However, one of the intake pumps is out of service. Stream current equipment is out of service and a raw water valve is leaking. Tube settlers for sedimentation basins of new plant seemed deteriorated and should be replaced. One filter unit of new plant is out of service, which is a critical component for this plant. No STS system. The raw water intake and the WTP (rental) have EGUs installed; however, the automatic transfer switches are not working. Distribution tanks was recently inspected. Lastly, there are corrective maintenance and parts procurement process challenges and no As-built drawings available. Training is adequate for this facility and its operating hours. However, the Plant needs at least 1-2 licensed operators to cover all its shifts and vacation/sick days effectively.

WTP	2020 Score	Observations
Cedro Arriba (North Region)	1.9	During the evaluated period, the facility compliance is rated as good. There were no exceedances reported for SDWA and NPDES compliance parameters. The Facility operations and process control is unacceptable. The operators perform the necessary sampling to adjust the process. However, the O&M manuals not updated, no jar tests being performed and EGU out of service. Also, no water meter installed, no control room and no additional security available. Finally, access road needs improvements and need better housekeeping / grounds-keeping. Overall equipment / maintenance rating is adequate. However, the Equipment component is borderline adequate. Several equipment deteriorated, such as: the intake EGU is out of service; flocculation and sedimentation tanks showing concrete deterioration and spalling; tube settlers with excess solids, need cleaning; one filter out of service and concrete tanks deteriorated; backwash pumps with corrosion; and filters actuators out of service. Also, chlorine building very tight, thickener showing signs of deterioration, vacuum pumps out of service and sludge drying beds deteriorated and more importantly EGU is out of service. Lastly, there are corrective maintenance and parts procurement challenges. The staffing is inadequate. Need at least one licensed operator and a TSO. Also, several trainings have not been offered and should be refreshed.
Jayuya Urbana (North Region)	1.9	During the evaluated period, the facility compliance is adequate. The WTP experienced several exceedances in SDWA compliance with DBPs in the system. For the NPDES compliance, there were no exceedances during the evaluation period. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling, following SOPs, for adjustments to process. Jar tests is performed weekly. However, the Plant's EGU does not have enough capacity for the facility operations, therefore an EGU has been rented for additional capacity. Also, no potable water meter available, no additional security available and access roads need improvement. In general, housekeeping, and overall appearance of the facility was adequate. Overall, the equipment / maintenance of the WTP is rated as adequate. Flocculation and sedimentation tanks look in good condition. However, there are some equipment that are out of service or malfunctioning. Raw water intake only has one pump operating with no redundancy. In addition, the Koanda system need repairs. Flocculation and sedimentation tanks look in good condition. Membrane filters need an assessment and replacement of some filter cassettes. No STS system. Corrective maintenance is challenging due to it is a lengthy process. Facility staffing needs at least one licensed operator and one At large licensed operator to cover the shifts efficiently. Several trainings in need of refreshers but have been delay due to the COVID-19 situation.
Patillas (South Region)	1.9	During the evaluation period, the Facility compliance is rated as barely adequate. There was significant non-compliance in HAA5 in several sample points, minor non-compliance in TTHM in several sample points and minor non-compliance in total coliforms. No exceedances in NPDES reported. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. However, O&M manuals not updated, compliance lab results not always conveyed to operators and no jar test performed. Also, no potable water meter, installed, no additional security available and missing gate. Overall equipment / maintenance rating is adequate. However, dam geological failure needs attention, chemical application piping needs improvement and flocculation and sedimentation structures showing concrete deterioration, spalling & bugholes. Also, flow meter at distribution tank out of service, thickener actuator out and thickener tank with concrete deterioration, exposed rebars. Lastly, there were corrective maintenance challenges. Staffing and training are adequate for this facility and its operating hours. However, the facility can benefit from having an additional licensed operator or an At large licensed operator.
San Sebastián (West Region)	1.9	During evaluation period, the facility compliance is rated as good. There was a minor noncompliance in HAA5 for SDWA at a sampling point and minor non-compliances in dissolved oxygen and BOD for NPDES parameters. Improvements in regard to DBPs controlled have been observed with more frequent cleaning of sedimentation tanks (preventive maintenance), implementation of a new polymer and adjustments to the pre chlorine dosing. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. Jar test performed per shift. However, O&M manuals not updated, intake EGU automatic transfer switch not working, no potable water meter installed and no control room. Also, general safety not adequate, no additional security available, access road needs improvements and the gate needs a motor. Lastly, no internet, housekeeping / grounds-keeping needs improvement and overall appearance inadequate. Overall equipment / maintenance rating is poor. Major equipment impacted. At the intake: one fine screen out of

WTP	2020 Score	Observations
		service, pumps capacity affected by turbulent flow, remote monitoring out of service and intake EGU not using automatic transfer switch. Also, influent flow meter out of service, pre-sedimentation helicone out of service, flocculation tank concrete deteriorated, slow mixing needs improvements and rapid mixer out of service (in process of replacing). In addition, sedimentation basins need improvement, filters media needs replacement and chlorine cylinders scales were damaged. Holding tank concrete deteriorated, two sludge pumps out of service and thickener inadequate continuous operation due to dewatering system being out of service and preventing its sludge discharge. Belt filter press out of service and sludge drying beds deteriorated and not being used. Lastly, there are corrective maintenance and parts procurement process challenges, no As-built drawings available and overall appearance inadequate. The staffing and training seem adequate for this facility and its operating hours. However, non-licensed operator should get proper certification.

As mentioned, compliance results show that facilities are, in general, performing better with respect to compliance with limits of SDWA and effluent discharge parameters. However, results might be misleading since several NPDES parameters had interim limits or only monitoring and it is unknown whether the facility can meet the actual (permanent) limits when the interim/monitoring expires. Interim limits are likely to continue until PRASA can perform improvements, whether capital or non-capital, to improve the facilities equipment in order 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, phosphorous (P) and nitrogen (N) recent criteria. At the issuance process for an updated NPDES permit, PRASA continues requesting interim limits, as determined by the Compliance Department, until the capital project for said facility is executed and completed. The project completion term would be subject to the Prioritization System. PRASA is vigilant of potential future regulations that may impact the System and the compliance of regulatory agencies requirements. One such case is the changes to the lead (Pb) and copper (Cu) limits.

The effects of these and other 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 with these future regulations (see Sections 6.5 and 6.6 for additional discussion on renegotiations with Regulatory Agencies, future regulations and other regulatory requirements). Notwithstanding the impact of future regulations, capital improvements are needed to modernize PRASA's WTPs, prevent further deterioration, protect public health, safeguard environmental quality, allow continued economic development and help bring the System into compliance with all regulatory requirements.

4.2.2.3 Wastewater Treatment Plants

PRASA currently operates 51 WWTPs. The facilities range in size from several thousand gallons per day up to 80 MGD. The island-wide design treatment capacity is approximately 378 MGD and the treated wastewater for FY2020 was approximately 207 MGD. In level of treatment, PRASA has seven plants designed to provide tertiary or advanced treatment, 38 plants are designed to provide secondary treatment, and the remaining six facilities (which account for 230 MGD of treatment capacity) provide primary treatment.

A total of 28 WWTPs (55% of total WWTPs) currently in operation were inspected as part of this asset evaluation. Each assessment consisted of a thorough site visit inspection and an interview with the operator, plant supervisor or designated personnel. Thus, as with the WTPs, information was at least in part based on the understanding of

the individual who was being interviewed. Also, for the equipment/maintenance criterion the inspections forms show scores distributed by type of processes, for ease of identification of deficiencies, as belonging to: Pretreatment; Primary Treatment; Secondary Treatment; Tertiary Treatment; Sludge Treatment and handling; Disinfection and discharge; and Miscellaneous (non-potable water system, Back-up Power, Septage). **Table 4-6** presents the comparison of the average rating results of the facilities inspected by each category evaluated. The overall average rating of each evaluation criteria for 2009 through 2020 is also presented. Overall, WWTP facilities were rated as borderline Adequate with a score of 1.7. Of the facilities inspected, eight were rated as Poor in overall rating. Furthermore, 13 of the 20 WWTPs rated as Adequate in overall rating where in the lower end, close to being rated as Poor.

Table 4-6. WWTPs – Comparison of Average Inspection Results for 2009-2020

Criteria	2009	2010	2012	2014	2015	2017	2019	2020	Change 2019 vs. 2020
Regulatory Compliance	1.5[1]	1.5[2]	1.4	1.5	1.8	2.3	1.3	1.7	0.4
Operations/Process Control	2.4	2.3	2.4	2.3	2.0	1.9	1.8	1.7	-0.1
Equipment/Maintenance	2.2	2.4	2.2	2.3	2.0	1.8	1.6	1.6	0.0
Staffing/Training	2.0	1.8	2.3	3.0	2.0	2.4	1.8	1.8	0.0
Overall	**2.0**	**2.0**	**2.0**	**2.0**	**1.9**	**2.0**	**1.6**	**1.7**	**0.1**

[1] Two WWTPs (Playa Santa and La Parguera) that discharge to underground injection were not evaluated under this criterion because they do not have an approved NPDES Permit.

[2] One WWTP (Playa Santa) that discharges to underground injection was not evaluated under this criterion because it does not have an approved NPDES Permit.

In comparison with the 2019 inspections results, the regulatory compliance score increased and although some of it could be attributed to operations adjustments, most of it is due to having interim limits and/or monitoring only parameters due to requested waivers. Operations and process control slightly decreased and while the equipment/maintenance and staffing/training criteria scores remained the same. Furthermore, the continuing negative trend in the equipment/maintenance criterion can be attributed in part to projects not being executed or being postponed in the last couple of years. Likewise, PRASA staffing needs qualified personnel (particularly WWTP and STS operators), as well as other support staff of which PRASA has not been able to fill those vacancies. Notwithstanding, PRASA is striving to invest in the training of its current and future staff, focusing on achieving greater job understanding, productivity, and ownership.

The WWTPs received an overall combined score of 1.7 in Regulatory Compliance, which falls in the lower end of Adequate. It is evident that the conditions of the equipment and having treatment units out of service has negatively impacted the compliance criterion. Despite some of the NPDES parameters having interim limits or monitoring only, the results show that there were still many exceedances. Of the 28 facilities that were inspected, two were rated as Unacceptable and eight received a Poor rating under the regulatory compliance criterion. The rest were rated as Adequate, except for Barranquitas WWTP, Jayuya WWTP, Naranjito WWTP, Yauco WWTP, Peñuelas WWTP and Mayaguez WWTP, which were rated as Good. The facilities that were rated as Unacceptable/Poor in this criterion include: Camuy WWTP and Aguadilla WWTP as Unacceptable; and Cayey WWTP, Culebra WWTP, Parcelas Borinquen WWTP, Morovis WWTP, Guánica WWTP, Patillas WWTP, Guayanilla WWTP and Maricao WWTP as Poor. In addition, ten 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, dissolved oxygen (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 it is obvious that major improvements need to be implemented to achieve positive results. Also, for some of these facilities the nutrient removal and aeration process needs to be evaluated to determine its optimal operation. Therefore, PRASA must plan and make the necessary improvements to meet current limits while also considering that when interim limits are lifted, they have the necessary tools and conditions to meet the permanent limits.

Operations/Process Control in the majority of WWTPs inspected were borderline Adequate, with a 1.7 overall rating. Of the 28 facilities that were inspected, two received a rating of Unacceptable and seven received a Poor rating under this criterion. These facilities were: Vieques WWTP (Unacceptable), Corozal WWTP (Unacceptable), Cayey WWTP, Culebra WWTP, Comerío WWTP, Camuy WWTP, Naranjito WWTP, Morovis WWTP and Vega Alta WWTP. Process control continues to be a challenge in some of the facilities, even though the plant operators indicated that SOPs and control strategies are followed. Some of the typical issues found during the inspections include: lack or outdated versions of O&M manuals, equipment manuals and ERPs; no calibration plan for chemical feed pumps; lab equipment or chemicals not adequate; not performing jar test; no control room; no additional security available; lack of non-potable water (NPW) system; no potable water meter available; equipment debris and poor groundskeeping; fence, access road and illumination need improvements; presence of floating solids in effluent; and condition and overall appearance not adequate, among others.

In addition, these facilities are still experiencing problems with process control of phosphorous, nitrogen, metals, and residual chlorine among some parameters with interim limits. Another issue that may be impacting operations is the fact that several WWTPs were only treating half or less of the plant’s capacity. Also, Camuy WWTP, Cayey WWTP have EGUs damaged, thus are without enough capacity to operate entire facility. Vieques WWTP EGU is old and does not have capacity to supply power to operate entire plant. Additionally, Corozal WWTP and Guayanilla WWTP, located near residential/commercial areas, are without proper odor control measures. Lastly, because the operations/process control inspections are based on interviews with plant operators and supervisors, and documentation review at the time each facility is visited, it is possible that there may be operations/process control implementation shortcomings not identified.

The WWTPs generally range from Poor to Adequate condition with equipment/maintenance as the category of primary concern. The greatest current concern is the physical condition of the facilities, which continues to deteriorate due to slowdown and suspension of the CIP and significant reduction in R&R. Average rating for this criterion was 1.6, which is barely Adequate. Of the 28 facilities that were inspected, six facilities received a Poor rating under this criterion and the rest of the facilities were rated as Adequate. These facilities include: Parcelas Borinquen WWTP, Culebra WWTP, Comerío WWTP, Vega Alta WWTP, Vega Baja WWTP and Corozal WWTP. Moreover, despite most of the facilities being rated in the Adequate range, at the time of inspection, most of those, 19, were rated on the lower end of Adequate (score below 2.0) and, if not addressed, could fall to Poor or Unacceptable rating in the future. Some of the recurring observations included: entire treatment units/process out of service; major process equipment 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 up keeping/maintenance; corrective maintenance and procurement challenges; no as-builts drawings available; overall appearance not adequate among others.

Pertaining to Staffing/Training, out of the facilities inspected, nine facilities were rated as Poor or Unacceptable, seven were rated as Good and the remaining facilities received an Adequate rating in this category. The facilities rated as Unacceptable or Poor: Naranjito WWTP (Unacceptable), Culebra WWTP, Vieques WWTP, Barranquitas WWTP, Camuy WWTP, Jayuya WWTP, Vega Alta WWTP, Vega Baja WWTP and Aguadilla WWTP.

Besides vacancies and need of licensed operators, the findings show multiple vacancies in sludge dewatering operators, maintenance/housekeeping staff and wastewater workers (TA, by its Spanish acronym). Although there were some facilities with 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. Lastly, even though 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 of the WWTPs are not staffed 24 hours per day, with many WWTPs having only one shift. Most WWTP staff had the required minimal level of training; however, there were some non-certified operators, and some indicated requiring training refresher courses.

In summary of overall rating, of the 28 facilities inspected, eight received an overall Poor rating and 20 received an Adequate rating, with six of those eight facilities with a Poor rating in terms of equipment/maintenance. Furthermore, 21 were rated below 2.0 and if not addressed, could fall to Poor or Unacceptable rating in the future. The facilities with the lowest overall score of the 28 WWTPs inspected are summarized in **Table 4-7**. PRASA should address the shortcomings identified during inspections to improve the staffing, process control, and physical condition of the facilities and achieve and maintain continuous and consistent compliance. These improvements may be related to new process equipment, process automation and or process control optimization.

Table 4-7. WWTPs – Lowest Rated Facilities and Observations

WWTP	2020 Score	Observations
Camuy (North Region)	0.9	During the evaluation period, the facility compliance is unacceptable. Significant non-compliance with BOD removal %, BOD Load (Weekly), BOD Concentration (Monthly/Weekly), Residual CL, TSS Removal %, and TSS Concentration (Monthly/Weekly). Also, Minor exceedances in BOD Load (Monthly), TSS Load (Weekly) and Total Suspended Solids. Need further analysis to determined violations. The Facility operations and process control is rated as poor. The operators perform the necessary sampling to adjust the process. However, the O&M Manuals not updated, no chemical feed pumps calibration plan, no control room, no laboratory on site and no potable water meter. Also, poor illumination, safety and security are compromise with broken fence and erosion near Cl contact chambers. EGU damaged, using rental. Lastly, housekeeping, and overall appearance not adequate, need maintenance, painting. Overall equipment/ maintenance rating is borderline adequate. However, most equipment is old and with some degree of deterioration. Pre-treatment area with structural cracks and deterioration (weathering). Comminutor in bad shape, degritter out of service. One lift station pump is out, and connectors are damaged. One blower out of service. Spray pumps for scum at package plants is out. Corrosion and slime all over package plants. No secondary containment for dewatering polymer. Available As-built drawings are not legible and breaking apart, should be digitalized. There are corrective maintenance challenges. The facility's training is adequate for this facility and its operating hours, although a non-licensed operator still in process to get certified and meet EPA requirements. The staffing needs at least two licensed operators to effectively operate this facility and its operating hours.
Cayey (East Region)	1.1	During the evaluation period the compliance is almost unacceptable. Significant Non-Compliance in Residual CL and Phosphorous parameters. Also, Minor Non-Compliance in BOD Concentration, TSS Removal %, TSS Load, and TSS Concentration (Monthly & Weekly). Facility's operations and process control is rated as unacceptable. The operators perform the necessary SOPs & sampling to

WWTP	2020 Score	Observations
		adjust the process. Installation of cameras, fence, and gate recently. However, the handling of phosphorus has not provided desired results since previous visit as phosphorus is still presenting compliance issues. Also, Jar test only performed monthly, need more frequency; plant's EGU is damaged, using a rental; power failures affecting EGU's performance; telephone out of service; and illumination and grounds keeping need improvements. Finally, the Plant is currently treating only about 26% of the Plant's capacity, which can cause operational issues. Overall equipment / maintenance rating is borderline adequate. Several equipment damaged, such as: EGU is out of service, plant using rental; one degritter out of service and heavy corrosion on all; one blower out (panel); two BNRs out of service; some BNR diffusers and mixers out and BNR structural condition deteriorated. Also, two RAS/WAS pumps out, holding tank mixer out, one belt filter press out and some lamps in UV system out. Finally, no As-built drawings at facility and experiencing corrective maintenance challenges. The staffing is adequate for this facility and its operation hours. However, trainings need to be updated (refreshers) and monitored.
Aguadilla (West Region)	1.1	During the evaluation period, the facility Compliance is unacceptable. There were significant violations on Fecal Coliforms, Residual Cl, Total TSS, TSS concentration and Load. Also, minor exceedances in TSS removal %. Some of these exceedances might be caused by some of the sludge treatment equipment being out of service, such as the thickener tank, (1) Clarifier tank, and belt filter press. The general operation and process control are rated as adequate. The operators perform the necessary sampling, following SOPs, for adjustments to process. However, safety issues as some railings in tanks are broken and stairs from the basement of the influent pumps, and the fence/gate is broken. Also, O&M manual not updated, the facility needs additional security, the access road is deteriorated and there are areas without illumination. The overall equipment / maintenance rating is adequate for the WWTP. There are some components and equipment that need improvements or replacements such as mechanical bar screens, lift pump station pipelines due to excess of corrosion, Clarifier mechanisms due to corrosion, and sludge pumps from clarifier tank due to problems in their operation. The staffing and training are inadequate for this facility and its operating hours. Refresher trainings are needed. Also, staffing needs at least one licensed operator and a permanent Lab Technician (Water analysis) since students offer only temporary services.
Culebra (East Region)	1.2	During the evaluation period, the facility Compliance is rated as poor. Facility had significant non-compliance with TSS Removal % and TSS Concentration (Weekly) parameters. Also, minor exceedances in dissolved oxygen and TSS Concentration (Monthly). The Facility operations and process control is rated as poor. The operators perform the necessary sampling to adjust the process. However, O&M manuals not updated, and no process control strategies set nor communicated effectively, since visiting plant only two days. Also, no calibration plan for pumps, no Jar test being performed, and EGU transfer switch not working properly and EGU not being tested. Lastly, no control room available, no additional security available and facility not equipped with proper communication tools. Overall equipment / maintenance is rated as poor. Several components in poor condition. Bar screen is being bypassed, comminutor out of service as well and the degritter system. Also, BNR mixing system has several units out of service, both secondary clarifier scum handling systems are out of service and filters not being used. In addition, chlorine application system is out, being applied manually; and septage system out of service. Lastly, facility experiences corrective challenges. The facility is not staffed daily. Needs at least two licensed operators and another licensed operator At Large. The training of staff needs to be provided and yearly kept; hindered by COVID-19 situation and lack of staff.
Corozal (North Region)	1.3	During the evaluation period, the facility is rated in the lower end of adequate (below 2). However, there issues with suspended solids as there were minor non-compliance with TSS Removal %, TSS Load Weekly, and TSS Concentration (Monthly & Weekly). The Facility operations and process control is rated as unacceptable. Although the operators perform the necessary sampling to adjust the process it had multiple missteps. O&M manuals were available but are not being used. Also, they are not updated (1992). Emergency numbers not posted, and equipment manuals not available/used. The ERP was not found. No calibration plan for chemical feed pumps established and no Jar test being performed. There were substantial floating solids on the effluent during visit. Since lab has been moved to operator's office, no proper storage of chemicals is conducted. There is no NPW system or odor control, and bathrooms are not adequate. Plant does not have a control room or additional security. Access roads and illumination need improvement. Facility has adequate emergency power, poor housekeeping, construction / equipment debris laying around. General safety and overall appearance inadequate. Overall equipment / maintenance rating is poor, specifically for the equipment component. Major units deficient. At pretreatment: Manual Bar screen

WWTP	2020 Score	Observations
		needs maintenance; extractor is corroded; comminutors taken out of service; lift Station showing deterioration; and degritters out of service. Also, one Biological Reactor out of service, due to the aeration basin (diffusers out); one clarifier#1 and its scum collector out of service and two scum handling pumps out; and digester diffusers need maintenance. Sludge drying beds not being used, no roof, instead using geotubes with limited capacity. Pending CIP project for dewatering improvements. In addition, project to add pretreatment unfinished and needs to be reactivated and completed with the dewatering system. Laboratory not used, unstable and unsafe, needs to be reconstructed somewhere else. Emergency generator deteriorated, needs maintenance or replacement. Lastly, there were corrective challenges, parts procurement challenges, the As-builts drawings are in bad shape and the overall appearance is deficient. The training is adequate for this facility and its operating hours. However, the facility needs at least two licensed operators or one licensed operator and one At Large Operator to operate facility efficiently. Also, need for a TA.
Vieques (East Region)	1.4	During the evaluation period, the facility compliance is rated as adequate. However, there was significant non-compliance with TSS Removal %. Also, minor exceedances in TSS Concentration Monthly and Weekly. The facility operations and process control is unacceptable. Although, the operators perform the necessary sampling to adjust the process. The O&M manuals are outdated, Equipment manuals available but not used, some floating solids in effluent discharge and Jar tests not performed. Also, dosing adjustments are based on operator's experience and not in scientific protocol, current EGU does not have enough capacity for entire plant, Automatic Transfer Switch (ATS) not working properly, testing not adequate and diesel tank containment/valve not adequate. In addition, chemicals not stored properly, no NPW system, no odor control and no additional security available. Lastly, general safety inadequate as catwalk in Package plant is unsafe and Plant operating at half the design capacity. Overall equipment and maintenance rating is borderline adequate. Condition at screening deficient and with corrosion. Package plant is heavily corroded and some of the catwalks are so deteriorated that are unsafe for operators. Blowers for aeration segment are deficient. One sludge drying bed used for chemicals, also only one polymer pump thus no redundancy. Disinfection system storage has no secondary containment and UV system PLC out of service. EGU is old and unreliable and does not provide enough power for entire facility; automatic transfer switch out of service; and secondary containment not adequate. Lastly, there are corrective maintenance challenges, parts procurement challenges and no As-builts drawings available. Need at least (1) "At large" licensed operator to cover sick/vacation days, so that the facility's operating hours are addressed effectively. Also, some maintenance personnel. The training needs refreshers for the staff.
Comerío (East Region)	1.4	During the evaluation period, the facility is rated as adequate but below 2.0. Major compliance issue with TSS removal. Maybe related to the deficiency of solids removal in the primary clarifier. Also, there were minor non-compliance in TSS concentration and dissolved oxygen (DO). The DO may be caused by having one bioreactor unit out of service. The main sanitary pump station is located in low elevation causing stormwater accessing the main trunk sewer. Recently, a chlorine application system was installed and programmed with flow paced. The facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. However, all process operations are manually, O&M Manual not updated, no Jar test and the EGU is out of service. Plant is using a Rental and the ATS is not working in automatic. Rental EGU does not have capacity for entire plant. Also, NPW not being used, no control room, and no additional security available. Lastly, there was some debris, old equipment laying around, and communication is limited. Overall equipment / maintenance is rated as poor, particularly the equipment component. There are two major process units out of service including one biofilter and one secondary clarifier. Also, the chemical pump at the degritter system and one sump pump at the primary clarifier were out of service. The scum removal system in both, primary and secondary clarifier are not properly working causing plenty of floating solids, including algae. The EGU was out of service and using a rental one. However, the ATS was not working and must be manually activated. This is a serious problem since the plant is daily staffed from 7:30 am - 3:30pm, and if power outage occurs outside the staffed area, the plant will be in shutdown. Furthermore, corrosion is affecting some of the treatment processes, significantly and there are structural issues in the primary clarifier. Lastly, effluent discharge flow meter was out of service. The training is adequate for this facility and its operating hours, except for the operational refresher missing. However, staffing in need for a TCA for maintenance support and may also need a licensed operator to cover sick/vacation days of the two current operators.
Guayanilla (South Region)	1.4	During the evaluation period, the Facility compliance is poor. There were significant non-compliance of BOD concentration and BOD Load. BOD concentration exceedances might be due to problems with the blower’s operation. Also, there were minor non-compliance of fecal coliforms and ammonia.

WWTP	2020 Score	Observations
		The Fecal Coliforms issue was addressed by PRASA. The Facility's operation and process control is rated as barely adequate. However, O&M manual not updated, there is no control room, safety is not adequate due to corrosion in structures, there is no ladies bathroom, the facility does not provide additional security, lacking housekeeping, and the overall appearance and access road were not found adequate. The Facility's equipment and maintenance is rated as borderline adequate. The WWTP needs significant equipment improvements. Heavy corrosion visible. Sludge Drying Beds have no roof and need improvement. Secondary Clarifier is out of service due to corrosion in the mechanism and Clari-digester with structural corrosion. Also, Comminutor and degritter booster pump out of service. Finally, no As-builts drawings available, no odor control and plant is near residential area and overall appearance not adequate. The training is adequate for the WWTP. However, facility needs at least one licensed operator.
Parcelas Borinquen (East Region)	1.5	During the evaluation period, the Facility Compliance is rated as poor. There was significant non-compliance in fecal coliforms, TSS removal and TSS concentration/month. The reason of the non-compliance parameters may be because one of the bioreactors is not working properly and the limitation of process control to perform adjustments. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. In addition, the WWTP has implemented a process control procedure for the Rotating Biological Contactor (RBC) biological treatment. However, the procedures are not tied to the process data collected, which does not provide guidance on what modifications in the operation needs to be made based on the analytical data. After hurricane Maria in 2017, new lighting system and facility fence has been improved. In contrast, Equipment manuals are not available, O&M manual not updated, no calibration plan and no control room. Also, no additional security available and access roads, facility appearance and housekeeping / grounds keeping need improvement. Overall equipment / maintenance is rated as poor. Some major equipment is in bad condition including the degritter unit which has no mechanical equipment, one RBC with missing biological film element, and corrosion in the secondary clarifiers. The facility receives sludge waste in an open area from pipe cleaning conducted by PRASA brigades. The solids are dry and collected in dumpster for final disposal. That area is not designed for septage receiving tanks purposes. The SDBs have been repurposed for the Geotube. The polymer for the sludge to be dewatered is applied online but not able to take samples to assure the correct polymer doses application. Non-potable water tank is in place. The NPW needs to be manually start when water is needed. Lastly, the facility has corrective maintenance challenges, no procedure to prioritize repairs, no As-built drawings available and overall appearance deficient. The training is adequate for this facility and its operating hours. However, the facility needs at least one licensed operator. Also, Supervisor & Manager need help.
Vega Alta (North Region)	1.5	During the evaluation period, the Facility compliance is rated in the lower end of adequate. There were minor non-compliance in the following parameters: BOD Concentration, Dissolved Oxygen, TSS Concentration and Residual Cl. The Facility's operations and process control is rated as barely adequate. The operators perform the necessary sampling, following SOPs, for adjustments to process. However, O&M manuals not updated, equipment manuals and SDS's incomplete, no ERP and no calibration plan for chemical pumps. Also, some lab equipment damaged, no potable water meter, no control room, no additional security available and the women's bathroom needs repairs. Finally, NPW out of service, roads need improvements, debris & old equipment laying around affecting housekeeping and grounds keeping and overall appearance deficient. Overall equipment / maintenance rating is poor. The equipment is in poor conditions. The screening is deficient, mechanical screens out of service. Comminutor and Degritter out of service for years. Lift station pumps disconnect switches are damaged. One of the package plants (Contact Stabilization) is out of service. Dewatering is deficient, currently using temporary centrifuge and NPW system out of service. Also, corrective maintenance challenges and difficulty to assigned WO and schedule priorities. The Facility needs at least on at large licensed operator to cover vacation, sick & reduce overtime. Also, staff training needs refreshers, confined space, due to delays by COVID-19 situation.
Vega Baja (North Region)	1.5	During the evaluation period, the Facility compliance is rated as borderline adequate. There was significant non-compliance in Phosphorous and several minor noncompliance in: BOD Concentration, TSS Removal %, and TSS Concentration. The Facility's operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. However, equipment manuals were not available, no jar tests being performed to establish coagulant dosage and no odor control system. Also, facility illumination is poor and needs frequently maintenance personnel to cut the grass and maintain grounds. Lastly, Facility has EGU to provide power for entire plant. Overall equipment/maintenance rating is poor. Several equipment damaged or in need of repairs such as: Manual screen broken; one mechanical screen out of service; mixing

WWTP	2020 Score	Observations
		system of nutrient removal tank is out as well as one of the polymer pumps. Also, one lift pump out, entire degritter system out, some of the RBC mechanical equipment is out and three of the floating aerators of the Anoxic/Aerobic train are out as well as one mixer. In addition, one blower out, disc filters are out, aerobic digester mixing system is out and UV system is out. Lastly, there are corrective maintenance challenges and contractor issues. Facility needs maintenance personnel for housekeeping & at least another Licensed Operator or At large operator to reduce overtime and cover vacations/sickness. Staff needs training refreshers, delayed by COVID-19.
Morovis (North Region)	1.5	During the evaluation period, the Facility compliance is rated as poor. There were significant exceedances in TSS concentration and removal, caused by problems with decanter actuators and blowers from SBR. Adding to that, some filters were out of service. This situation caused accumulation of solids in the effluent. Also, minor exceedances in BOD removal. The general operation and process control of the plant are adequate. The operators perform the necessary sampling to adjust the process. However, equipment manuals not at facility; the ERP and O&M need to be updated; SDS need to be visible; bathroom facilities are not adequate for ladies, and the fence around the plant needs to be repaired. Also, some pipes not colored appropriately, no additional security, and facility needs housekeeping and improvements to illumination. Overall equipment / maintenance rating is in the lower end of adequate. Several of the equipment needs improvements, such as: BNR Blowers; mixers for BNR and Digester need to be replaced; mechanical bar screens are working with problems; and filters are out of service. Also, conveyance/washer from degritter system is out, (1) submersible pump on equalization tank is out. The staffing and training are adequate for the operation of this facility and its operating hours.
Guánica (South Region)	1.6	During the evaluation period, the Facility compliance is rated as adequate. However, several parameters' exceedances in fecal coliform, TSS and residual Cl. The supervisor indicated that the dewatering system, clarifier tanks and screening system were out of service or working in bad conditions during this period and attributed these non-compliances to solid overload at the thickener tank operation. The facility operation and process control were rated as adequate. The operators perform the necessary sampling, following SOP's for adjustment to process. The emergency generator has capacity to operate entire plant. However, WWTP lab needs jar test and cleaning equipment upgrade. Also, there is no potable water meter nor control room and there is equipment debris that needs removal. Finally, access roads, fence (including gate) and illumination need improvement. Overall, the facility equipment and maintenance were rated as adequate. However, the equipment component was barely adequate. The influent wet pit needs to be repaired, one mechanical screen and two degritter units are out of service, and one lift pump is out as well. Also, the following deficiencies were observed: primary clarifiers concrete structure has cracks, and two out of the six units are out; the traveling bridges in primary clarifiers with heavy corrosion, as well as the weirs and pipelines; two sludge pumps and a grinder out of service; several blowers out of service; and a thickener unit is out of service and has not worked for years. Similarly, the control panel room from the dewatering system is in bad condition and electrical equipment located in a room that floods. Likewise, one of the belt filter press is out of service as well as one of the sludge pumps and one of the effluent vertical pumps. Also, the effluent pump station has structure cracks, and its control panel is in bad condition. Lastly, one of the NPW pumps is out and there are corrective maintenance (delays) and procurement process challenges. The training is adequate for this facility but need to complete the programmed hazwoper training. Staffing needs at least a licensed operator and a TA for effectively attending the facility's operating hours.
Unibón (North Region)	1.7	During the evaluation period, the Facility compliance is rated as barely adequate. Several parameters exceed their limits. Dissolved Oxygen (DO) non-compliance results were due to the low quality of the influent at that period. This situation affected the DO of the waterfall in the discharge channel. Coliform fecal % non-compliance was caused by the cleaning made by the operator in the contact chambers area days before the samples were collected. Nitrite and Fluoride non-compliance causes are unknown. The facility Operation and Process Control was rated as barely adequate. The operators perform the necessary sampling to adjust the process. At the time of the visit, O&M and ERP were not updated, SDS was not visible for visits, lab equipment was not adequate for the necessary samples, and there is no ventilation in the laboratory. Also, there is no NPW system, no control room, bathroom facilities need an upgrade, and some debris were laying around. Finally, there is no additional security in the WWTP, and access road and illumination need improvement. Equipment and maintenance were rated in the lower end of adequate (below 2.0). Significantly, is the fact that only one package plant is operational. The circular package plant is not operating due to problems in some components and corrosion in the clarifier mechanism. Deterioration is evident as both package plants need improvements for a better operation. SDBs roof need improvements.

WWTP	2020 Score	Observations
		Also, no As-built drawings available. The staffing and training are adequate for the operation of this facility and its operating hours.
Patillas (South Region)	1.7	During the evaluation period, the Facility compliance is rated as poor. There were minor non-compliance in DO, BOD removal %, BOD concentration, TSS removal % and TSS Concentration. The BOD and TSS exceedances were caused by some reparations made in the clarifier tank. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. However, during the visit O&M manual was incomplete and not updated, the equipment manuals are incomplete and there is no NPW System. Also, general safety was not adequate due to Corrosion and cracked structures, there was no control room, no additional security, damaged fence and facility needs housekeeping improvements. Adding to that, the facility needs some improvements. Overall equipment / maintenance rating is adequate but in the lower end (Below 2.0). However, comminutor in the influent area is not in place, grit removal system is out of service, and sludge drying beds needs improvements and a better maintenance. Also, some structures need improvements. The staffing and training are adequate for the operation of this facility and its operating hours.
Naranjito (North Region)	1.8	During the evaluation period, the Facility compliance is rated as good. However, it had several parameters with interim limits or only monitoring. It only had significant non-compliance with TSS Removal %. The Facility operations and process control rating is poor. Although the operators perform the necessary sampling to adjust the process and no coagulant added thus no Jar test performed. However, equipment manuals were not available/used, O&M manuals not updated, and emergency numbers not posted. Also, lab equipment not adequate and chemicals not properly stored; lab needs improvements. In addition, Plant does not have a control room or additional security and access road and housekeeping need improvements. Facility has adequate emergency power. Lastly, Facility is operating below half of design capacity, which could create process control / operational issues. Overall equipment / maintenance rating is borderline adequate. However, in pretreatment, the bar screens need constant cleaning, lot of debris and one degritter is clogged. Two secondary clarifiers out of service and in bad shape overall. Several units although operating show signs of deterioration and corrosion and no effluent flow meter. Lastly, some corrective maintenance challenges. No procedure to prioritize repairs and no As-built drawings available. Staffing and training is unacceptable. Need to complete operator license certification for non-licensed operator and have continue training for staff. For its operating hours, Plant needs another licensed operator and maintenance staff.
Maricao (West Region)	1.8	During the evaluation period, the Facility compliance is rated as poor. Significant non-compliances in BOD Removal % and minor exceedances in DO, BOD Concentration, fecal coliforms and TSS Removal %. In addition, there was an exceedance for residual chorine which is under an interim limit. Facility personnel mentioned that low BOD concentration of the influent makes the percentage of removal very challenging. The Facility's operations and process control is rated as good. The operators perform the necessary sampling to adjust the process. No coagulant added thus no jar test is performed. Facility has adequate emergency power, and it is tested regularly. However, O&M manuals are the originals from the plant and have not been updated, no NPW system and no control room. Overall equipment / maintenance rating was adequate. The facility presented a significant improvement compared to the last inspection performed in 2017. A complete rehabilitation project for the package plant was completed in 2018. However, the dewatering system has some corrosion and sand filters need improvements. In addition, dry sludge hauling is not performed regularly, which limit the capacity of sludge discharge into the sludge drying beds and affect the plant operations. The training is adequate for this facility and its operating hours. However, delays in refresher trainings are being experienced due to COVID-19 situation. Also, the plant can benefit of an additional license operator since the at large is covering two plants (Las Marias, Maricao). Finally, no STS staff and paying private for services.
Jayuya (North Region)	1.9	During the evaluation period, the Facility compliance is rated as good. This facility complies with most of the compliance parameters except for Phosphorus removal which exceeded once during the evaluation period. The Facility operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. However, the O&M Manual and ERP not updated and the access to the plant is deteriorated. Also, there is no control room (only partial) and housekeeping needs improvement. Lastly, during the inspection, a lot of chemical drums were found without the proper containment and not in a storage area. Overall equipment / maintenance rating is borderline adequate. The facility has major equipment out of service including the comminutor, two lifting pumps, and two rotors of the oxidation systems. The lifting pumps are

WWTP	2020 Score	Observations
		critical for the treatment and only one is operating and has problems with leaking grease and noisy pulley belt. The liquid chlorine is added in line, but the flow meter is not working; not flow paced. Lastly, there are corrective maintenance challenges and no procedure to prioritize repairs. The staffing needs at least one licensed operator and a TA to efficiently operate this facility and its operating hours. The training is not adequate.
Lares (North Region)	1.9	During the evaluation period, the Facility compliance is rated as adequate. It had minor non-compliance in each TSS, TSS removal % and BOD removal %. The events were isolated and not related to a specific operational issue. The facility operations and process control is rated as adequate. The Operators perform the necessary sampling to adjust the process as per the process control manual. Jar testing is performed in a weekly basis. The EGU is tested automatically every week and biweekly by maintenance personnel. However, the equipment manuals were not available, the O&M manuals and ERP not updated and there was no control room. Lastly, no additional security available and access roads, housekeeping and overall appearance need improvement. Overall equipment / maintenance rating is rated as borderline adequate. However, some major equipment was out of service including the secondary clarifier, one Trickling biofilter and several blower units. In addition, some of the equipment showed significant corrosion. Major safety and housekeeping concern in the plant headworks, specifically, the degritter area. The degritters have no fall protection and the access area is not adequate. Lastly, effluent flow meter out of service, maintenance management done manually and no procedure to prioritize repairs implemented. The staffing and training are adequate for this facility and its operating hours.
Adjuntas (South Region)	1.9	During the evaluation period, the Facility compliance is rated as barely adequate. It had significant violations in Residual Cl, mostly due to difficulty meeting the new stringent limit. Also, there were minor exceedances in Fecal Coliforms and ammonia. The Facility's operation and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. However, O&M manual is not updated and there is no equipment manual available on site. There is no NPW system, no control room and some pipelines colored / labeled inadequately. Also, no additional security and landscaping needs improvement. Overall equipment / maintenance rating is in the lower end of adequate. There is visible corrosion in several of the equipment. Package Plant structure needs improvements. The training is adequate for the facility and its operating hours. However, additional licensed operators are needed.
Las Marías (West Region)	1.9	During the evaluation period, the Facility compliance is rated as adequate but below 2.0. However, it has minor exceedances in Nitrates and BOD Concentration, and significant non-compliance in Residual Cl, even under an interim limit. The Facility's operations and process control is rated as adequate. The operators perform the necessary sampling to adjust the process. No coagulant added thus no jar test is performed. However, O&M manuals are the originals from the plant and has not been updated; equipment manuals not on site; not all compliance records were on site, although they were requested; and no control room, partial only. Also, no additional security available; broken fence; inadequate illumination; power failures affecting EGU; and needs better housekeeping/grounds keeping. Facility has adequate emergency power. Although, the facility has internet and phone service the connection is very poor. Finally, facility is only treating 25% of the plant's capacity, which could result in operational issues. Overall equipment / maintenance rating is in the lower range of adequate. The equipment aspect is barely adequate. Package plant has significant deterioration and corrosion. Structural evaluation of package plant is recommended. Dry sludge hauling is not performed regularly, which limit the capacity of sludge discharge into the sludge drying beds and affect the plant operations. EGU storage room has significant roof leaks. There are some corrective maintenance challenges and no As-builts drawings on site. The training is adequate for this facility and its operating hours. However, delays in refresher trainings are being experienced due to COVID-19 situation. Also, the plant can benefit of an additional license operator since the at large is covering two plants (Las Marias, Maricao). Finally, no STS staff and paying private for services.

4.2.2.4 Wells

PRASA has reported that it owns and operates 249 water wells, most of which deliver water directly into a distribution system with little or no treatment, except for disinfection by chlorination. PRASA's wells vary in size from 100 to 1,200 gallons per minute (gpm). Twenty (20) wells (equivalent to 8% of total wells) from the

Operational Areas of Arecibo, Toa Alta, Bayamón, Carolina, Cayey, Humacao, Guayama, Coamo, Aguadilla and Mayaguez were inspected in FY2020. Each assessment consisted of a site visit inspection and an interview with the designated personnel. The results of the assessment of those wells are described below. The facilities were evaluated using the following criteria: facility specific and regional specific criteria. The facility specific evaluation criterion considers operations, process control and equipment aspects, which are related to a specific facility. The regional specific criterion considers maintenance aspects which are carried out either on a regional or operational area basis and, also, the staffing and training aspects. Staffing and training was 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 assigned a weighting factor of 25%.

The inspection results for previous years were compared to the inspection results from the 2020 inspection to analyze condition changes. **Table 4-8** illustrates the comparison of the average rating for 2009 through 2020 of all facilities using the overall rating since the equipment evaluation was merged with the operations/process control criterion. This merged criterion was performed using the same deductions and weighted score than previous asset condition assessment reports thus the impact on the overall score was not altered. Out of the 20 wells inspected, two received a rating of Unacceptable, four were rated as Poor and the rest were rated as Adequate, under overall rating. The wells rated as Unacceptable or Poor include: Levitown 4 (Unacceptable) Plata 1 (Unacceptable), Bauzá, Plata 2, Campanillas 6 and San Felipe. Furthermore, it is important to point out that even though only six wells were rated as Poor or Unacceptable, eight (equivalent to 40% of the wells inspected) of the 14 wells rated in the Adequate range received an overall rating below 2.0 and, if left unattended, their condition could deteriorate downgrading their rating to Poor or Unacceptable rating in the future. Of particular note is the condition of the Levittown 6 and Voluntarios wells, which were barely Adequate (1.6).

Table 4-8. Wells – Comparison of Average Inspections Results for 2009-2020

Criteria	2009	2010	2012	2014	2015	2017	2018	2019	2020	Change 2020 vs. 2019
Overall	1.9	2.1	2.2	2.2	1.9	1.8	1.7	1.9	1.6	-0.3

In general, the average results decreased when compared to the 2019 results. Although most wells were generally observed to be in Adequate condition, there were several factors that resulted in 70% of inspected wells receiving a lower score and rating.

In general, the facility specific deficiencies noted were due in part to deterioration in equipment conditions. According to the inspection performed the most notable deficiencies were:

- 65% of the wells are not remotely monitored;
- 50% of the wells have corroded pipelines, valves and fittings;
- 40% of the wells have inadequate well head sealing and missing bolts;
- 25% of the wells do not have waste line properly colored;
- 10% of the wells have leaks;
- 10% of the wells have well head not above 12"; and

- 55% of the inspected wells do not have an EGU.

The observed deficiencies in terms of the Regional evaluations for Arecibo, Toa Alta, Bayamón, Cayey, Humacao, Guayama, Coamo, Aguadilla and Mayaguez Operational Areas for potable water systems, which were rated as Poor, were the following:

- Insufficient staff
- Unavailability of O&M/vendor manuals
- Unavailability of As-built drawings
- Maintenance parts inventory inadequate
- Challenges in the parts procurement process
- Lack of training

In addition to the above common deficiencies observed the Humacao and Toa Alta Operational Areas indicated the lack of a procedure to prioritize repairs and lack of written procedures to handle emergencies, as deficiencies. Likewise, in Cayey and Mayaguez Operational Areas one other deficiency was observed, the lack of plan to implement major improvements.

The other operational area evaluated, Carolina, did not have an operating well, therefore, four wells were evaluated from the Bayamón Operations Area.

The average rating of the evaluated wells was borderline Adequate, and if unattended, could fall to Poor or Unacceptable rating in the future. Furthermore, as much as 30% of the wells visited were rated as Poor or Unacceptable in the facility criteria and deterioration has been observed through the years since there has not been capital improvements. Also, the regional evaluation average rating was Poor and PRASA should look to mitigate some of the deficiencies cited herein. Nevertheless, 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 well facilities inspected. This lack of backup power compromises the quality of service to PRASA's clients, making the potable water supply an intermittent one during events of electrical power problems. Also, corrosion was a repeated observation in several wells. Notwithstanding, most of the deficiencies noted can be addressed through PRASA's R&R program and may not require major capital improvements. Note, however, that financing of PRASA's R&R program has also been negatively affected given PRASA's fiscal situation. In terms of operational deficiencies, the lack of monitoring of 65% of the wells evaluated in this year's assessment is of concern, since the quality of the product (safe potable water), could be compromised in the future if no action is taken.

Furthermore, 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. Currently, PRASA continues the groundwater under the direct influence (GWUDI) of surface water program. Results of the GWUDI evaluations currently being conducted by PRASA should 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.

4.2.2.5 Water Pump Stations

PRASA has reported that it owns and operates 1,060 WPSs and an additional 70 raw water pump stations. 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 visit inspection and an interview with the designated personnel. The results of the assessments of those stations are described below. Similar to wells, the facilities were evaluated using facility specific and regional specific criteria, in order to have a better understanding about the facility's conditions and obtain an overview of the maintenance and staffing practices of the region/operational area with the same weighing factors assigned to each criterion.

The average WPSs overall rating resulted in Poor with a rating of 1.2. 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. Five facilities, Cerro Candelero II (East Region, Humacao), Romero and Paso Seco (South Region, Coamo) and Cuba and Plata 1 (West Region, Aguadilla) were rated Unacceptable under the Facility category. In addition, 13 facilities were rated as Poor under this category, these included: Barrazas 3, El Gandul and Escorial, all from the Carolina Operational Area (Metro Region); Abras and El Conjunto, both from the Toa Alta Operational Area (North Region); Cerro Marquez (North Region, Arecibo); Cercadillo 3, Cercadillo 4 and Cercadillo 5, all from the Cayey Operational Area (East Region); Terminal Sur (East Region, Humacao); and Villa Santa Catalina and Barrio Cruz, both from the Coamo Operational Area (South Region). Furthermore, it is important to point out that besides the 17 WPS rated as Unacceptable or Poor in overall rating, eight facilities received an overall rating below 2 and, if left unattended, their condition could deteriorate, downgrading their rating to Poor or Unacceptable in the future. Moreover, in contrast with previous assessments, the overall Regional Evaluation of Operational Areas was rated as Poor.

The inspection results for previous years were compared to the inspection results from 2020 inspection to analyze performance changes since the previous inspections. **Table 4-9** illustrates the comparison of the average rating of all facilities by each category evaluated. The overall average rating of each evaluation criteria for 2009 through 2020 is also presented.

Table 4-9. WPSs – Comparison of Average Inspections Results for 2009-2020

Criteria	2009	2010	2012	2014	2015	2017	2018	2019	2020	Change 2020 vs. 2019
Overall	2.2	2.3	2.4	2.2	2.2	2.3	1.7	1.7	1.2	-0.5

As shown in **Table 4-9**, the overall rating decreased to Poor compared to the 2019 results, which continues the deteriorating trend as no capital or R&R investments have been implemented in the last few years.

There were several factors that resulted in the 57% of the WPSs being rated Unacceptable or Poor and 62% of the Adequate rated facilities being in the lower end. According to the inspections performed, some of the most notable deficiencies include the following:

- 63% of the facilities were observed to have leakage with severity ranging from minor to severe;
- 60% 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;
- 50% of facilities visited had at least one pump out of service;
- 40% of the facilities visited lacked remote monitoring;
- 40% of the facilities visited did not have a flow meter;
- 27% of the facilities visited did not have a low pressure suction alarm/pump shut-off on control panel
- 27% of the facilities visited lacked pump's elapsed time meters;
- 20% of the facilities visited had a control panel not labeled adequately; and
- 20% of the facilities visited had an unsatisfactory appearance.

The observed deficiencies in terms of the Regional evaluations for Arecibo, Toa Alta, Bayamón, Carolina, Cayey, Humacao, Guayama, Coamo, Aguadilla and Mayaguez Operational Areas for potable water systems, which were rated as Poor, were the following:

- Insufficient staff
- Unavailability of O&M/vendor manuals
- Unavailability of As-built drawings
- Maintenance parts inventory inadequate
- Challenges in the parts procurement process
- Lack of training

In addition to the above common deficiencies observed the Humacao and Toa Alta Operational Areas indicated the lack of a procedure to prioritize repairs and lack of written procedures to handle emergencies, as deficiencies. Likewise, in Cayey and Mayaguez Operational Areas one other deficiency was observed, the lack of plan to implement major improvements; and in Carolina Operational Area, the lack of coordination between PRASA and contractors.

The WPSs rating decreased significantly to a Poor condition (1.2), that is a (-0.5) decreased compared to the 2019 results, which continues the deteriorating trend as no capital investments or R&R investments have been implemented in the last year. Note that 17 facilities (57% of the evaluated facilities) were rated as Unacceptable or Poor. Nevertheless, they are expected to continue to serve their intended function of delivering drinking water throughout the distribution systems, but the intended function could be impacted if improvements are not performed in the near future. The deficiencies noted are related to lack of features to optimize O&M practices, and condition of equipment of facilities. Other noted deficiencies, such as leaks, and overgrown vegetation can be addressed through routine maintenance or PRASA's R&R program and do not require major capital improvements. The most significant deficiencies observed were, the lack of an operating EGU and different severity of leaks and corrosion in the facilities, followed by pumps out of service, then the lack of flow meters, the lack of remote monitoring of the facilities, and lastly the lack of low-pressure suction alarm/pump shut-off on control panel, the lack of pump's elapsed time meters and unsatisfactory appearance of facilities.

4.2.2.6 Wastewater Pump Stations

PRASA has reported that it owns and operates 846 WWPSs, these vary in pumping capability 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 FY2020. Each assessment consisted of a site visit inspection

and an interview with the designated personnel. In general, 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 criteria and regional specific criteria, in order to have a better understanding about the facility's conditions, and obtain an overview of the maintenance, training and staffing practices of the regional/operational area. One criterion considers operations, process control and equipment aspects, which are related to a specific facility. The other criterion considers maintenance aspects, which are carried out either on a regional or operational area basis and, also, 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 assigned a weighting factor of 25%.

Out of the 20 WWPSs inspected, 15 received an overall rating of Adequate, five received an overall rating of Poor and none were rated Good or Unacceptable. The facilities rated as Poor included: Troncal Cayey (East Region, Cayey); Dorado Regency (North Region, Toa Alta); Sierra Taína (Metro Region, Bayamón); Villa Pulga (South Region, Coamo) and Moca Parque (West Region, Aguadilla). 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 WWPs. Therefore, highlighting this criterion, the WWPSs rating distribution for this evaluation period is as follows: none Unacceptable, five Poor, 14 Adequate, and one Good. In addition, this inspection cycle had more Operational Areas in the Regional Evaluation category rated in the Poor range.

In addition to the facilities rated as Poor in the Facility criterion, although rated as Adequate in that criterion, five WWPSs (equivalent to 25% of WWPS inspected) 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: Vistamar Marina and Moroco, both from the Carolina Operational Area (Metro Region), Olimpo and Los Recreos, both from the Guayama Operational Area (South Region) and El Hospital (West Region, Mayaguez).

The inspection results for previous years were compared to the inspection results from 2020 to analyze the performance**. Table 4-10** presents the comparison of the average rating of all facilities by each category evaluated. The overall average rating of each evaluation criteria for 2009 through 2020 is also presented.

Table 4-10. WWPSs – Comparison of Average Inspections Results for 2009-2020

Criteria	2009	2010	2012	2014	2015	2017	2018	2019	2020	Change 2020 vs. 2019
Overall	2.0	2.0	2.1	2.3	2.4	1.8	1.8	1.9	1.7	-0.2

The overall condition of WWPSs slightly decreased to barely Adequate, compared to the 2019 results. There has not been a significant improvement, which can mostly be attributed to the lack of investment recent years.

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

- 90% of the facilities visited were not remotely monitored;
- 70% of the facilities visited had its exhaust fans out of service, missing or operating in manual mode;

- 60% of the facilities visited had floating solids or debris in pump pit
- 55% of the facilities visited lack exterior or interior audible alarm;
- 50% of the facilities visited had signs of corrosion on pump, piping, valves or fittings;
- 30% of the facilities visited had bar screens not properly cleaned;
- 20% of the facilities visited had recorded overflows during the evaluation period;
- 20% of the facilities visited did not have an EGU or it was out of service;
- 20% of the facilities visited had security fence damaged; and
- 15% of the facilities visited had inadequate exterior or interior illumination

The observed deficiencies in terms of the Regional evaluations for Arecibo, Toa Alta, Carolina, Bayamón, Humacao, Coamo, Mayaguez and Aguadilla Operational Areas for wastewater systems, which were rated as Poor, were the following:

- Unavailability of O&M/vendor manuals
- Challenges in the parts procurement process; very slow
- Maintenance parts inventory inadequate
- Lack of procedure to prioritize repairs
- Lack of sufficient maintenance tools
- Maintenance parts inventory inadequate
- Unavailability of As-built drawings
- Inadequate training
- Insufficient staff

The other operational areas evaluated, Cayey was rated in the lower end of Adequate (1.8) and had some of the previously mentioned deficiencies with no staffing needs and two new deficiencies: lack of coordination between owner/contractor and facilities not visited daily. The latter was also an additional deficiency in the Arecibo Operational Area. As for the Guayama Operational Area, which was rated as Adequate (2.3), had similar deficiencies but no staffing needs.

Overall, the WWPSs are in Adequate to Poor condition. However, the facilities inspected decreased in overall average rating compared to FY2019 to barely Adequate. In past years, there has been a trend on increase deterioration due to the lack of capital improvement invested, as a result of the fiscal situation, and compounded with the damages caused by the 2017 Hurricanes. While only 20% of the visited facilities had recorded overflows during this evaluation period, it is still of concern. Even though most of the visited facilities had an EGU, 20% were reported out of service, resulting in overflows still being reported. Therefore, this problem can be attributed to the fact that 90% of the facilities visited are not remotely monitored, 55% of the facilities do not have an exterior alarm, and 5% had pumps out of service, among other potential issues. Having remote monitoring will help PRASA prevent overflows in the System and adding a comminutor (grinder type) to those facilities which receive vast amounts of solids would help maintain the 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 but they are addressing the WSTs and WPSs first, thus the WWPS are lagging.

4.2.2.7 Water Storage Tanks

PRASA has reported that it owns and operates 1,557 water storage tanks (WSTs) that vary in storage capacity (size) from 100 to 10,000,000 gallons. A total of 31 water storage tanks (2% of total tanks) were inspected in FY2020. Each assessment consisted of a site visit inspection and an interview with the designated personnel. The results of the assessments of those stations are described below. **Table 6-1** summarizes the two evaluation categories and corresponding weighting factors used in the evaluation of water storage tanks, same as the previous inspections. As with wells and WPSs, the facilities were evaluated using facility specific criteria and regional specific criteria, in order to have a better understanding about the facility's conditions, and obtain an overview of the maintenance, training and staffing practices of the region/operational area with the same weighing factors assigned to each criterion.

Out of the 31 WSTs inspected, 26 received an overall rating of Adequate and five were rated as Poor. The facilities rated as Poor included: Metropolis and Barrazas 3 (Metro Region, Carolina); Río Jüeyes (South Region, Coamo); Cerro Candelero II (East Region, Humacao); and 1 Millón (North Region, Arecibo). Furthermore, it is important to point out that although the average overall rating was in the adequate range (1.9), 11 WSTs (equivalent to 35% of tanks inspected) received an overall rating below 2.0. Moreover, 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. Therefore, highlighting this criterion, the WSTs rating distribution for this evaluation period is as follows: one Unacceptable, four Poor, 16 Adequate, and 10 Good.

The inspection results for previous years were compared to the inspection results from 2020 inspection to analyze performance changes since the previous inspections. The overall rating was in the adequate range, with an overall rating of 1.9. **Table 4-11** illustrates the comparison of the average rating of all facilities by each category evaluated. The overall average rating of each evaluation criteria for 2009 through 2020 is also presented.

Table 4-11. WSTs – Comparison of Average Inspections Results for 2009-2020

Criteria	2009	2010	2012	2014	2015	2017	2018	2019	2020	Change 2020 vs. 2019
Overall	1.6	1.6	1.9	2.4	2.3	2.4	1.9	1.9	1.9	0.0

On average, the overall rating remains the same, in the lower end of Adequate, compared to the 2019 results. WSTs do not have that much equipment, so they do not deteriorate at the same rate as wells or WPS but recently we have observed more signs of concrete deterioration, cracks, bugholes, spalling than previous years. Notwithstanding the slower deterioration process, there were still five WSTs (16% of inspected tanks) were rated as Poor in FY2020. In addition, five of the 11 WSTs rated as adequate in overall rating but below a 2.0, were borderline adequate in the facility criterion and, if left unattended, their condition could deteriorate downgrading their rating to Poor or Unacceptable in the future. These facilities are: Cercadillo 4 WST (East Region, Cayey), Niagara WST (South Region, Coamo), Vigia II and Montesoria WSTs (South Region, Guayama) and Maravilla Este 2 WST (West Region, Mayaguez).

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

- 61% of the tanks visited do not have a high/low level alarm;

- 48% of the tanks visited have deteriorated concrete walls, with cracks ranging from minor to moderate degree; and have roof surface defects
- 42% of the tanks visited had poor exterior or interior lighting
- 39% of the tanks visited did not have a local level indicator;
- 32% of the tanks do not have adequately secured access hatches
- 29% of the tanks visited have an unsatisfactory appearance and did not have emergency numbers posted
- 26% of the tanks visited are not remotely monitored and had walls with spalling and bugholes
- 23% of the tanks visited have minor to moderate degree leakage; had some degree of corrosion; and are not visited daily
- 16% of the tanks visited had overflows and had security issues

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

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

The WSTs are generally in Adequate condition and are expected to continue to serve their intended function of providing potable water storage throughout the distribution systems. The most significant deficiencies observed were lack of high/low level alarm, minor to moderate roof surface defects, minor to moderate cracks, lack of local level indicator, poor exterior or interior illumination, minor to moderate leaks, lack of remote monitoring, emergency numbers not posted, overflows, and lack of adequately fitted/ locked access hatches. 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 leakage through walls were observed in 23% of the visited tanks.

In addition, remote monitoring is recommended as an optimization measure and as a preventative measure against water losses in the distribution system; consequently, PRASA had started with this initiative, providing remote monitoring to those tanks that have been identified as critical in the distribution system. Although PRASA's Operational Regions are at different stages of WST visualization level achieved, some at more advanced than others, all have established goals to reach high levels of WST visualization and will continue implementation until reaching 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 provide some discussion regarding indirect indicators of the condition of buried infrastructure. PRASA uses a Geographical Information System (GIS) database to allow for a better control, record, and management of its buried assets. In addition, PRASA's Operational Regions via the R&R program continue improvements of the buried infrastructure, as their assigned budget allows. Potable water pipe breaks and wastewater collection system leak-prone areas are identified by PRASA's Operational Areas, and their repairs prioritized according to the severity of the problem.

4.3.1 Water Meters

PRASA owns over 1.4 million water meters ranging from 1/2 to 12 inches in diameter. As reported by PRASA, about 738,000 small meters (1-inch in diameter or less) and over 5,500 large meters (greater than 1-inch in diameter) were replaced between FY2009-FY2020 However, due to PRASA's current fiscal situation the implementation of the initiatives included in the Revenue Optimization Program have been slowed down and the meter replacement program is on hold. About 6,724 small meters and 108 large meters were replaced during FY2020 to address maintenance, theft, or special client requests.

One of the main initiatives included in the 2020 PRASA Fiscal Plan is to implement a P3 Project to modernize PRASA's metering system, enhance customer service activities and customer satisfaction, improve billings and collections, and reduce NRW. Through this project, PRASA will reactivate its meter replacement initiative, utilizing advanced metering technology.

4.3.2 Water Distribution System

Based on the latest published PRASA Accountability Report (1st trimester of FY2016), PRASA owns over 14,753 miles of water pipelines, which include both transmission and distribution pipes with sizes ranging from two inches to 84 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, as well as rehabilitation to reduce leakage, even more so considering the impact of the 2017 Hurricanes and the 2020 Earthquakes.

NRW is water that has been produced but is not billed to customers. However, not all NRW is due to water losses. As shown in the water balance summary presented in **Figure 4-1**, 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 is in turn composed of unbilled metered and unbilled unmetered consumption which includes 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 for washing and cleaning PRASA's tanks and sanitary pipelines, tanker trucks for communities with deficient water service, firefighter's usage, water used for compliance sampling for the DOH, dewatering to alleviate pressures and allow for repairs, etc.

Following the industry's recommended NRW data analysis and reporting, PRASA is reporting NRW in terms of volume 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 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.

Table 4-12 provides a summary of key water distribution system metrics since FY2012, including current estimated levels of water production, water losses, and NRW, as reported by PRASA. PRASA's NRW levels have declined from FY2012 through FY2017. However, in FY2018 and FY2019 NRW increased due to the 2017 Hurricanes, the 2020 earthquakes and other factors which extended into FY2020, including the COVID-19 pandemic and the lack of material investment in R&R.

System Input Volume (Dispatched Water)	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water
			Unbilled Unmetered Consumption	
	Water Losses	Commercial Losses (Apparent Losses)	Unauthorized Consumption (theft)	
			Customer Metering Inaccuracies	
			Data Handling (Billing) Errors	
		Physical Losses (Real Losses)	Main Line Leakage	
			Storage Tank Overflows	
			Service Connection Leakage	

Source: American Water Works Association and International Water Association

Figure 4-1. Water Balance Summary

Table 4-12. Water Losses and Non-Revenue Water

Fiscal Year	Total Water Production (MGD)[1]	Water Losses (MGD)	Non-Revenue Water (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	547	342	349
FY2020	539	329	336
Difference FY2020-2019	**-8**	**-13**	**-13**
Cumulative Difference FY2012-2020	**-108**	**-52**	**-63**

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

As shown in **Table 4-12**, from FY2012 to FY2020, PRASA reports to have reduced the amount (volume) of water produced (108 MGD reduction), amount of water losses (52 MGD reduction), and NRW (63 MGD reduction). In FY2020, of the total 539 MGD produced, approximately 336 MGD was NRW, a slight decrease over FY2019 results (349 MGD). Of this amount of NRW, 329 MGD was due to water losses (both apparent and real) and 6.93 MGD was due to unbilled authorized consumption. Of the total amount of water losses in FY2020, approximately 52 MGD was due to apparent (commercial) losses, while approximately 278 MGD was due to real (physical) losses. According to the 2020 PRASA Fiscal Plan, PRASA's goal is to reduce water losses by 41 MGD by FY2025 by successfully implementing the Water Recovery Office's (WRO) three main programs: Master Meters[10], Pressure Management[11] and Leaks Detection and Reduction[12].

Since FY2012, PRASA began measuring the Infrastructure Leakage Index (ILI) which is an indicator that is used to measure the level of physical losses in the water distribution system. More specifically, 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 is 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[13] 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 1.06 to 4.45, with a median of 2.20[14]. 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 then slightly increased to 12.16 in FY2019. In FY2020 PRASA reported an ILI of 11.31 which constitutes a decrease of 7% from FY2019.

PRASA has been calculating 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 to do so, a high amount of estimation takes place, 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., water production meters, tank water levels, systems' pressures).

PRASA attributes the FY2020 reductions in NRW 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.

[10] Master Meters: accurately measuring water production by the installation of water meters at critical facilities.

[11] Pressure Management: incorporating pressure management best practices across the transmission and distribution network.

[12] Leaks Detection and Reduction: improving identification, prioritization and resolution of major leaks across PRASA assets,

[13] Source: Alegre, H. Hirner, W., Bapista, J., and Parena, R. (2000). "Performance indicators for water supply services" IWA Manual of Best Practices.

[14] Source: 2019 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

Notwithstanding the recent improvement in NRW, PRASA's level of NRW is still higher than the average utility benchmarks results. 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 4.48 to 16.92 gallons (median of 8.91) and from 22.12 to 86.13 gallons (median of 38.87)[15], respectively.

PRASA recognizes that reducing its NRW and water losses volume and, in turn, its water production, will have positive effects on not only its operations, but also on its financial results (lower O&M expenses and higher revenues, for example), and on its sustainability practices. Therefore, reducing NRW is one of the top priorities and is one of the main objectives of the 2020 PRASA Fiscal Plan.

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 2020 PRASA Fiscal Plan, PRASA's goal is to reach a metered reading of 80% of the water production by the end FY2021. Measuring the most amount of water production increases the credibility of the results and decreases the probable over estimation 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

As shown in **Table 4-13**, leaks reported in FY2020 amounted to 55,723. **Table 4-13** also shows the average annual leaks occurrence per 100 miles of water piping for recent fiscal years. The total annual reported leaks for FY2020 increased approximately twenty-two percent compared to FY2018. The previous increasing trend observed over FY2015 and FY2016 shifted for FY2017 and FY2018. However, Arcadis has not made an independent evaluation to identify the root causes of this recent decrease. For FY2018 part could be attributed to the 2017 hurricanes that impacted the island, a period when PRASA refocused efforts to recovery activities and other more critical matters. As such, in FY2019, after the normalization of PRASA's operations the annual reported leaks went back up twenty-six percent. Yet, in FY2020 the trend went back down by four percent, which may be an impact of the COVID-19 pandemic and people not reporting as frequently.

Despite the recent decrease trend, 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 9.7 and 38.6, with a median of 21.6)[16]. 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. Aging infrastructure is another contributing factor to the high rate of leaks in addition to the decrease of funding available for pipeline R&R.

[15] Source: 2019 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

[16] Source: 2019 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

Table 4-13 Reported Leaks from FY2015 to FY2020

Fiscal Year	Total Annual Reported Leaks	Annual Leaks per 100 miles Using 14,753 miles of Water Pipeline
2015	63,503	430
2016	62,079	421
2017	54,810	372
2018	45,873	311
2019	57,997	393
2020	55,723	378

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

[1]Water pipeline total length used for previous fiscal years (FY2011-FY2014) was 14,031 miles.

The average weekly reported and repaired leaks per fiscal year, as well as the percentage of repaired leaks with respect to the number of leaks reported in each fiscal year are shown in **Figure 4-2**. For FY2020, PRASA reports an average of leaks per week of approximately 1,067. Comparing the weekly reported leaks in each fiscal year, it can be observed that from FY2015 to FY2018, the weekly reported leaks decreased annually by approximately 4%, 10% and 15%. Then it increased from FY2018 to FY2019 by approximately 26% and again decreased by 4% from FY2019 to FY2020. The same trend is observed with the weekly repaired leaks. Also, the percent leaks repaired decreased to 97% from FY2019 to FY2020.

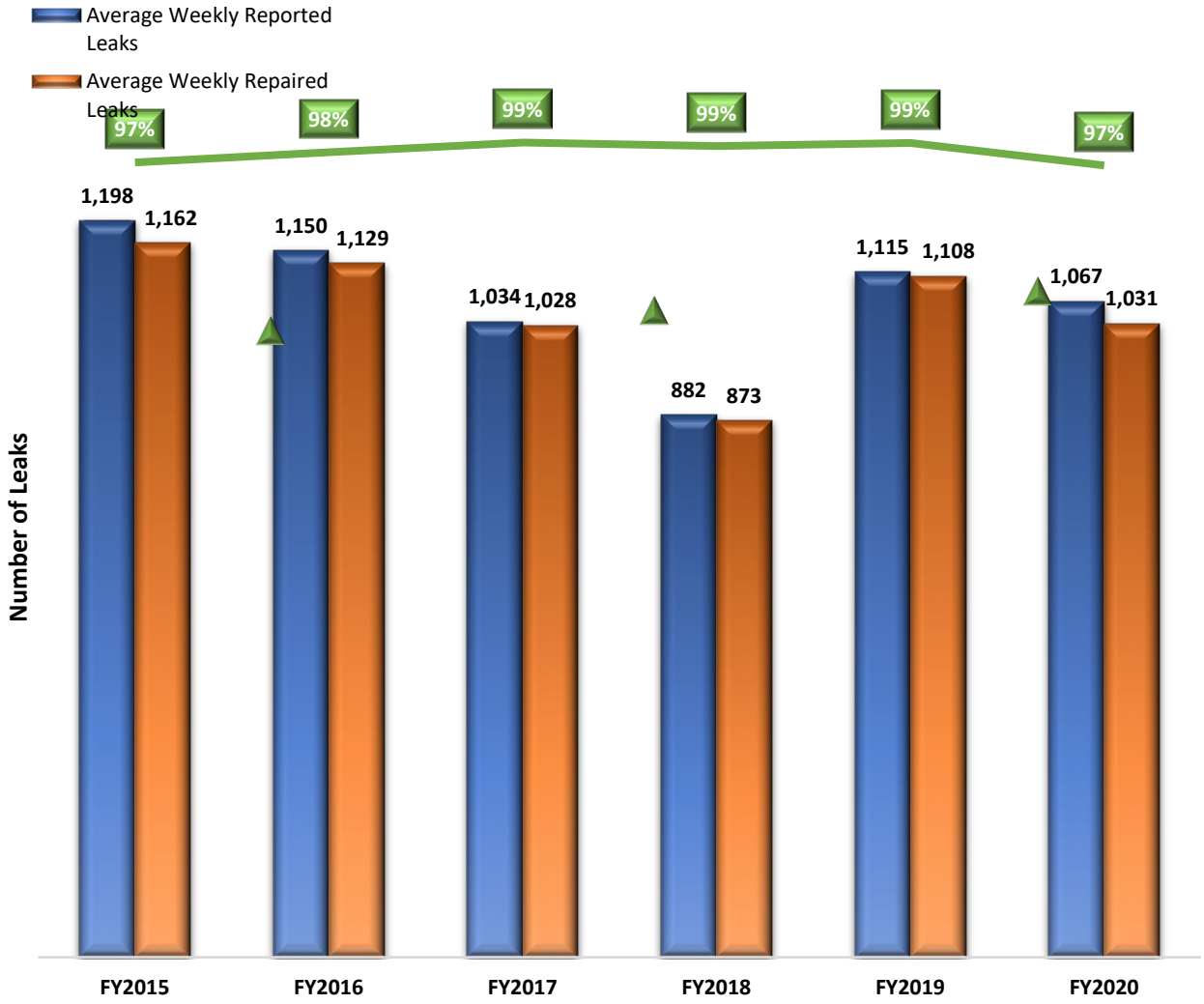

Figure 4-2. Island-Wide Weekly Average Leaks Reported and Repaired

Figure 4-3 shows the active leaks with duration greater than seven days before being repaired for recent fiscal years. In FY2016 the number of leaks with duration greater than seven days was reduced to a total of 2,698 pending leaks with duration greater than seven days and 54 weekly average pending leaks with duration greater than seven days. Furthermore, in FY2017 the number of leaks with duration greater the seven days was significantly reduced to a total of 365 pending leaks with duration greater than seven days and 8.1 weekly average pending leaks with duration greater than seven days. However, the month of June 2017 data was not available. For FY2018, not enough data was obtained to generate a good trend for the year since the only data available was from March 2018 to June 2018. This was mostly due to the impact of the 2017 hurricanes and the recovery efforts, damage to the communications infrastructure and the fact that the responsible personnel were temporarily relocated to attend the more urgent recovery and restoration of the System. For FY2019 the number of leaks with duration greater than seven days significantly increase to a total of 13,291 pending leaks with duration greater than seven days and 288.9 weekly average pending leaks with duration greater than seven days. Lastly, in FY2020 the number of leaks with duration greater than seven days was similar to FY2019, with a total of

13,360 pending leaks with duration greater that seven days and 334 weekly average pending leaks with duration greater than seven days.

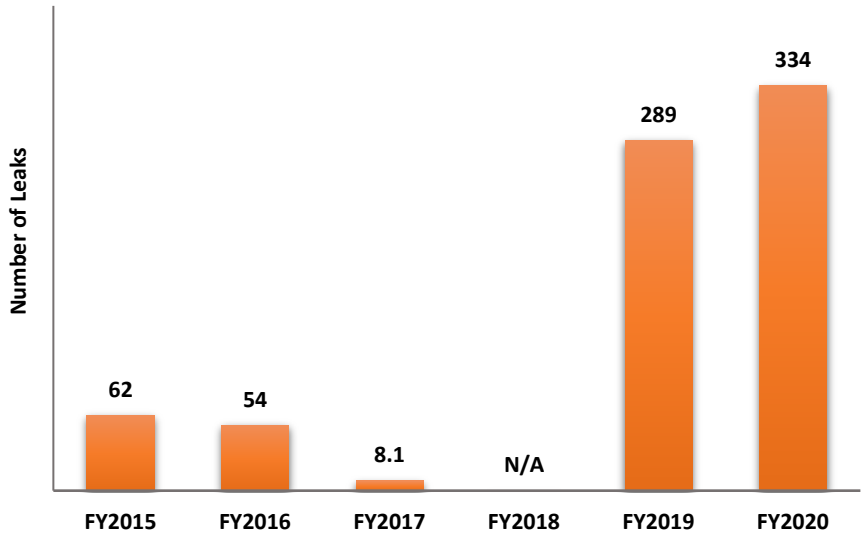

Figure 4-3. Island-Wide Weekly Average Pending Leaks with Duration >7 Days

Table 4-14 provides a summary of the average repaired leaks per working day and average backlog for recent fiscal years. Based on the weekly average pending leaks and weekly average pending leaks with 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, not enough data was obtained to generate a good trend for the year 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, continued increase in effectiveness is expected. Also, hidden leaks have a negative impact in the average backlog days for pending leaks.

Table 4-14. 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
2015	434	62	232	1.9	0.3
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	4.3	1.6

[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 as a measure 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 consequently help with tank overflows.

4.3.3 Wastewater Collection System

PRASA owns approximately 5,994 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, as well as rehabilitation (replacement) to reduce inflow and infiltration and overflow occurrences and to address the impacts of the 2017 Hurricanes and 2020 Earthquakes.

4.3.3.1 Overflow Monitoring and Control

As shown in **Table 4-15**, PRASA indicates that overflows reported in FY2020 were 27,289. Data is not available regarding 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 are an indicator of leaking sewers, storm water 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 FY2020, an average of 455 overflows per 100 miles of sewer were reported, as in FY2019. There was an increase of total annual reported overflows of about 6% from FY2015 to FY2016, which could be due to an increase in the actual number

of overflows occurrences, an increase in the number of people reporting overflows (as a result of PRASA's communication initiatives and increased social media presence), the additional pipeline miles included in the analysis or a combination of the three. However, in FY2017 and FY2018, there was a decrease in reported overflows of 5% and 16% when compared to FY2016 and FY2017, respectively. In FY2019, there was an increase of 16% in reported overflows, which could be due to the 2017 Hurricanes impact to the buried infrastructure and WWPSs. Again, as with the increase in FY2015 and 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. Notwithstanding, 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 0.6 and 4.6 overflows, with a median of 2.1)[17]. 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).

Although the number of sanitary overflows is 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, and adding pre-treatment (screens, comminutors) and preventive maintenance to facilities would help lessen overflows.

Table 4-15. Reported Overflows from FY2015 to FY2020

Fiscal Year	Reported Overflows	Annual Overflows per 100 miles Using 5,994 miles of Wastewater Pipeline
2015	28,569	477
2016	29,991	500
2017	28,510	476
2018	23,819	397
2019	27,253	455
2020	27,289	455

Source: PRASA SAP (Commercial) Database

PRASA's average weekly reported and repaired overflows per fiscal year for recent fiscal years are shown in **Figure 4-4**. For FY2020, PRASA reports an average of approximately 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 when compared to FY2016 and continuing the decrease trend, a 15% drop from FY2018 to FY2017. 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 when compared to FY2018. Lastly, in FY2020 an average weekly reported overflows decrease of 1% was observed when compared to FY2019. Also shown in **Figure 4-4** is

[17] Source: 2019 AWWA Utility Benchmarking: Performance Management for Water and Wastewater.

the percentage of repaired overflows with respect to the number of overflows reported in each fiscal year, FY2020 remained at 100%.

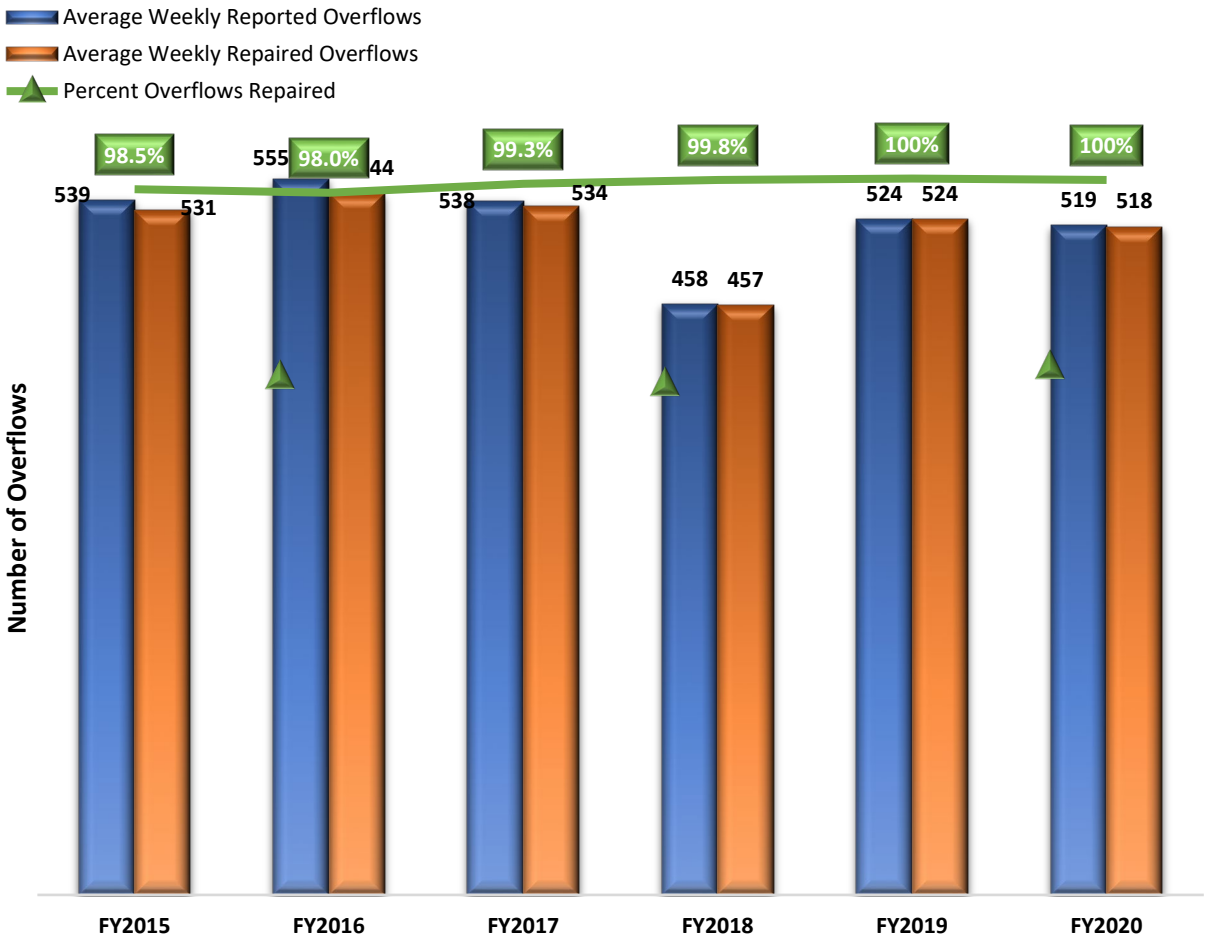

Figure 4-4. Island-Wide Weekly Average Overflows Reported and Repaired

Figure 4-5 shows the pending overflows with 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 duration greater than seven days of about 30%. Conversely, in FY2017, there was a decrease of 62% in the weekly average pending overflows with duration greater than seven days. For FY2018, not enough data was obtained to generate a good trend for the year since the only data available was from March 2018 to June 2018. This 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. This could be due to slow recovery process and non-repaired impact to the buried infrastructure and WWPSs as a result of the 2017 Hurricanes and 2020 Earthquakes. However, Arcadis has not made an independent evaluation to identify the root causes of this increase. Lastly, in FY2020 there was a slight decrease of 6% in the weekly average pending overflows with duration greater than seven days compared to FY2019.

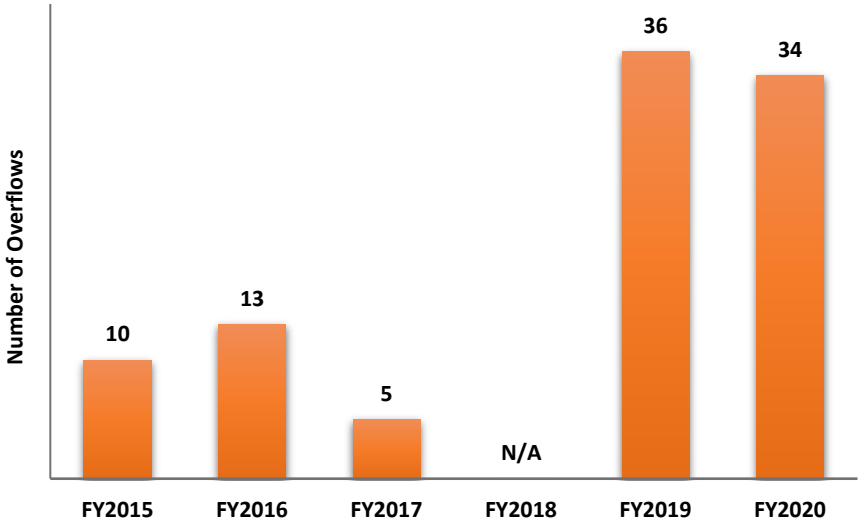

Figure 4-5. Island-Wide Weekly Average Pending Overflows with Duration >7 Days

Table 4-16 provides a summary of the average repaired overflows per working day and average backlog. As shown, in FY2016 and FY2017, PRASA reported a decrease 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 as well as the backlog of pending overflows with 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 in a timely manner has continued to improve year after year since FY2015, particularly those with duration greater than seven days, except for FY2016. For FY2018, not enough data was obtained to generate a good trend for the year 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 continue with 146 average weekly pending overflows. Similarly, the backlog of pending overflows and the backlog of pending overflows with duration greater than seven days improved by 8% and 8.5%, respectively.

Table 4-16. 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
2015	108	10	106	1.0	0.09
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

[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 have a positive impact on overflows. Fortunately, the COVID-19 pandemic did not impact overflows as it did leaks.

4.4 Conclusions

Table 4-17 presents a summary of the overall rating results for the 181 facility inspections completed by Arcadis between January and September of 2020. Of the inspected facilities, eight were Regulated dams and 72 (40%) were treatment (WTP and WWTP) facilities. The data indicates that only 1% of the facilities inspected in FY2020 are in the Good range and 73% are in the Adequate range. However, almost half of the facilities rated as Adequate were scored below 2.0 and, if unattended, the condition of these facilities could continue to deteriorate and fall to Poor or Unacceptable rating in the future. Furthermore, 25% of the facilities are in the Unacceptable to Poor range.

The greatest current concern continues to be the physical condition of the facilities, which have not received CIP or R&R investments to improve their conditions due to the fiscal situation and budget limitations compounded by the damaged caused by the 2017 Hurricanes and to some degree, mostly in the South Region, the 2020 earthquakes. In addition to the physical condition, the staffing/training criterion is also impacting the overall rating of the facilities. This criterion was mostly affected by the migration of staff as consequence of 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 4-17. 2020 vs 2019/2018 Asset Condition Inspections Results Summary

Asset Category	Unacceptable		Poor		Adequate		Good		Total	
	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018
Dams	0	0	4	2	4	5	0	1	8	8
Asset Category	**Unacceptable**		**Poor**		**Adequate**		**Good**		**Total**	
	2020	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**
Water Treatment Plants	0	0	1	0	41	35	2	0	44	35
Wastewater Treatment Plants	0	0	8	9	20	11	0	0	28	20
Wells	2	0	4	3	14	13	0	0	20	16
Water Pump Stations	4	0	13	12	13	15	0	4	30	32
Water Storage Tanks	0	0	5	6	26	30	0	4	31	40
Wastewater Pump Stations	0	0	5	5	15	21	0	4	20	30
Total	**6**	**1**	**40**	**35**	**133**	**125**	**2**	**12**	**181**	**181**
Percent of Total	**3%**	**0%**	**22%**	**20%**	**73%**	**72%**	**1%**	**7%**	**-**	**-**

Comparing the assessment results by asset category with those of the FY2019 condition assessment for treatment plants (WTPs and WWTPs) and FY2018 condition assessment for Dams, negative changes were observed for Dams and WWTPs. Also, overall rating for ancillary facilities decreased to different degrees for wells, WPS and WWPS.

Overall, the condition of PRASA's regulated dams is rated as Adequate to Poor. Many of the recommendations from the 2018 and prior inspections saw little or no progress, which resulted in the overall depreciation of ratings all across the board, and on all of the inspected dams. Four were rated as Poor and four as Adequate. Furthermore, all dams appear to have deteriorated to varying degrees since the last inspection was performed. Exceptions being made for some actions that took place thanks to PRASAs Integrated Maintenance Program, many of PREPAs recommendations, and most recommendations issued by Arcadis in the 2016 and 2018 Reports, were not addressed. We also found that the Integrated Maintenance Program, while commendable, has a generalized difficulty in keeping up with the maintenance needs of PRASAs dam portfolio.

Condition ratings of each regulated dam could be improved by addressing the outstanding PREPA priority action items, as well as other deficiencies noted in this report. With attention to these items, the large dams will have a greater level of safety and can be expected to continue to play their vital role in the water supply system. Lastly, Arcadis generally recommends that PRASA addresses past and present recommendations as documented in the

past inspections performed by Arcadis and PREPA; that as-built (or record) drawings and basis of design information be located and maintained for easy retrieval and reference, as it should be reviewed to evaluate its compliance with current dam safety design standards; each dam should have an updated O&M Manual and EAP; and an SMP should be prepared for each dam. In particular, special consideration should be given to maintaining the dams' instrumentation and keeping records of its readings for further evaluation, strengthening of its Integrated Maintenance Program and the development of targeted rehabilitation actions to meet the needs of the critical aspects of these structures, the development of Potential Failure Modes Analysis for each dam, and investing in training in dam safety for all relevant PRASA staff. Additionally, for specific dams: for the Loíza Dam, Arcadis recommends a comprehensive climbing inspection of all gates, with emphasis on its trunnion supports; for the Río Blanco Dam, unless there is a compelling reason to do so, it is recommended that the passive relief wells not be connected together; for the Toa Vaca Dam, it is recommended an underwater inspection be conducted within the stilling basin to check for scour which may have been caused by the 2017 Hurricanes.

Overall, the WTPs are mostly in Adequate condition and, 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 potable water supply in compliance with applicable regulations. Facility ratings decreased in staff/training criterion compared to the 2019 inspections and still remain in the lower end of the scoring range (score below 2.0) for equipment/maintenance and operations/process control criteria. The greatest concern continues to be the physical condition of the facilities, which continues to deteriorate year over year evidenced by the lack of the capital improvement and R&R programs due to the fiscal situation and budget limitations. Even more so after the damaged caused to the treatment facilities by the 2017 Hurricanes. Regarding the compliance, even though 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 progress of corrective measures, among others.

The WWTPs generally range from Poor to Adequate condition in overall rating, with equipment/maintenance as the category of primary concern. Out of the 28 facilities inspected, eight (29%) received an overall poor rating and 20 (71%) received an adequate rating, with six of those eight facilities with a poor rating in terms of equipment/maintenance. 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.

Regarding ancillary facilities, the facility criteria rating of WPSs deteriorated significantly to Poor, while wells 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 WPS but recently we have observed more signs of concrete deterioration, cracks, bugholes, spalling than previous years. Moreover, although concrete deteriorates at a slower rate it 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 their STS systems and make the necessary improvements so that when the NPDES interim/monitoring limits are lifted, they have the necessary tools and conditions to meet the permanent limits established in each WTP's NPDES permits. In addition, PRASA should continue to standardize processes and providing more tools and training to operators regarding process controls and actions to facilitate and improve plant operations and performance, as well as optimize O&M expenses. Moreover, PRASA should consider operational improvements including new process control equipment and system automation considering that operators continue to depend on manual operation for several processes. Also, based on the ratings and interviews to the operational staff during the site visits, it is evident that the lack of treatment plant operators is a concern. Also, as mentioned, there are other staffing needs 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 drive the reduction in the volume of water production, water losses, and in NRW reported. Furthermore, the 2020 PRASA Fiscal Plan WRO initiatives: pressure management and optimization; water leak reduction (reported and unreported); WST overflow avoidance; and data quality improvement (reduce estimation) should help reduce physical water losses. Moreover, the provision of meters or mechanism 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, and adding pre-treatment (screens, comminutors) and preventive maintenance to facilities would help lessen overflows.

Considering the size and complexity of the System, it is reasonable to state that the System will continue to require significant capital investments and continuous maintenance and repairs. Also, it is likely that, as the System continues to age and as new compliance regulations are implemented, additional O&M budget may be necessary to address maintenance and repairs and compliance matters. PRASA's updated six-year CIP as included in the 2020 PRASA Fiscal Plan certified by the Oversight Board, includes all adjustments resulting from negotiations with the regulatory agencies and damage from the 2017 Hurricanes and 2020 Earthquakes. Nevertheless, it is envisioned that no capital projects will move forward until the necessary funding sources are allocated.

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 are 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 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 adequately accommodate resulting needs. These CIP needs, as negotiated or as currently being negotiated with Regulatory Agencies, 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. Complement that with the detrimental impact caused by the 2017 Hurricanes, the 2020 Earthquakes, and improvements are needed to repair, modernize and/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 that the CIP will be reactivated during FY2021 and some of the issues highlighted in this report will start to be addressed.

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 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

There were several WTP and WWTP facilities that 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 are generally delivering potable water adequately, but some WWTPs are facing challenges due to process control or equipment issues.

PRASA should consider operational improvements including new process control equipment and system automation given that operators continue to depend on manual operation for several processes. Also, standardization processes and providing more tools and training to operators on process controls and actions to facilitate and improve plant operations and performance, as well as optimize O&M expenses. Furthermore, there is still room for further improvement with respect to prioritization, scheduling, and execution of corrective and routine maintenance activities, and optimization and strengthening of the System (through permanent rehabilitation projects).

Despite of all the challenges faced by PRASA since FY2017 due to the 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 the production of safe drinking water and treatment of wastewater in compliance with applicable regulations.

5.3 O&M Costs

Over the past five fiscal years, PRASA's O&M expenses have fluctuated from $635M in FY2015 to $689M (prior to expected reimbursement from the 2017 Hurricanes) in FY2019, mostly from the increase on 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 FY2020 O&M expenses preliminary projection for the water and wastewater system (combined) prior to expected reimbursements from the 2017 Hurricanes is approximately $721M, of which $641M are directly related to the O&M of the System. The other $81M 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 FY2020 approximately 73% of its System's O&M budget ($468M) was allocated to the water system and the remaining 27% ($173M) to the wastewater system. Estimated costs per million gallons (MG), per customer account and per 100 miles of pipe for combined utilities operations are summarized in **Table 5-1** and **Table 5-2** below. A comparison to benchmark values is also provided.

Table 5-1. PRASA FY2020 O&M Water System Budget Benchmarks

Performance Indicator	FY2020 PRASA	2019 AWWA Benchmark Median[1]
Cost per Account[2]	$379.00	$428.00
Cost per MG Processed[3]	$2,379.00	$2,468.00
Cost per 100 miles of pipe[4]	$3,144,527.00	$2,891,000.00
Total O&M System FY2020 Results	$468M	-

[1]Source: 2019 AWWA Utility Benchmarking: Performance Management for Water and Wastewater. Values are rounded.

[2]Based on number of accounts at the end of FY2020 of 1,233,191 (water accounts) and 762,894 (wastewater accounts).

[3]Based on FY2020 total production and distribution of approximately 539 million gallons per day (MGD) of potable water.

[4]Based on 14,883 miles of water pipeline.

Table 5-2. PRASA FY2020 O&M Wastewater System Budget Benchmarks

Performance Indicator	FY2019 PRASA	2019 AWWA Benchmark Median[1]
Cost per Account[2]	$227.00	$378.00
Cost per MG Treated[3]	$2,290.00	$2,489.00
Cost per 100 miles of pipe[4]	$2,886,220.00	$2,868,950.00
Total O&M System FY2020 Results	$173M	-

[1]Source: 2019 AWWA Utility Benchmarking: Performance Management for Water and Wastewater. Values are rounded.

[2]Based on number of accounts at the end of FY2020 of 1,233,191 (water accounts) and 762,894 (wastewater accounts).

[3]Based on FY2020 total treatment of approximately 207 MGD of wastewater.

[4]Based on 5,994 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 below.

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 4,600 employees by FY2025 (with no vacant positions) as presented in the 2020 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, 2020 it has not been approved and remains under evaluation by the Oversight Board.

As for PRASA employees benefits during FY2020, vacation and sick leave time were restored to 30 days and 18 days per year, respectively.

Also, PRASA followed a competitive process for the medical plan services for its employees to comply with the Oversight reductions of health plan costs starting on July 1, 2020. The process resulted in a new health coverage for PRASA employees with changes in benefits and deductibles.

Lastly, the HR Department ongoing initiatives include:

- Updating and developing KPIs that adjust to HR Department changes.
- Continue the utilization of System Applications and Products in Data Processing (SAP) to manage Health Plan Insurance information.
- Contractor working on employees' compensation studies to evaluate salary scales; however, this initiative could not be completed. It is on PRASA's agenda for FY2021.

New initiatives of the HR Department for FY2021 are:

- Perform employee compensation study to evaluate salary scales.
- HR Department along with Compliance Department created the Safe Return COVID-19 Plan. Plans were created specifically for each facility (Approx. 300 plans were approved). There still some pending for approval.
- Explore and evaluate alternatives to promote remote work under Act 36, which could require an audit and evaluation of the labor unions agreements after presenting to PRASA's Governing Board.

Material changes occurred within the HR department after the end of the FY2020, as PRASA's September 4, 2020 request to increase Headcount by 49 positions up to 4,649 employees was met with no objection by the FOMB in a letter dated September 30, 2020. However, they advised PRASA to closely monitor overtime spending levels to comply with payroll expense in the Budget.

5.4.1.2 Customer Services

PRASA's Customer Service Department continues to focus on measuring and implementing metrics to further improve the following: invoicing, collections, billing adjustments, customer service complaints, service

interruptions, service quality, meter actual reading, and waiting time in commercial offices as well as in the call center.

PRASA operates 12 commercial offices with an average rate of 1,200 people per day visiting the offices for invoice payments and service requests before the COVID-19 pandemic. Since offices reopened, visits are now scheduled appointments and there are approximately 960 appointments available daily. Aside from the commercial offices, PRASA has two private call centers currently under contract until the end of FY2021. An RFP for call center services is currently under revision and PRASA's target is to select one to three companies in 2021, with start date in July of 2021 when current contracts are due to expire.

The Customer Service Department has been impacted by COVID-19 this fiscal year due to office closures and not being able to read the meters throughout March through June of 2020 or disconnect customers for lack of payment per Governor's legal ordinance (Act 39-2020). The KPI of 92% measured meters was not achieved. Also, due to the restrictions of in-person visits, the use of Call Centers has increased and consequently exceeded the contracted amount. But not all has been impacted negatively. The COVID-19 pandemic has also affected the way payments are being received, customers have been able to find new ways of paying their bills such as, banks, small pharmacies, online, etc.

Current inventory of 5/8" meters typically used for residential and commercial customers is estimated at about 1,500 and is being used strictly for new service connections or critical replacements. Due to the fiscal situation and waiting for resolution and execution of a potential P3 Project Agreement, PRASA is limiting purchases of meters to 5,000 units each purchase order for emergencies or leaks, etc. During FY2020, 15,000 meters were acquired. Inventory will continue to be replenished as necessary until the P3 Project Agreement is executed and the private partner that will assume all responsibilities for meter replacements is fully transitioned.

The department's ongoing initiatives are summarized below:

- Revision of Customer Service Protocols for alignment with the most recent version of Regulation 8901 are currently on hold because of the 2020 earthquakes and COVID-19 pandemic. It is now expected to be completed by the end of FY2021.
- Awaiting on funding for the acquisition of new TPLs (handheld computers). Currently there is a significant number of TPLs that are not working, therefore field work data is being recorded on paper. About 200 units have been replaced of the 550 TPLs needed for the whole department.

The department's new initiatives include:

- Implementation of a new Interactive Voice Response (IVR) for customer services (includes a virtual call back system.) The program is in testing phase and is expected to be implemented by January 2021.
- 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.
- Work on an RFP to perform a study (analysis) on a new Rate Structure. It is projected that the RFP will be ready by December 2020. The target is to have the Rate Structure analysis completed by the end of the FY2021, to allow for PRASA's Governing Board approval, public hearings process, FOMB review and approvals, etc. and have the structure in place by July 2022 (FY2023).
- Design and develop a tool for KPIs tracking.
    - Develop a project to read government accounts (water consumption) accurately.

These last two initiatives are on hold due to the P3 project (expected now for FY2021).

5.4.1.3 Purchasing and Logistics

PRASA's Purchasing and Logistics Department continues to operate mainly from the central administration building, although certain purchasing and logistics personnel are permanently assigned to the regions. As of the date in the Disclaimer of this Report (September 30, 2020), the Rehabilitation works commenced in the Ponce Warehouse but were not completed because of the COVID-19 pandemic. A small storage area in Yauco was improved and converted to serve as a small warehouse and improvements to the warehouse yards in Aguadilla, Humacao and Carolina are in process.

The Materials Requirement Planning (MRP) is fully operational at Aguadilla, Puerto Nuevo and Trujillo Alto Storage Warehouses and Distribution Centers. This system automatically sends purchase orders (POs) once the inventory has reached certain amount of inventory. Also, PRASA is modifying the system to limit repetitive POs and to buy those materials in bulk, thus streamlining the process and saving time and money.

Two updates to the SAP System were completed during the FY2020. The approval process for the Insurance Department was included in the PO tracking; before the tracking was all through emails and using Excel tables. Another update was to include the tracking for rejected POs. Through this process when a PO is rejected the system requires a comment be entered in SAP and this is sent via email to the manager copying the originator of the PO. The tracking of the rejected PO is recorded in SAP.

By June 2020, Procedure 400 for purchases was revised to comply with Act 73-2019. By said date Procedure 399 was also adopted to address emergency purchases independently from Procedure 400 for Purchases.

Purchases adhere to the following:

- From $0 - $10,000: requires three quotes and only needs approval by the different regional managers (with the revision of Procedure 400 "*Rapiditas*" were eliminated).
- 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 Ren/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 (*Solicitud de Pedido*). Fiori allows users to access SAP, and create and approve POs, look at stock in warehouses, perform warehouse management, etc. through a mobile unit. With full implementation of Fiori, Lotus Notes was eliminated in May 2020. Also implemented was the requirement for funds to be available in the right account to be able to process warehouse "reserves".
- The Inventory Labeling by product initiative continues implementation.
- The process to track the whereabouts of chlorine gas cylinders (150lbs &1-ton) in SAP has been completed. The cycle will be tracked from the original shipment from provider to Puerto Nuevo WWTP for storage, to each WTP and back for refill. The tracking commenced in April 2020. Not all cylinders are in the system because they have not been refilled since April 2020.
    - It is expected that by the beginning of calendar year 2021, all cylinders should be in the system.
    - This tracking will also help know the age of the cylinders to be able to keep a track and implement first in first out.

The department's new initiatives include:

- Commence warehouse management in Ponce and Arecibo (Bar Code)
- Create a new system to measure metrics (KPI), since improvements to SAP implemented in September 2020 allow for more tracking in different areas.
    - Supervisor and Insurance Department, both can be tracked.
    - Continue evaluating performance of new system.

The COVID-19 pandemic has impacted the department in many ways. At the beginning of the pandemic, it was a challenge to find all the materials for disinfecting the offices, masks, and gloves to provide staff adequate protection. Improvements to the office workspace were required and an office work plan was developed. Also, improvements to the warehouses had to be made to comply with social distancing protocols.

Furthermore, other COVID-19 adjustment activities include:

- Currently, the inventory for protective materials is very solid, and a bid is in process for additional safety and disinfecting supplies to maintain a stock for 2 years.
- The department invested in laptops and/or moved employee's computers to their homes to allow remote work.
- Site visits are still required for some bids and the department has established safety protocols to ensure the safety of all.

5.4.1.4 Systems and Information Technology

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

During FY2020 the following initiatives and programs were implemented:

- Lotus notes was eliminated at the end of FY2020 and replaced by Fiori which is a program that is user friendly. Fiori is an SAP based program.
- SAP improvements
    - Integration of SAP with QPLUS, which is a software that utilizes an android platform. The implementation within the Preventive Maintenance Department is expected by October 2020. Also, underway is the replacement of the handheld computers (tablets) used in the field to generate orders with either a Honeywell or Sonim Handheld.
    - SAP HANA went live in October 2019 as expected.
    - SAP Single Sign-On initiative will facilitate and reduce the use of multiple passwords which result on less 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.
    - Business Warehouse - BW 4 HANA is a SAP tool to obtain real time reports. Expected to be completed by December 2020.
    - Developing for P3 project
        - SAP HANA is in place
        - Low power wide area network. Developed in Europe, new technology in Puerto Rico. PRASA evaluated the technology; pilot tests were successful with SIGFOX.

- Arin Application that provides internet redundancy has not been implemented yet. The routers have been bought and the software is complete. A consultant is currently working on this initiative, which is at approximately 90% and is expected to be complete by FY2021.
- The SAIA Application was completed during FY2018; however, the implementation contract is still pending due to an outstanding MOU between PRASA and the PR Fire Department. This application enhances the hydrants inspection process.
- P-25 Radios were acquired for communication during emergencies.
    - P-25 Radios work on a specific band for public safety and are located in strategic areas such as Offices of Emergency Management, PRASA's Main Building, and Municipalities with dams.
    - During FY2020, PRASA purchased 17 P-25 Radios for the following sites: PRASA's Main Building, West Regional Operations Office (Sultana del Oeste), South Regional Operations Office (El Tuque), North Regional Operations Office (Arecibo Operations), East Regional Operations Office (Angora), La Plata Dam, Sergio Cuevas WTP, Carraízo Dam, Operations Carolina, Loíza Dam, Operations Trujillo Alto, Operations Toa Alta, Operations Dorado, Operations Bayamón, Guayabal Dam, Emergency Management Villalba, and Emergency Management Juana Diaz.
- Inventory initiative named "PRASEO", is the inventory of *Fixed Assets* within PRASA. The project went live during FY2020.
- Open Text is a repository for digitalized data or images that will allow SAP to run faster. The program has the capacity to store images, pdf, invoices, and other data and provide pointers (links) within SAP. The program has been implemented.
- PS and SAP Grants – will facilitate Grants management and disbursement (for Infrastructure and Finance Departments). Project is complete; pending test runs for full implementation, expected by December 2020.
- New Website initiative – Language was changed to increase security and make it easier to perform updates. This will also allow access to specific parts of the website without having to modify the entire structure. The website is in place and running live in a new portal.
- Dynatrace Software (Artificial Intelligence) initiative that will help to identify errors, diagnose, and fix performance issues and find the root cause analysis of the issues. The initiative was completed.
- Developing KPIs – First phase is complete. No other phases to be completed at this time.

PRASA's IT future initiatives include the following:

- SAP Analytic Cloud works like Microsoft Power BI, Real time analytics with forecasting and dashboards. Has been implemented and is in place.
- PCI – Payment Card Industry, a consolidation of all payment methods. Working on the certification and undergoing audits of processes and systems. Expected during FY2021.
- Q Order is a program like Q plus with end users being PMs and Customer Service. Pilot stage will be finished in the next months and expected to be accessible to everyone by the end of FY2021.
- Storage Infrastructure – The IT Department is in the process of changing how the information is stored in PRASA. An RFP is in process and expecting for implementation and migration to be completed by December 2020.
- 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 detail information of clients.

  - First phase of the initiative is expected to be completed during FY2021 and will integrate GIS, SIM, and SAP ISU.
  - Two more phases will be announced later and will be add to next year's initiatives.

- Network System – PREPA Net contract ends in November 2021. A bid for a new network provider is in process. The new provider needs to include upgrades to 1 GB WAN island-wide on all fiber optics circuits, access to the cloud (Microsoft and for PRASA), and 2nd Disaster recovery site, and no bandwidth charges.

Impacts to the IT Department because of COVID-19 have been minimal as they already had a remote work plan in place. However, it did cause an increase in workload and resulted in additional costs to set up VPN, laptops, and hotspots to provide remote access for employees in other PRASA departments.

5.4.1.5 Communications

PRASA's Communications Department has been focusing efforts on moving forward and improving the utilization of PRASA's website as well as the different social media platforms such as Instagram, Twitter, Facebook, and LinkedIn. There has been a substantial increase of followers for the social media platforms used. Due to the quick availability of information and images received through social media, it allows PRASA to respond faster to its customers. In addition, PRASA indicates that this has resulted in a positive impact on customers' perspective towards the service offered. PRASA is continuing to use social media as an educational platform by continuously sharing information on treatment processes, how their infrastructure works, among others. 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 on-going and resolution of operational situations. Press conferences and other events are also shared on social media. For the FY2021, 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. As noted above, PRASA's new website was launched in January 2020. All government agencies websites will follow the same template for consistency.

Two key positions for Educational Program and Webmaster are pending to be filled in FY2021.

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

- The posting of hurricane preparedness information during the hurricane season. The last day of the season is November 30.
- Social media presence is still on-going.
- Media/Press presence is still on-going.
- YouTube: PRASA has increased activity on their YouTube channel. Video editing software was purchased. Board meeting and videos used in social meetings are being uploaded.
- There has been greater integration of social media networks. For example, if a picture is posted on IG, then it is posted at the same time on Facebook and Twitter. They are working with IT Department to bid for a platform that will manage all accounts through one program.
- Educational events: all events and programs are on a hold because of COVID-19 pandemic.

- As an on-going program, the public can still sign-up online for education seminars.
- The Water Conservation Program and Educational campaign are on-going. The educational campaign is a joint effort among PRASA, DNER, and Emergency Response. PRASA uses the hashtags for social media: *GotaAGota Se Agota*. A new campaign for FY2021 will be released the last week of December 2020.
- Preparation of annual report that includes the activities performed in each region such as: interviews, community events, public notice, etc.
- Greater focus on publicity (e.g., press, engagements with the public, official government ceremonies, etc.) to reinforce the image of the corporation.
- All messages and comments posted by clients on social media platforms are addressed by PRASA. Each regional communications director is responsible of addressing posts.
- Fats, Oils and Grease (FOG) Program and Petroleum, Oil, Gas and Sand (POGS) Program campaign in multiple media platforms: social media, radio, PRASA website, radio, flyers, etc. This was a joint effort with the Compliance Department. This initiative lasted three months because of funding.

The Communication Department will begin new campaigns and continue some existing ones in FY2021. The programs originate in different departments and the Communications Department creates campaigns according to the needs of the other departments. Also, the 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 continues to maintain open channels of communication with Regulatory Agencies. The 2017 Hurricanes destroyed the PRASA Central Laboratory located in Caguas. Three years after those events, PRASA has been able to continue processing samples in the multiple mobile office trailer units that were installed as the temporary laboratory complex, and through subcontracting of 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 and the design/build phase for the construction of a new PRASA Central Laboratory has been awarded and construction is expected to begin in late FY2021. Until the new facility is completed, PRASA will continue using the temporary facility with some additional help from smaller scale laboratories. Regarding the smaller scale laboratories located at strategic points on the island, only PRASA Mayagüez Laboratory is operating normally. On the other hand, PRASA Camuy Laboratory is no longer in operations (does not meet standards). Therefore, PRASA started evaluating other alternatives such as the location of another laboratory in the Aguadilla area, but activity was placed on hold.

After the 2017 Hurricanes PRASA requested Force Majeure protection and a hold for ongoing and upcoming work, deadlines, and stipulated penalties with Regulatory Agencies. Furthermore, in FY2020 PRASA experienced the impact of earthquakes in the South Region and the COVID-19 pandemic exacerbating the challenging situation. Ongoing negotiations with USEPA and PRDOH are being conducted on a case-by-case basis. Further detail is included in Section 6 of this Report.

PRASA continues implementing several operational strategies and initiatives in the water systems to reduce DBPs, which they acknowledge to be the biggest compliance challenge at the time after the implementation of the Stage 2 Disinfectant By-Products Rule (D/DBPR). Complying with Stage 2 D/DBPR is more challenging 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. In the past, PRASA

performed water quality modeling to identify the root cause of these non-compliance events to establish corrective actions and implement control measures. Since FY2017, PRASA has developed an action plan to address DBP exceedances and, in FY2020, 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 FY2020, the following additional initiatives were integrated to create a more robust plan for DBPs control:

- Purchase of TOC equipment for systems with DBPs exceedances.
- Established a Process Control Program for DBPs.

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

As part of their efforts to comply with the requirements stipulated by the Regulatory Agencies regarding the optimization of preventive maintenance protocols and corrosion prevention, new opportunities to improve the preventive and corrective maintenance program are required to ensure the proper O&M of all critical facilities. PRASA began implementation of the Corrosion Control Plan with site visits conducted on September 3rd, 2019.

PRASA continues the implementation of the GWUDI program. PRASA has completed five priority evaluations and has performed Microscopic Particulate Analysis (MPA) in selected wells, initially identified at risk due to their proximity to superficial body of water or geological conditions, to further evaluate the potential of a well of being GWUDI. Results of the GWUDI evaluations currently being conducted by PRASA should prove beneficial to identify additional needs in these facilities. As of the date of this report, PRASA has completed wet and dry sampling of 96 wells consisting of the MPA assessment. Only two have been identified as GWUDI, medium and high risk. These two wells were disconnected from the System. Some of the wells identified with GWUDI potential were not sampled because they were out of service and/or have been eliminated. The program will continue with MPA sampling in FY2021.

As indicated by the Compliance Department, the implementation of the Sewer System Operation and Maintenance Plan (SSOMP) program for Puerto Nuevo WWTP, which includes mapping pipelines, cleaning and flushing program, assessment of System's condition, among others, is ongoing and the sewer cleaning of the High Priority Areas (lines greater than 30 inches in diameter) was delayed. This project is expected to be completed by the end of FY2021. The Compliance Department also reported that they continue with the

implementation of the FOG Program, performing monthly visits, delivering educational material, locating, and focusing areas prone to overflows, among others.

Also, in compliance with the consent decree requirements, PRASA continues the implementation of the Process Control System (PCS) at treatment facilities in accordance with 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. In FY2020 PRASA 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 the implementation of 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), which includes workshops, meetings, accident investigations and task risk assessments to improve O&M practices and employee safety. A delay in the development and implementation of the Health and Safety Plan occurred due to the significant 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. The EHS plan is expected to be submitted during FY2021.

New initiatives and upcoming regulations:

- USEPA proposal for Lead and Copper Rule came out in October 2019, which includes lower level, focus on schools, childcare facilities, public education, among others. Revision to the Rule is expected to be completed by 2020. Final Rule decision is pending. However, this could be a challenge for PRASA soon because there are no records of existing lead pipelines in Puerto Rico.
- Digitalization of compliance processes.
- EGU's emission permits; expected to be completed by the of FY2021.
- New communities to steer change:
    - Management & transportation of sludge – formed to evaluate actions and reduce cost of transport.
    - Chemical Control – formed to reduce chemicals costs.
    - Partial Automation - Formed to reincorporate the WTPs reduce operations (8-4-8-4).

Lastly, the Compliance Department is severely understaffed; along with the limitations of funding this has resulted on program 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 nine lawyers; down from 11 in FY2019, as two lawyers resigned under the pre-retirement programs. Also, for damages (Torts) and pre-judgements litigation related to insurance claims they use contracted external counsel. During FY2020, there were about 11 firms under contract to handle litigations. The department has various vacancies.

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.

Invoice objection and water theft litigations are managed through administrative proceedings, with an average rate of about 10 administrative hearings per day up until March 2020. Due to COVID-19, hearings were put on hold from March to July 2020, commencing again in August 2020. Hearings are from Tuesday to Friday and a maximum of seven hearings are schedule due to COVID-19 protocols. As for PRASA's financial debt negotiations and Fiscal Plan counsel, these are managed exclusively by external law firms.

The department reports that there has been a decrease in litigation cases, mainly due to the CIP continuing to be suspended as well as a decrease in claims in general. During FY2020, the legal department concentrated its efforts on existing litigation, mainly related to damages and prejudice claims, and some awarded bid appeals. Also, there were no criminal active cases and bankruptcies are usually handled by the Customer Service Department, but the department supports as needed.

The Legal Department is providing support and legal guidance in re-negotiations of Consent Decree stipulations, amendments and deadlines associated to Force Majeure events. The 2006 PRDOH Drinking Water Settlement Agreement continues negotiations through the individual systems vehicles provided under the Agreement. Additionally, the department continues to provide support to PRASA's land acquisition for sales and expropriation cases. Lastly, it also provides support to PRASA for the P3 project process.

A series of laws and executive orders have been passed because of the COVID-19 pandemic. The new laws and Executive Orders applicable to PRASA are:

- Executive Order 2020-80: With this order and COVID-19 cases the Central Government limits certain services and activities;
- 2020-39: Prohibits suspending electric or water service during the pandemic;
- 2020-80: Incentive retirement;
- 2020-57: Central Government has less time to complete payments to suppliers; 30 days is the new payment term; and
- 2020-36 and the amendments 2020-125: Allows for remote work in the government during the pandemic.

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.

New initiatives for FY2021 include:

- Management Systems Office (reports directly to the legal department) is working on the revision and organization of internal procedures (institutional documents). This initiative is a high priority for PRASA.
- Implement the following KPI metrics:
    - 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.

Lasty, for the upcoming FY2021 the legal department expects an upturn in contracts and claims, as well as land acquisition cases due to the start of the CIP program and the funding expected for recovery.

5.4.1.8 Infrastructure

PRASA's Infrastructure Department continues to oversee and manage PRASA's CIP. As of September 30, 2020, the CIP program had started for several SRF funded projects, which began in December 2019; however, the CIP Consortium Management Program continues the select project bidding and contracting process. Most of the department's efforts since the 2017 Hurricanes have been steered towards the recovery efforts, the insurance settlements for damages incurred, the SRF debt restructuring, and negotiations with FEMA for funding of damages not covered by insurance. 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 reactive the CIP Consortium Management Program (expected to start in FY2021). The Infrastructure Department is also responsible for the management of the Comprehensive Energy Management Program.

Regarding the Energy Management Program, the Energy Performance Contracts (EPCs) with Honeywell were permanently cancelled. However, the Solar Power Purchase Agreement (PPA) contracts continue with Windmar Renewable Energy. For further detail refer to Section 5.5.

During FY2019, several projects were submitted to FEMA to obligate funds via a Project Worksheet (PW), however, there was a delay in the funding availability. Three permanent PWs were approved for funds: 1) Comerío WTP (Oct-2019), 2) Buena Vista Arriba WST (Jan-2020), and 3) FEMA's Accelerated Obligation Strategy (known as FAAST) projects (Jan-2020). The other projects are being considered by FEMA under a different strategy and are pending approval for funds. Furthermore, as of September 30, 2020, the only funded project that began work was PRASA's Central Laboratory because it was issued as emergency works. The demolition phase has been completed and the design/build contract for the new facility was awarded. Construction is expected to begin during FY2021. Furthermore, besides the SRF funded projects started in December 2019, PRASA indicated they have engaged designers for revising design of several projects that were previously suspended and eventually cancelled in preparation for the CIP Consortium Management Program reactivation (expected for FY2021).

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

- Projects for compliance stipulated in the USEPA Consent Decree and PRDOH Agreement. Several projects started in December 2019.
- Dorado Sewer Trunk improvements
- Ponce Nueva WTP improvements
- PRASA Central Laboratory in Caguas
- Carraízo Dam dredge and improvements
- Renewal and rehabilitation of the overall deteriorated infrastructure

The Department also played a key role in the negotiations for the Debt Restructuring with USEPA SRF and USDA RD programs, allowing access to SRF and RD funds.

The following material changes occurred during FY2020:

- Published a Bid announcement to receive support from a Consultant with the allocation of funding with FEMA's Program of Public Assistance (20-RFP-DAC). PRASA completed the selection during FY2020.

- Infrastructure published the RFP for PMCs to manage the CIP. PRASA expects that the CIP implementation starts during FY2021.

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 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 in finalizing the Strategic Plan (2021-2025).

The PMO is currently in the development phase and the team expects to be presenting the plan the second semester of FY2021, at a high level, to evaluate the needs and scale of the program within the organization. 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. To 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 focusses on water recovery (NRW) and operational optimization. However, it is important to highlight the leak detection plan, for which the WRO has been approved additional funding for FY2021 to implement the program throughout the island and eventually transition knowledge and equipment to each Operational Region. Currently, the program has progressed slowly due to the 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, on 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 FY2020, achievements, overall operational activities, and future initiatives.

The regions presented issues and challenges because of limited operational budgets, slow recovery from damages caused by the 2017 Hurricanes and delay on FEMA funds disbursements, the impact of the 2020 earthquakes and the COVID-19 pandemic, among others. 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 emigration to the U.S., and the Voluntary Pre-Retirement Program. There are mechanisms available to fill positions of difficult recruitment and currently efforts are focused to cover these vacancies. One of the greatest challenges that O&M regional experience is the ability to find operators, electromechanics, among others.
- Although a considerable number of systems have restored the visualization, there are still telemetry systems pending to be installed to achieve full visualization of the water systems. Efforts has been focused to achieve 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 limited

number of vehicles for each region during FY2020, 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 limited budget, which prevent investment for repairs, additional sampling, exploration of new technologies, among others.
- Plant Automation Program continues to be on hold.

During FY2020 all the regions reported a shortfall in qualified employees which have caused an increase in overtime costs and a direct impact on the operations of the System resulting in repair delays in addition to making more challenging the ability to maintain and/or achieve regulatory compliance. During the second semester (second and third quarter) of FY2020, personnel limitation was even more challenging due to the COVID-19 pandemic and the complexity of the operations workflow logistics along with the requirements to comply with the Safe Return Protocols in the workplace.

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 although in some cases it may require a capital project to address the issues. Because capital projects are subject to funds availability they are currently on hold or moving slowly. Also, the regions are continuing their efforts to control costs and System optimization to the extent possible. However, other programs that were 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 be highlighted. For example, in the West Region repairs are taking too long to be resolved, partly because of purchasing, logistics and payment challenges. Once those repairs are completed, replacing asphalt on the work area has become an issue due to the current elevated asphalting costs. In addition, STS present significant equipment and management issues in the region as well as corrosion control at WWTP facilities. In Metro Region, sewer line inspections and cleaning continue to be a challenge for 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 to 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 along with several WTP elimination projects (under evaluation) are being performed for optimization and compliance purposes. Lastly, the East Region has experienced delays on installation of pressure regulators, line repairs, among other necessary work for optimization of the System due to limitations in available personnel and funding.

Table 5-3 summarizes some of the initiatives and projects being implemented or planned during FY2020 and initiatives to be implemented during FY2021, 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. • Increase visualization of water to 100% and continue with wastewater facilities. • Optimization study aligned to Master Plan • Project for chemicals optimization and reduction specially for chlorine and bisulfite application.
	Water Compliance Actions to meet DBPs	• Rehabilitation of Aguadilla (Montaña) WTP and dredging of the water source. • University of Puerto Rico at Mayaguez (RUM) collaboration on additional sampling.
	Asphalt Cost Reduction	Coordination with Municipalities to establish Memorandums of Agreement (MOAs) or Contracts so that Municipalities address asphalting needs after a repair. Municipalities already included in this program are: San Sebastián, Hormigueros, Aguada and San Sebastián. This is an ongoing program.
West	Projects	• Mayagüez Submarine Outfall - repair of pipeline rupture, to address violations to the discharge permit. • Installation of permanent EGUs at multiple locations. • Rehabilitation and expansion of Culebrinas WTP. • Improvements at Aguada-Aguadilla and Mayagüez WWTPs. • Installation of the 2 MGD “Super Toma” for Guajataca WTP to remove iron and manganese. • 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 of pre-Cl. • System’s drain program, flushing at drain locations. Also flushing program was implemented as well as sampling points (100% accomplished). • Tank clean-up program (yearly). Use divers for tanks that cannot be taken out of service. • Tank’s oscillation to reduce retention time to avoid water aging. • Application of new chemicals at raw water sources to reduce organics. • Aeration project at Carraízo Dam was re-bided, it is expected to begin during FY2021. This could bring benefits for reducing polymers, reducing permanganate and reduction of chlorine application.

Region	Initiatives/Projects	Description
	Optimization Initiatives	• Delimitation of service areas. • Continue with pressure reduction measures in the distribution system. • Redundancy and Flexibility of the potable water distribution system has continued to be achieved. • Water meters installation at the Region's WWTPs was completed in FY2020 (May 2020).
	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.
Metro	Energy Consumption Reduction Program	Targeted 0.5% energy reduction was achieved. This initiative includes performing pumps adjustments, reducing time in operation, using smart system in several systems, which reduces consumption. Another ongoing initiative regarding reduction in energy consumption is the elimination of the WPSs in the systems of Caimito and Quebrada Arenas, due to pressure problems at the Hollywood Hills WPS and WST and WPS Holy Hills. This project is expected to begin in FY2021. In addition, elimination of additional WPSs and WWPSs and replacement of vertical pumps for VFDs are other initiatives that are being implemented. Replacement of illumination system by solar system technology at strategic locations (WWTPs, roadways, Op. buildings, etc.). Targeted energy reduction for FY2021 is 0.6%.
	Projects	• Puerto Nuevo's 48-inch potable water transmission pipeline- new alignment needed, as current alignment hinders flexibility between Sergio Cuevas and Superaqueduct WTPs Service areas. This project is on the list of Resiliency Projects for FEMA funds ($13 - $14 M). • Installation of degritter system at Puerto Nuevo WWTP. This project was considered in 2015 and was resumed in FY2020. • Elimination of Hollywood Hills and Holy Hills pump stations. • Transition from CL gas to liquid at Carolina WWTP. • Pump installation at Cantera is ongoing, is expected to be completed in FY2021. • Rehabilitation of Enrique Ortega WTP.
East	Water Compliance Actions to meet DBPs	Implementation of measures continues such as tanks oscillation, chorine injection point, evaluation of new chemicals, and implementation of the System flushing program.
	Restructuring of Fleet Department and Acquisition of New Vehicle Fleet	An on-site and off-site repair and maintenance contract still ongoing with Mayagüez Fleet company for the Humacao operational area. Additional fleet service contracts were completed for a total of 10 mechanic shops. Also, the region acquired new vehicles for their fleet, however, these do not fulfill all the needs of the fleet in the Region. Will be acquiring a new vehicle fleet to improve the operations department performance during FY2021. Heavy equipment such as digger and cranes are contracted out. In addition, equipment and vehicles for piping repairs and flushing are also contracted due to the recurrency of PRASA equipment in the shops.

Region	Initiatives/Projects	Description
East	Energy Consumption Reduction Program	• This program continued with a target of 0.5%. Solar Panels were installed at Culebra WTP, El Yunque WTP, Humacao WTP, and Arcadia WPS (Vieques). • Elimination of pump stations • Turned off Laura Well and Hato Nuevo WPS for energy reduction and optimization of the systems. • Installation of timers for pump stations. Will continue throughout FY2021
	Optimization Initiatives	• Pressure Management (Regulator Valves) and Sectorization. • Leaks/Breaks complains management • Analyzing use of VFDs for decreasing water use (also, energy reduction)
	Projects	• Several R&R projects to repair pipe ruptures completed (water and wastewater). • Aibonito WWTP – Sand filters and Biofilters. • Caguas WWTP – Blowers BNR, Primary clarifiers, odor control domes, dewatering (screw conveyor), BFP or centrifuge, corrosion protection on walkways of secondary clarifiers. • Aguas Buenas WWTP – Module B done; Rehabilitate Module • Comerío WWTP – Clarifiers 1 & 2 improvements. Construction is expected to start in FY2021. • Culebras WTP (Cayey) – Replace package unit. • Farallón WTP – STS Project. • Central Lab – Demolition was completed. Design/build was awarded. Construction is expected to start in FY2021. • Buena Vista WPS – Variable frequency drives (VFDs). • Ceiba Sur WTP – improvement of filter performance and continuous monitoring equipment. This is an interim project to achieve LT2 compliance. • Sabana (Las Piedras) Trunk Sewer – Bid ongoing.
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, Jayuya, 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.
North	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 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.

Region	Initiatives/Projects	Description
	Optimization/Energy Consumption Reduction Initiative	Same concept as other regions. Key initiatives include: • Reduction of Corozal WTP service area. Elimination/rehabilitation of Corozal WTP feasibility is being evaluated This project will reduce energy, costs, and water quality improvements. • Installation of telemetry systems to integrate more facilities into visualization system. • Sectorization and pressure control
	Projects	• Future Relocation of the Dorado WWTP (Pending funding and analysis). • New Dorado Trunk Sewer & Pretreatment Works is scheduled for FY2021. • Rehabilitation of Hatillo-Camuy raw water intake and pipeline. Expected for FY2021. • Improvement to Vega Alta WTP treatment technology. Expected to bid in FY2021. • Dorado WWTP Improvements. • Elimination of Indiera Alta WTP. • Elimination or rehabilitation of Corozal WTP. • Elimination of Río Arriba WTP. • Elimination of UV system and replacement of STS at Morovis Sur WTP. • “Super Planta” (15 MGD), project would eliminate the Arecibo WTP need of water from Superaqueduct.
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.
	Acquisition of Vehicle Fleet	• New vehicles are in process to be acquired for the region’s fleet. However, budget still being a limitation to cover all the vehicle needs. • Contract with several shops in Ponce & Yauco areas for lightweight mechanical works. Identifying additional mechanical shops for Guayama and Coamo Operational Areas.
	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 since the Carite system could be supplied 100% by 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.

Region	Initiatives/Projects	Description
	Energy Consumption Reduction Initiatives	Similar concept as other regions and same 0.5% target. This initiative includes: • Guayama penstock • Facilities lighting replacement to LED • Hydraulic modelling El Tuque (Brisas) for optimization and reduction of energy consumption by the elimination of several Brisas I and Brisas II pump stations in Ponce Area. • Installation of timer on blowers of Package WWTP to reduce operations at night.
South	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. • Continue transitioning to chlorine solution in several systems. • Evaluation and relocation of NPDES of few WTPs (Peñuelas & Guayanés) to the Peñuelas wastewater system. Similar project for Coto Laurel WTP, eliminate NPDES discharge through the connection with Ponce wastewater system. • Increase visualization of WSTs to 100%. Target for FY2020 was 65%, which was achieved. • Continue with pressure adjustments, installation of flow meters at WTPs and installation of digital pressure gauges (“Coquitrols”) on strategic locations throughout the System.
	Projects	• Rehabilitation of the sanitary trunk sewer from Salinas to Guayama, which collapsed after the September 2017 hurricanes. • Elimination of Ponce Vieja WTP. • Ponce Nueva WTP Improvements. • Coto Laurel WTP Improvements. • Guayama WWTP Improvements: Secondary Clarifiers and Digesters. • Yauco WWTP – evaluating replacement WWPS to chopper pumps and dewatering building repairs. • Ponce WWTP: installation of new mechanical screen, splitter box & clarifiers structural repairs, and elimination of digestors. • Vertedero well improvement (currently is out of service).

5.5 Strategic Plan

PRASA’s Executive Management Team is completing the 2021-2025 Strategic Plan which is aligned with the objectives included in the 2020 PRASA Fiscal Plan. The plan was revised and sent to PRASA’s Governing Board for approval. PRASA has reported that the new Strategic Plan maintains the basics elements of the previous plan while striving for PRASA’s Goals and Vision. Operational and performance KPIs and metrics were revised. Once approved by the Governing Board, PRASA expects the Strategic Plan to be published during FY2021.

5.5.1 Key Performance Indicators

Table 5-4 presents a summary of PRASA's KPI goals and results for FY2020 as of June 30, 2020. In FY2020, PRASA's KPI results did not improve from FY2019 and remained low because of the delays in the recovery efforts, budgeting constraints, and the 2020 earthquakes and COVID-19 pandemic.

Table 5-4. FY2020 PRASA Operations Key Performance Indicators

Strategic Plan Initiative	Key Performance Indicator	FY2020 Goals	Results as of June 2020
Fiscal Health	Employees per Connection	3.34 or less Employees per 1,000 connections	3.61
	Overtime[2]	Reduce to 7% or Below	14%
	Budget Compliance (Excludes Electricity Costs)	Below 100%	95%
	Collection vs. Billings	Increase to 96% or Above	90.4%
Operational Efficiency	Compliance - Water System[2]	Increase to 100% or Above	99.4%
	Compliance - Wastewater System[2]	Increase to 98% or Above	96.7%
	Billing Adjustments	Reduce to 2% or Below	.04%
	Complaints in Customer Service (per 1000 Actives Accounts)	Reduce to 14.5 or Below	11.61
	Monthly Average of Customers with Service Interruptions (as a Percentage of Total Customers) [2]	Reduce to 5% or Below	23.8%
	Customer Service Attention Time (Commercial Office)	Maintain below 30 min.	22:45 min
	Vehicle Availability	Increase to 92% or Above	72%
	Average Processing Time of Purchase Orders[2]	Less than 40 days	55 days
	Preventive vs. Corrective Maintenance Ratio	Increase to 80%	78%

Strategic Plan Initiative	Key Performance Indicator	FY2020 Goals	Results as of June 2020
Operational Efficiency	Average Time for Equipment Repairs	Less than 25 days	49.35 days
	Reported Leaks	Reduce to 4,598 monthly	4,629
	Reported Overflows	Reduce to 2,298 monthly	2,206
	Repair Time for Leaks[2]	Reduce to 53.0 hrs.	136.81 hrs.
	Repair Time for Overflows[2]	Reduce to 32.0 hrs.	54.66 hrs.
	Average Water Production (MGD)	Reduce to 505 MGD	539 MGD
	Percent of NRW[1]	Reduce to 53.2%	-
Infrastructure and Sustainability	Energy Consumption (Annual)	Reduce to 660.34 MkWh	623.87 MkWh
	Project Progress (CIP)[3]	Greater or equal to 0.9	-
	Cost Performance (CIP)[3]	Greater or equal to 0.9	-
Organizational Transformation	Training (Cumulative Hours per Employee)[2]	More than 26 hrs. per year	9.4 hrs.
	Unplanned Work Effectiveness (Absenteeism)	Reduce to 2.0 days	2.13 days
	Planned Work Effectiveness	Reduce to 2%	2.23%

[1] This Percent of NRW KPI is not being measured, PRASA is in the process of redefining a new KPI to assess NRW.

[2] These KPIs results were affected by earthquakes, drought and the COVID-19 pandemic.

[3] Due to the suspension of the CIP, the Project and Cost Performance KPIs for FY2020 are not being measured.

5.6 On-Going Programs and Initiatives

The following are programs and initiatives, some of which began development and implementation prior to FY2015, being pursued by PRASA. A brief description and status of each of these initiatives is 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 to treatment plants, pump

stations, vehicles, and equipment to provide for more reliable service, improve client satisfaction, and achieve long-term operational cost savings through 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

In accordance with the requirements established on the 2015 USEPA Consent Decree, PRASA has incorporated 100 percent of the facilities into the IMP. 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:

- New metrics IMP metrics were established and are ongoing. With the Asset Management Initiative being implemented during FY2021 additional metrics may be generated and implemented.
- Implementation of the new handheld (HH) technology that allows for more accurate work documentation and system updates in real time started and is ongoing. It will accurately document opening of work order and completion. Initiative not completed during FY2020, only Phase I for equipment, telemetry, EGUs, etc. implement for (29) H-H devices (Androids). However, Phase II – Calibrations, is a different system has not been implemented. Expected to complete all H-H devices and phases during FY2021.
- 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. Initiative is ongoing.
    - Two Components: 1) the actual physical flow meter installation and 2) SCADA configuration to relay data. The latter is a slower process.
- Ongoing improvements to SAP PM for IMP processes optimization.
- Integration of IMP routes in SAP for optimization. This still ongoing.
- IMP Procedures Revision initiative - Completed approximately seven procedures during FY2020 and in process to finalize others. Expected to be completed by FY2021.
- Predictive Maintenance Program for WTPs and WWTPs was completed only for the South Region during FY2020. Efforts continue during FY2021 for the other Regions. During the first quarter of FY2021 a Bid was conducted and its currently under evaluation. Expected to start implementation with Awarded Bidder during FY2021. Some of the predictive maintenance techniques include ultrasound technology, vibration, among others, to make sure that the preventive maintenance is working properly and to be able to predict future failures. The end goal of this initiative was to train PRASA personnel to internally continue the implementation of predictive maintenance, however, due to lack of equipment, training, and the fact that only one region was able to establish an incomplete program, for the time being the program will continue to be subcontracted.
- The Corrosion Control Program initiated during FY2020. Currently, PRASA is in the process of evaluation of the most critical facilities to develop an action plan on a case-by-case basis. The facilities evaluation phase was divided into four phases, of which Phase I has been already completed and Phase II is at 30% of completion. Phase 1 targeted critical facilities highlighted in the 2015 USEPA Consent Decree or the 2006

PRDOH Agreement. However, COVID-19 has impacted the completion of the other phases; they are expected to be completed during FY2021.

  - IMP in collaboration with the Infrastructure Department are in the process of developing "Scope" to address the findings of the completed Phase I and for the other phases as they are being completed.
  - Additionally, the intent is to integrate the developed corrosion protocols into the design phase of CIP projects in addition to IMP's own projects.

- IMP Department began the installation of technologies for the visualization of water tanks. During FY2020, IMP achieve 72% of visualization of all Water Storage Tanks. Expected to reach 100% during FY2021.
- Acquisition, installation, and maintenance of EGUs to ensure systems redundancy. They were able to acquire 191 EGU's and 25 Portable units during FY2020 and are currently finalizing their installation. There is a Phase II for an additional 100 EGUs, which is expected during FY2021.

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

- For FY2021, implementing a Command Center *Centro de Excelencia* that will serve for the planning, monitoring, assigning of task for preventive and corrective maintenance, contracts and all required documentation and data collection within the IMP Department's tasks and purview.
- Develop Asset Management Program for electro-mechanical equipment. Expected implementation during FY2021.
- WPS visualization (New Technology Panels with capacity to operate WPS) – Goal for FY2021 is to install at least 10 new panels in each PRASA Region.
- MPS procedures are being revised to a more Planning focus, although monitoring of status remains part of IMP staff meetings discussions.

Critical factors that continue to affect PRASA's ability to efficiently implement the IMP are the fiscal situation and the limitations to hire new staff. As stated by the IMP Department a consistent issue is the difficulty to enforce the program due to limitations on technical staff. PRASA needs to recruit additional staff to support the program. The staffing was deficient in Electro-mechanical staff and maintenance managers before COVID-19 to implement the preventive maintenance and corrosion control programs, which the pandemic exacerbated. Additionally, the lack of technical personnel adversely affects the KPIs tracking. Furthermore, during the FY2020 the IMP Director changed a couple of times, which contributed to delays and continuity in the implementation of the programs.

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 Reduction Program

In May of 2008, PRASA began to implement 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 to 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 reduction by 41 MGD by FY2025. These programs are listed below:

- Master Meters – accurately measuring water production by the installation water meters at critical facilities. Goal of measuring 80% of WTP production by FY2021.
- 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, and one geared for addressing commercial losses is:

- Privatizing PRASA's customer services via a P3 to reduce commercial losses and identify unauthorized consumption.
    - Replacement of meters
    - Installation of advanced metering technology
    - Enhance customer services activities

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 make adjustments and improvements in data collection to help reduce physical losses.
- Non-operational equipment
- Inaccuracy of Equipment or fail 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 easy to replace. During FY2020, the office visited more than 45 facilities to validate the conditions of the master meters. The process of validating a meter is: visit the facility, verify if the meter complies with the run length upstream/downstream specified by the manufacturer, verify the hydraulics of pipeline to ensure the meter is reading accurately, and validate the local display with SCADA. If the existing meter is not operational, WRO will purchase a new meter that complies with the field conditions. Also, if the meter does work but the conditions are not met, WRO has contracted an engineering consultant, Salo Engineering, to assist in the proper placement of the meter. Phase II of the validation includes visiting 48 facilities during FY2021.

The WRO further established a NRW team ("TeamORA") to include not only the Water Recovery Office staff, but also integrate operations personnel to address the NRW initiatives in a more efficient and effective manner 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.

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, which target apparent losses related to its commercial operation. Since 2009, PRASA has implemented a public-private effort that is charged with identifying 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) are generated from these initiatives. In the future, most of these initiatives are expected to and address by the P3 Project Contractor.

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. 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 either non-PRASA communities (communities that have their own private water source) or illegal connections (theft, derivations).

An initial number of 300,000 accounts were identified. In its Geodatabase efforts in previous fiscal years, PRASA was able to narrow down this number to 265,505 by eliminating structures that are 600 square-feet or less and at a distance of 6 meters from a water meter to reduce the potential of keeping gazebos. Then, PRASA searched for structures such as hotels and industries to also disregard those and were able to 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 the search for schools and hospitals to keep reducing this number prior to going to the field for verification. However, this initiative was impacted by the effects of the September 2017 Hurricanes and was put on hold during FY2018 and remained so through FY2020. The initiative is expected to be transferred to the P3 Project Contractor; therefore, efforts have not been continued.

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. In total, between the two systems a total of 600 miles of pipeline was surveyed. About 288 leaks were detected with an estimated flow of about 4.7 MGD. Through this project, PRASA confirmed that there are a significant number of undetected water leaks in PRASA's water system. Based on these results, PRASA projects that there could be as much as 100 MGD being lost through undetected water leaks throughout the island. Hence, 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, island-wide, over an 18-month period as part of the project. 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, due to the September 2017 Hurricanes impact this initiative was placed on hold. As of the date of this Report, PRASA's management is evaluating the next steps for this project.

For continuing implementation of 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 of expanding throughout PRASA's Regions has continued; various regions have procured WRO leak detection service and a regional training program is expected to be implemented in FY2021. 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.

The program tasks included, but 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

The team also, 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 have expanded throughout all the Regions. This exercise has allowed the WRO to have a database of 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 the regional directors were requested to provide at least 5 tanks within their region that have had problems with overflow in the past. The valves were inspected, and recommendations were given to the region. During FY2021 WRO will follow up on the regions to verify if recommendations were followed. The WRO has obtained additional funds to expand their field team. This will allow the office to have two, 2-person crews dedicated to leak detection and another for pressure management by January 2021. By the end of FY2021, three additional crews will be included in the field team.

5.6.3 Comprehensive Energy Management Program

PRASA's energy cost is the second largest 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[18], has reduced from 744 million kWh during FY2013 to 617 million kWh during FY2019. Currently, energy costs are around 619 million kWh during FY2020 (updated to September 2020). This current estimate may increase slightly 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. PRASA is only continuing one of the two programs previously engaged. As previously mentioned in the FY2019 CER, the EPCs were cancelled and only the Solar PPA continues. Additionally, PRASA continues its internal initiatives and activities being 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. As reported in FY2019, during the implementation of this initiative, PRASA encountered several issues with the contractor and achieving the Project's objective. This resulted in the cancellation of all EPCs. 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 who were 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 what 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 cancelled. **Table 5-5** provides a status summary of the PPAs in place. In addition, as of FY2020, PRASA has saved approximately $2.04M (production of approximately 11 million kWh per year) from the solar PPAs currently in operation. The ten facilities operating PPAs, and their average annual solar energy production are shown on **Table 5-6**.

[18] For more details in Regional energy conservation measures refer to Section 5.3.2 *Regional Updates: Challenges and Initiatives*

Table 5-5. PRASA PPAs

Proponent	Technology	Status
Windmar Renewable Energy (PV Properties)	Solar	Under contract; 7 MW; 10 facilities (projects) have been completed and are currently in operation.

Table 5-6. 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

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.

5.6.3.3 Regional Operational Initiatives

PRASA's Executive Management Team had set a goal to achieve additional energy consumption reductions, as per final budget, of at least five percent kWh per year island-wide, which has already been achieved. Moreover, during the last couple of fiscal years the Regions target energy consumption reduction has deescalated from 5% to 1.5% in FY2019. As shown in the previous section, PRASA has been able to reduce costs with Regional measures. In FY2020, a new goal of half percent (0.5%) of energy consumption reduction was established across the regions. However, achieving this goal has become a challenge due to, in most cases, the lack of capital investment necessary to perform adjustments/improvements, to achieve the goal. Notwithstanding, since FY2014, PRASA's Operational Regions have been implementing energy conservation measures in its WTPs and WWTPs, and they are also leveraging 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, elimination of WPS or WTPs, identifying energy conservation measures in the operation of the equipment, among others. Regions have identified energy conservation measures that reduce equipment operation time at the WWTPs with process control measures and at the WPSs by identifying and controlling system pressures and distribution tank overflows. As PRASA continues to strive to reach their goals, the expected target for FY2021 is 0.6%.

In FY2020, PRASA delineated strategies and initiatives to comply with the goals included in the PRASA Fiscal Plan revised as of June 2020. A task force was created to lead each initiative which includes staff representation from all the components involved in achieving these goals. The eleven goals stipulated in the PRASA Fiscal Plan were the following:

1. Rate re-structuring
2. Compliance with AWIA
3. Optimization and Chemical Inventory
4. Start an Asset Management Program
5. Resume the Automation (8-4-8-4) Program
6. DBPs Compliance
7. Sludge Management Plan
8. Digitalization of Pre-Treatment Department
9. Fleet
10. EGUs
11. Government Accounts Collections

PRASA Operations Department, like other departments, main challenges are the fiscal situation and the limitation of human resources. In addition, this situation was exacerbated with the impact of the Earthquakes of the South and the COVID-19, both occurred in the second semester of FY2020, which limited even more the availability of personnel and challenged the logistics for the operations.

5.7 Treatment Plant Automation Program

In prior years, PRASA embarked on a Treatment Plant Automation Program, which consisted in the installation of the necessary equipment and the development of the system protocols to automatically operate and remotely monitor its WTPs. 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[19]. PRDOH and PRASA agreed on an endorsement procedure prior to the implementation of 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 prior to 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 FY2020 there was no activity under this program, as it is on hold for the time being. However, it is expected to resume during FY2021.

[19] The term 8-4-8-4 operations refers to having an operator at the facility for a period of eight hours followed by a remote monitoring and un-manned operation for the next four-hour period. This 12-hr cycle is repeated, reducing the number of operators needed and reducing overtime.

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 close out work service orders, and the impact of COVID-19 on their day-to-day functions.

PRASA's main O&M efforts during FY2020 continued to focus on the reestablishment of the System in the aftermath of Hurricanes Irma and María and on obtaining funding for capital and O&M projects. Although some of the FY2020 planned O&M investments and key PRASA initiatives were ongoing, several were delayed or suspended due to the extraordinary events that affected the island in FY2020. Initiatives like the NRW Reduction Program's Leak Detection and the Pressure Management Programs will be expanded with PRASA's P3 Project, for which PRASA expects benefits will surpass those already achieved under the Revenue Optimization Program. PRASA expects that the CIP is reactivated during FY2021 and anticipates the implementation of projects will address some of the major System needs and issues. Also, the Strategic Plan is expected to be completed and published during FY2021.

Lastly, the FY2020 PRASA's KPI results remained low because of the delays in the recovery efforts, the fiscal situation hindering the implementation of certain initiatives, the earthquakes and the COVID-19 pandemic impacting all PRASA's operations.

6 Capital Improvement Program and Regulatory Compliance Status

6.1 Introduction

PRASA has updated its multi-year CIP. 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 (mandatory and non-mandatory compliance). In addition, PRASA has included as part of the CIP objectives the restoration of damaged infrastructure by 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 2020 PRASA Fiscal Plan and public policies endorsed by PRASA's Governing Board includes financing of the CIP with federal 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 2020 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. As previously mentioned, it was customary for PRASA to use a portion of its operating funds to cover expenses for its CIP projects. However, in FY2016, after using 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 cancellation of an additional 86 projects totaling an additional $247M in investment. Notwithstanding, PRASA was able to pay off all outstanding payments due to contractors and CIP consultants.

As of September 30, 2020, execution of almost all capital projects remain on hold, except for about twenty-seven projects that are regulatory-driven, and for R&R and emergency recovery. There is still a strong concern that the lack of capital investment will accelerate infrastructure deterioration and lead to a critical situation. However, PRASA is projecting that the CIP will be fully reactivated in FY2021.

The suspension of CIP projects has resulted in both short and long-term effects on PRASA's operations and infrastructure, and on Puerto Rico's economy. In the short-term, PRASA is facing continuing deterioration of their infrastructure, and potential non-compliance with regulatory mandates or administrative orders. In the long-term, PRASA may see an increase in cost of capital projects as vendors price-in the risks associated with delays in payment or non-payments to contracted projects as well as increasing risks related to asset failures or operational challenges that could affect the quality and continuity of service, ultimately leading to reduced Operating Revenues and increased Operating Expenses.

6.2 CIP Implementation Management

In FY2019, PRASA completed a two-step procurement process to qualify and select program management consultants (PMCs or Consortiums) to support their Infrastructure Department in the planning, design, and management of CIP projects. Like the engagement of PMCs between 2005 and 2016, PRASA seeks to partner with qualified and experienced program managers that will oversee implementation and management of CIP projects throughout pre-construction, construction, and post-construction. As of September 30, 2020, the PMCs are still in the bid-contracting process.

As part of the pre-construction activities, the PMCs will assist PRASA in controlling, monitoring, and executing 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 construction 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 such tasks as managing project schedules, negotiating project claims, and administering construction contracts. Finally, as part of the post-construction services, the PMCs will support project start-up, training, and close-out activities. PMC Contracts are expected to be executed with selected PMCs in later FY2020 or early FY2021 in preparation of the escalation of PRASA's CIP.

6.3 CIP: Project Distribution and Costs

CIP projects are divided into categories, groups, and types. Additionally, PRASA has implemented a prioritization system to better manage the large and complex compliance projects. 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 and earthquakes 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 charter is prepared. The charter includes the project scope, preliminary schedule, cost estimate, type of project, compliance requirements, location, project benefits, contact person, and specific data. The project is then assigned a CIP project number and added to the CIP list, where it is categorized according to PRASA's classification and needs. Updates to the CIP are presented to PRASA's Governing Board twice a year for revision and approval.

Total CIP investments per project are calculated taking into consideration the following estimated costs:

- Planning – Cost related to planning studies such as preliminary engineering reports, feasibilities studies, modeling, land acquisition, etc.
- Studies – Studies required for the design of the projects such as land surveying, geotechnical studies, etc.
- Design – Design engineer fees
- Project management - Design and construction project management
- Inspection – Inspection fees during the project construction
- Design Services During Construction (DSDC) - Design engineer services during the project construction
- Contingencies – Design, construction, inspection, and DSDC contingencies
- Administrative – General administrative costs
- Insurance - PRASA's insurance program
- Interest – Cumulative interest during the project financing period

Design costs typically use, as base, 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 adjusted by the current market and availability of local designers. 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 and the recent boom in construction, when the CIP is activated the previously described cost percentages used to determine the various stages cost of project lifecycle should be reassessed.

Throughout the development of the planning and design phases of a project, 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 close-out. During the construction phase of projects, contingencies are used to cover change order costs and expenses that may arise, such as additional land acquisition, permitting, design or re-design activities. Before the CIP suspension, PRASA reported that existing contract change order percent in construction projects was approximately 3%, which is much lower than typical industry average of 15-20%.

6.3.1 Project Classification and Prioritization

CIP projects, as recently redefined in the 2020 PRASA Fiscal Plan, are classified into the following mandatory and non-mandatory categories:

- Emergency/Permanent Works
- Renewal and Replacement (R&R)
- Compliance (Mandatory and Non-Mandatory)
- Quality
- Fleet and IT
- Optimization and Emergencies
- Safety & Growth and
- Others (includes Meter Replacement)

Emergency/Permanent Works are projects to repair the infrastructure impacted by the Hurricanes Irma and María. R&R are 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, and other mandatory projects), or that would be included in the future if not performed. Quality projects increase the quality of the water and wastewater service provided to customers. Fleet and IT replace vehicles in PRASA's fleet and improve IT infrastructure. The goal of Optimization and Emergencies projects is to increase efficiency, mainly pertaining to electrical consumption, and address 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, including replacement of meters outside of the P3 project.

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, amongst others.

In addition to project classification, Mandatory projects used to be ranked according to a prioritization score. This score was the result of 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. PRASA has indicated that it will reassess its prioritization methodology under its upcoming Master Planning effort, further discussed in Section 6.8 below. The implementation schedule of future long-term projects will be subject to the prioritization system and PRASA's financial capacity.

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

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 2020 PRASA Fiscal Plan, PRASA must establish metrics by project and must monitor compliance and execution through a CIP tracking tool. PRASA intends to review and update the CIP tracking tool used prior to the suspension of the CIP to ensure compliance with the forecasted execution schedules. The tracking tool was used to perform project time management, develop a detailed project baseline, and track the actual progress of all projects on a monthly basis, to keep track of projects on target and off target, and to identify gaps root causes for 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 the CIP KPIs historically used to allow for detailed tracking of CIP compliance and success. These include: Cost Performance Index (CPI) and Schedule Performance Index (SPI). The CPI measures the cost efficiency of resources as compared to the budget and the SPI measures the relationship between the executed work against planned work.

6.4 Six-Year CIP (FY2020-FY2025)

PRASA's six-year CIP for FY2020 through FY2025, as included in the 2020 PRASA Fiscal Plan, amounts to $1,704M. Annual capital expenditures by project category are presented in **Figure 6-1** and **Table 6-2**. As shown, the six-year CIP is mainly composed of Emergency/Permanent Work, R&R and Compliance projects, which account for 80% of the total forecasted expenditures.

Renewal & Replacement totaling 29% of total CIP increased by 14% to $487M and is now the largest category in terms of dollars over the duration of this CIP period. Emergency/Permanent Works category moves down to second, with an annual average expenditure $73.5M and total of $441M over six years. Historically, the majority of PRASA's CIP investment (about 60%) was for mandatory and compliance driven projects. This shift in priorities is mainly due to repair needs for infrastructure impacted by the Hurricanes Irma and María and higher prioritization of hardening efforts to transition to a more resilient System. In the FY2019 Fiscal Plan, PRASA had allocated $644.4M for Resiliency projects over the next six years in its CIP, however, these projects are not part of the FY2020-FY2025 CIP approved by the FOMB included in the FY2020 Fiscal Plan.

Compared to the 2019 PRASA Fiscal Plan's six-year CIP which totals $2,410.5M, the 2020 PRASA Fiscal Plan CIP was reduced by a total expenditure of about $706M, a 29.3% reduction. The difference is mainly accounted for by the exclusion of the Resiliency projects ($644.4M) and a reduction of $309M[20] in Emergency/Permanent works in the FY2020-FY2025 period. Moreover, the reduction in Emergency/Permanent works was in the Hurricanes Irma and Maria Infrastructure Rehabilitation projects (CIP 0-80-0115), which were decreased by $313.8M (65%) in the FY2020-FY2025 CIP. In contrast, the FY2020 PRASA Fiscal Plan did have some increments in projects and expenditures in various categories to mitigate some of the CIP cutbacks, such as: $119.5M in R&R, $29.1M in Mandatory Compliance, and $47.4M in Non-Mandatory Compliance.

[20] This reflects the reduction from $750.2M for 584 projects included in the FOMB approved FY2019 PRASA Fiscal Plan to the $441M for 421 projects included in the FY2020 PRASA Fiscal Plan approved by the FOMB.

Table 6-1. Capital Improvement Program FY2020-FY2025 by Category ($, Millions)[1]

Project Category	Fiscal Year Ending June 30						2020-2025 Total
	2020	2021	2022	2023	2024	2025	
Emergency/Permanent Works	$33	$125	$141	$41	$44	$57	$441
Renewal & Replacement	$50	$98	$83	$80	$81	$96	$487
Compliance (Mandatory/Non-mandatory)	$13	$73	$148	$124	$49	$29	$435
Quality	$0	$14	$40	$41	$25	$15	$135
Fleet & IT	$19	$14	$9	$9	$9	$9	$70
Optimization & Emergencies	$0	$15	$15	$14	$16	$5	$65
Safety & Growth	$4	$5	$14	$13	$13	$9	$58
Others	$1	$4	$4	$1	$2	$3	$14
Total	**$119**	**$349**	**$454**	**$323**	**$238**	**$222**	**$1,704**

[1]Numbers may not add due to rounding.

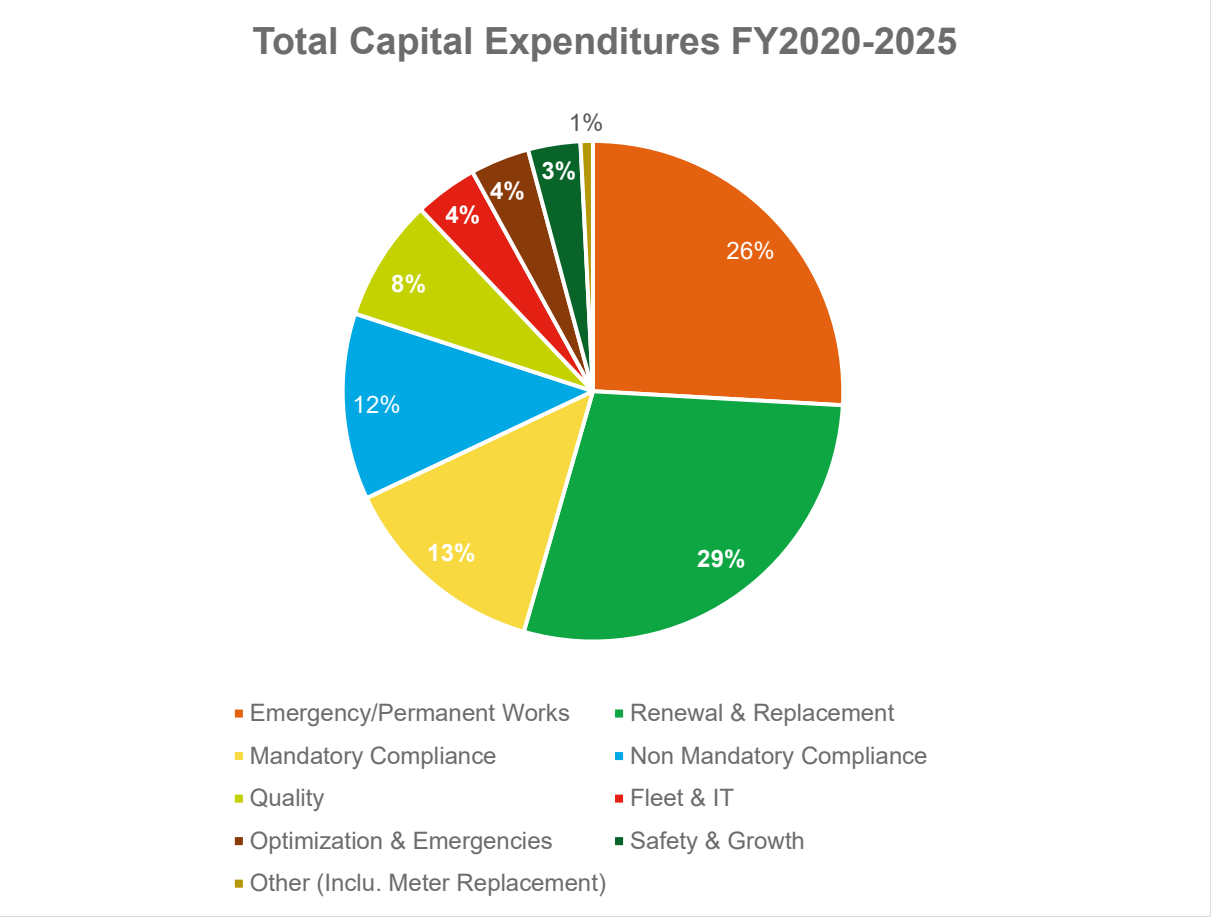

Figure 6-1. Six-Year CIP Capital Expenditures by Category

PRASA's six-year CIP consists of a total of 421 projects. As included in the CIP 2020-2025 certified by the FOMB, 71.5% are in the pre-construction stage (planning, design, and bid), with 51.7% of those starting at the planning stage, and 5.2% are in the construction and/or closeout stages. The remaining 1.9% are projects already in operation.

PRASA has identified a total of 185 projects under the Emergency/Permanent Works category that have priority. Fifty (50) projects were identified for Renewal & Replacement, 32 projects to address Mandatory Compliance and 39 for Non-mandatory Compliance. In addition, 49 projects focused on Quality.

6.4.1 Water System Projects

The water system projects include projects to improve compliance (mandated and not mandated), upgrades to WTPs, STSs and water distribution systems as well as construction of new water infrastructure. Total capital expenditures in water system projects for FY2020–FY2025 are estimated at approximately $487.74M, of which approximately $146.09M is allocated for projects classified as Mandatory Compliance and approximately $128.27M is allocated for projects classified as Emergency/Permanent Works.

6.4.2 Wastewater System Projects

The wastewater system projects include projects to improve compliance, new WWTPs, and upgrades to wastewater collection systems. Total capital expenditures in wastewater system projects for FY2020–FY2025 are estimated at $305.15M, of which approximately $57.83M is allocated for projects classified as Mandatory Compliance and approximately $66.62M is allocated for projects classified as Emergency/Permanent Works.

6.4.3 Other Projects: Renovation & Replacement, Buildings, Energy & Optimization, Emergency/Contingency and Others

Total capital expenditures for all other capital projects are estimated at approximately $911.04M for FY2020 – FY2025, of which approximately $662.15M is allocated for repairs to infrastructure impacted island-wide by Hurricanes Irma and María and other under the R&R program. Buildings and Energy & Optimization projects have $43.5M and $53.57M allocated, respectively. Emergency/Contingency projects are budgeted at $50M. The remaining $101.83M is interspersed between Fleet, Technology, and Metering system upgrades.

Table 6-2 shows the project distribution and capital expenditures by Category and Project Type for FY2020 through FY2025.

Table 6-2. PRASA's Base CIP Projections FY2020- FY2025 ($, in Millions)[1]

Category Type	Project type	Fiscal Year Ending on June 30						
		2020	2021	2022	2023	2024	2025	2020-2025
Wastewater System	Wastewater Pump Stations	$0.00	$1.56	$1.96	$0.38	$0.00	$0.59	$4.49
	WWTP	$5.96	$25.43	$61.74	$41.09	$12.42	$8.79	$155.43
	Wastewater Collection	$4.39	$20.12	$58.39	$44.80	$14.47	$3.08	$145.24
	Subtotal	**$10.35**	**$47.10**	**$122.10**	**$86.27**	**$26.88**	**$12.45**	**$305.15**
Water System	Water Supply	$8.35	$7.03	$11.59	$10.84	$11.82	$6.90	$56.53
	Water Pump Stations	$0.00	$3.96	$7.80	$4.09	$2.53	$4.44	$22.82
	WTP	$9.06	$61.14	$99.34	$62.11	$31.54	$18.31	$281.50
	Water Distribution	$11.45	$56.60	$37.55	$13.92	$4.21	$3.15	$126.88
	Subtotal	**$28.86**	**$128.72**	**$156.28**	**$90.97**	**$50.10**	**$32.81**	**$487.74**
Renovation & Replacement	-	$27.21	$103.66	$131.73	$113.94	$133.79	$151.81	$662.15
Buildings	-	$2.51	$14.23	$18.35	$7.55	$0.87	$0.00	$43.50
Energy & Optimization	-	$6.31	$27.26	$5.00	$4.38	$5.63	$5.00	$53.57
Emergency/Contingency	-	$0.00	$10.00	$10.00	$10.00	$10.00	$10.00	$50.00
Fleet	-	$5.50	$5.00	$5.00	$5.00	$5.00	$5.00	$30.50
Technology	-	$0.00	$4.00	$4.00	$4.00	$4.27	$4.33	$20.59
Meters	-	$37.85	$8.82	$1.06	$1.00	$1.00	$1.00	$50.73
	Subtotal	**$79.37**	**$172.97**	**$175.14**	**$145.87**	**$160.55**	**$177.14**	**$911.04**
Total		**$118.58**	**$348.79**	**$453.52**	**$323.10**	**$237.53**	**$222.40**	**$1,703.93**

[1]Numbers may not add due to rounding

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 and considers 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 materials 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.

Up 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 to 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 and despite the fact that PRASA substantially complies with the requirements of the consent decrees and agreements, PRASA requested and negotiated amendments. 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, placing an end to the extensive renegotiation 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 renegotiation of certain terms and conditions on the Term 2 and Term 3 mandatory projects have been accomplished such as the renegotiation 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 Clean Water Act (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. Amendments to this Settlement Agreement are being addressed by the PRDOH and PRASA through independent motions.

Up to the two atmospheric 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. On September 2017, upon declarations of "States 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 programs 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 renegotiation process, and the impact of the hurricanes. Essentially, PRASA requested a hold for a period to be determined for certain obligations and stipulated penalties be excused for such period. Moreover, during FY2020 PRASA continued to carry over the operation and compliance challenges caused by the hurricanes Irma and María in addition experienced several natural threats such as tropical storms (Dorian, Karen, Isaías, and Laura tropical storms) and earthquake, labor strike, and the COVID-19 pandemic that are detrimental to the already deteriorated facilities and its operations. Therefore, PRASA continue the 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, all concerned parties met on several occasions via conference call and 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 as mentioned above, 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 (On-going)
- 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 as to 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 on March 16, 2020 and April 14, 2020 communications to USEPA concerning the COVID-19 pandemic to invoke Force Majeure. Part of the requests included was an extension for the submittal of the Biannual report and a joint report combining Reports No.9 and No.10 corresponding to year 2020. Subsequently, on April 23, 2020, a

conference call was performed which outset the discussions until the COVID-19 pandemic was recognized as a Force Majeure event. PRASA was granted the extension requested for the Biannual Report submittal established for November 1, 2020.

On March 12, 2020, the Governor of Puerto Rico declared a state of emergency island wide as a result of the COVID-19 global pandemic. Through several Executive Orders, mindful of the need to protect public health and safety, restrictions to the citizens were imposed, such as: curfew, social distancing, stay home, vehicle movement limitations, among other measures mandated under penalty of law. In addition, the Governor ordered closure of governmental operations excluding essential services, commercial enterprises, among other exceptions. These orders had a direct impact on PRASA's personnel, restricting the availability of personnel to continue operations of the facilities. Also restricted were the non-operational administrative personnel duties. This hindered efforts to timely produce the reports and the continuity of the program of the agreements. According with the Force Majeure events conversations with USEPA a periodic CWA Compliance Situation Report during the COVID-19 pandemic was submitted to USEPA explaining and justifying the delay or non-compliance for the period from March through August 2020. Hence, PRASA invoked Force Majeure for its obligations to comply with one or more of the provisions of the Consent Decree to be defer or excused to the extent that the delay in compliance or non-compliance cannot be achieved amidst the current situation.

There are ongoing discussions between PRASA, USEPA, and USDOJ in relation to the Force Majeure protection that have resulted in the submission of Amendments. However, Force Majeure, will remain in effect 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, although PRASA remains positive and maintains open communication with the Regulatory Agencies.

PRASA continues the utilization of the 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 address any discrepancies reported between the information included on 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 is: 1) in compliance, 2) due to the declining population trends the project no longer needs to be performed, or 3) because the project has already been completed and certified.
- Addition of new compliance projects (categorized as Other Regulatory Projects and New Mandatory Projects). Several projects that were not originally included in the consent decrees were negotiated to be included. Additional projects added 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).

- Inclusion of the operation, maintenance and capital improvement program requirements related to the Puerto Nuevo wastewater collection system, including alleged CSWOs. PRASA shall comply with all the requirements of its NPDES Permit and with the Permit concerning CSWOs. 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 is currently undertaking 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) in addition to 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 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 consolidated SSOMP Annual Report. May 2020 Consolidated SSOMP Report submittal was extended until November 1st, 2020, due to Force Majeure of COVID-19 pandemic.
    - 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 better estimate 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, as well as population served, among other characteristics. The prioritization system establishes the relative priority of all planned upcoming projects with the objectives of allocating PRASA's limited financial resources according to such priority. Hence, for example, any projects to address future regulations would only be funded if they are 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.

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

The 2006 PRDOH Drinking Water Settlement Agreement with PRDOH renegotiation 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, 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. On May 2019, PRASA and PRDOH presented an Amendment to the joint motion for the Quebrada Grande WTP measure previously stated, in which, instead of limiting the water production to a 1MGD, PRASA would implement a series of procedures at operational level. These procedures include, but 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. A motion was revised and agreed upon on May 11, 2018. During FY2020, as per QSAR No. 50 (July 1st - September 30th, 2020), PRASA met with PRDOH on October 20th, 2020, where issued a proposal of additional remedial measures for Ceiba Sur WTP while the construction of Valenciano WTP is completed. Additional discussions regarding LTP3 projects and other Agreement requirements are expected to continue as funding become available and projects are reactivated.
- In addition to the 2006 PRDOH Drinking Water Settlement Agreement, PRASA has agreed with the PRDOH to give priority to 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 on the 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. To address DBPs exceedances and meet compliance with these requirements, several additional measures were included, such as: monthly monitoring, tank repairs and cleaning, rehabilitation of filter units, implement and maintain pipelines and tanks flushing program, and operational adjustments.
- As of FY2020, still pending to complete are eight LTP3 projects for the following systems: Culebras, Río Blanco, Juncos Urbano, Canalizo, Frontón, La Pica, and Monte del Estado. Although, completion deadline for the LTP3 is December 31st, 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. CIP projects are currently on hold due to funding limitations. For this reason, delays on the completion of these projects may occur and renegotiation of deadlines for LTP3 projects are expected in the near future. Nevertheless, it is expected that funding become available, and projects will be reactivated during FY2021.

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. 8 covering the period from March 1st, 2019 to August 31st, 2019; and Joint No. 9 & No. 10 covering the period from September 1st, 2019 to August 31st, 2020.
- 2006 PRDOH Agreement Quarterly Progress Reports: No. 46, covering the period from July 1st to September 30th, 2019; No. 47, covering the period from October 1st to December 31st, 2019; No. 48, covering the period from January 1st, 2020 to March 31st, 2020; No. 49, covering the period from April 1st to June 30th, 2020; and No. 50 July 1st to September 30th, 2020.

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

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

The 2015 USEPA Consent Decree requires PRASA to submit BPRs. BPRs No. 8, No. 9, and No. 10 covering from March 1st, 2019 to August 31st, 2020 were considered for this section.

- Up to August 2019, PRASA had been in significant compliance with the consent decree. 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 in some cases impossible. In addition, PRASA still facing significant challenges in the recovery process after the 2017 Hurricanes due to funding and staffing limitations. Moreover, in FY2020 PRASA experienced one of the most challenging years with several natural threats such as tropical storms and earthquake, labor strikeout, and the COVID-19 pandemic which prolonged even more the already delayed recovery process.
- 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 was able to reach a debt restructuring agreement with the funding programs of the Clean Water and Drinking Water State Revolving Funds (CWSRF and DWSRF, respectively). This initiative will allow PRASA access to the funds needed for the execution of CIPs included on the Appendices H and J of the 2015 USEPA Consent Decree. PRASA, CWSRF and DWSRF are currently in the process of completing the new financial agreements and new proposed dates for the Base List that were presented to USEPA in October 2019. Dates were based on the assumption that the funding agreements would be effective in 2019. However, there was a delay on finalizing the CWSRF loan which was signed in August 2020 and the DWSRF have not been signed yet. While funding agreements were secured, PRASA started the design and permitting updates and the construction procurement process of the projects that could be start as internal funding sources become available. The agreed upon revised completion dates of the Base List projects continues as planned.

- Currently, PRASA is 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 COVID-19 pandemic. As of August 2020, 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. Additionally, PRASA is in the final stages of its negotiation with the Federal Emergency Management Agency (FEMA) claim associated to the 2017 hurricanes. FEMA obligation of funds is expected to be completed by December 2020.
- As reported by PRASA in the BPR No. 6, the reasons that impaired compliance efforts after the 2017 Hurricanes were, or a combination thereof, due to but not limited to:
    - Lack of electricity and/or water
    - Fuel shortage
    - None 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
    - 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

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

- Remedial Measures: 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 December 2020. However, the construction contract for this project was terminated by convenience due to PRASA's fiscal situation. A new proposed completion date of April 2025 was presented to USEPA as part of the ongoing STS modification discussions between PRASA and USEPA. Proposed completion date is subject on 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 9, 10 and 11 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 Biannual Progress Report No. 9 & No. 10. These are expected to be repaired by December 2021.

- 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, the status regarding PRASA's fiscal situation remained unchanged and PRASA had to request another extension which also included the Force Majeure component. PRASA presented to the USEPA nine outstanding projects as part of the ongoing modification discussion of the 2015 USEPA Consent Decree. The requested extension, currently under review, includes the new completion dates, which are subject to the financial agreement terms to be established based on the CWSRF and DWSRF debt restructuring.
- PRASA previously completed the process of analyzing the rain and wastewater flow relationships, 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. However, as per the 2015 USEPA Consent Decree, the repair projects must be completed by 2021, otherwise the I/I study will have to be updated to address any new conditions or changes on the particular sewer system. In addition, 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 renegotiation 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 to recovery that has impacted PRASA's financial conditions and continuity of its CIP. The proposed revised compliance dates requested were based on the assumption that the CIP would be reactivated by January 2018, which did not occur. Due to the fact CIP was not reactivated as planned, the expected compliance dates established in Appendices H, I, and J of the CD require scheduling review. In addition, as previously stated, as a result of PRASA's Force Majeure notification the extension of the expected compliance dates of the projects established in Appendices H, I and J (Base List and Prioritization List Projects) of the 2015 USEPA Consent Decree may require changes to address the need to develop new and /or modified projects.
    - As previously stated, on August 2020, PRASA signed the CWSRF loan, however the DWSRF still pending to be finalized.

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. For the period covered in the BPRs No. 8, 9, and 10 there were no new STS constructed.
- SSOMP Program and Condition Assessment Program with respect to 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 on previous

Biannual Reports USEPA agreed upon the submission of a consolidated SSOMP Annual Report beginning May 2019 until the Consent Decree terminates. As discussed, and agreed by USEPA, PRASA submitted the first consolidated SSOMP Annual Report 2018 on May 31st, 2019. Thereafter, also due to Force Majeure invoked for the COVID-19 pandemic PRASA requested an extension for the submittal of the May 2020 Consolidated S2OMP Report until November 1st, 2020.

- As of August 31st, 2020 PRASA, has recognized over a 1 million linear feet of pipeline that are connected to the Puerto Nuevo WWTP system. From the period cover in Biannual Report No. 9 and 10, September 1st through August 31st PRASA completed the reconnaissance of an additional 10,500 linear feet. 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 is being sought up for June 2021 for all sewer lines with a diameter less than 30-inch. For the sewer lines with diameters of 30-inch or greater located within the High Priority Areas, PRASA will complete reconnaissance of the mentioned sewer line by June 30, 2026. No illegal interconnections to the Puerto Nuevo WWTP sewer system were found during the period of March 1st, 2019 to August 31st, 2020. There are no illegal interconnections pending for correction during this period.
- By August 31st, 2020, the following has been found and/or achieved regarding the Puerto Nuevo WWTP sewer system:
  - Cleaning of approximately 854,000 linear feet of sanitary sewer pipeline.
  - PRASA has an ongoing bidding process for additional sewer cleaning projects in fiscal year 2021.
  - From March 1, 2019, to August 31, 2020, 69 PRASA sewer lines were identified with sewer defects within the Puerto Nuevo WWTP sewer system. Since SSOMP implementation, 205 sanitary sewer defects have been identified and 159 sanitary sewer defects have been corrected. Additional seven sewer defects will be corrected under the CIP Project, when activated.
- PRASA seeks modification of the one-year period to correct defects that hinder the operation of the Puerto Nuevo RWWTP sewer system. PRASA proposes the period of correction for the sanitary defects to be determined based on a case by case evaluation. PRASA and USEPA met in multiple occasions to discuss the criteria to correct defects based on sewer repair and re-inspection criteria; a prioritization process will be established. As a result of Force Majeure Event schedule delay encountered, PRASA has had to reinitiate the process for evaluation of alternatives, PRASA continues to investigate options to monitor the occurrence of discharges from CSWO outfalls and means to estimate the discharge flow. PRASA has 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. PRASAS 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 Dry Weather overflow events.
- Puerto Nuevo WWTP sewer system initiatives, PRASA's SSOMP Program and status of FOG Program:
  - As a result of the 2017 Hurricanes, FOG Control Program inspections were suspended between September 2017 and February 2018 as PRASA resources were reassigned to recovery efforts.
  - On March 2018, PRASA resumed and continued since then the public education program. Orientations and meetings were held with food associations, non-profit organizations, government

agencies and municipalities to introduce the new requirements and guidelines of the program. The inspections schedule was established according to the Prioritization System.

- From March 2019 to August 2020, PRASA conducted refresh training to approximate 45 inspectors and supervisor, which included the following topics: overview of the FOG and POGS Control Program, grease control equipment requirements, inspection process, best management practices and education program. Furthermore, PRASA continues the public educational campaign entitled: *Tuberías Limpias*. The goal of the campaign is to educate citizens, establishments, and industries about the proper management of fats, oils, and grease. Summary of inspections conducted from March 2019 to August 2020 are included on **Table 6-3** below:

Table 6-3. Summary of FOG Program Inspections March 2019 to August 2020

Region	Number of Inspections
East	2,484
Metro	4,120
North	2,795
South	3,978
West	2,148

- As result of the COVID-19 pandemic impact, the inspections were suspended from March 15, 2020 to June 8, 2020.
- As reported in BPRs No. 8, 9, and 10 no Dry Weather Overflows (DWOs) events occurred during this reporting period.
- In FY2020, PRASA identified and presented the method chosen to approximate Sanitary Sewer Overflow (SSOs) or Unauthorized Release. In order to identify the approximate flow of SSO or Unauthorized Release, a pictographic method was selected to identify through comparison the approximate overflow flow rate in gallons per minute (gpm). On September 30, 2019, PRASA began the implementation of the pictographic method. Guided training on the selected method was provided to all PRASA personnel associated to sanitary sewer system duties and to the 24-hour overflow notification.
- Status updates of SSO events reported in BPRs No.6, 7, and 8 are as follow:
  - BPR No. 6: Villa Margarita Ward. St. 175, Km. 2.12 E-29 - Trujillo Alto due to complexities encountered and additional costs required, an amendment to the contract is needed to complete the project. Currently the project is 80% of the design phase.
  - BPR No. 7: 406 St. Alcaniz San José San Juan- completed on November 22, 2019.
  - BPR No. 8: Calle Loíza Esq. San Jorge, San Juan- completed on November 4, 2019.
- Three sanitary sewer overflow events were identified during the period covered by Joint BPRs No. 9 and 10, however were not corrected within the reporting period:
  - Alda St., Cupey – expected completion by December 2020
  - Int. Mayagüez St. and Ponce de León Ave., Hato Rey – expected completion by March 2021

  - #517 Lippitt St., Bo. Obrero, San Juan – expected completion by June 2021

- Caño Martin Peña Projects: None of these projects were performed during the period of March 2019 to August 2020. 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 status report of the sewer inventory and mapping project on March 17, 2017. The final report was submitted to EPA on March 29, 2019. 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 each in May each year. Due to the Force Majeure invoked as a result of the impact of the COVID-19 pandemic, USEPA granted an extension up to November 1st, 2020 for the submittal of the May 2020 S2OMP Annual Report.
  - Sewer Systems and Mapping Projects:
    - PRASA GIS Maps within Barriada Figueroa basin were updated after sewer cleaning of the area was performed. PRASA awarded several projects to cleaned high priority basins that were reliant upon observing maintenance problems related to FOG, sediment buildup, debris o roots.
    - PRASA established a minimum of 2-yrear revisit frequency for some areas within the High-Priority Area and document it in PRASA's GIS.
    - PRASA purchased two sewer cleaning trucks and an easement "jetter" machine dedicated for use by S2OMP as part of the SSMC program and is working towards fulfilling the staffing and additional equipment needs.
    - PRASA's contractors will be phased out as the SSMC to maintain 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 lifetime of the asset as documented within the PRASA GIS. PRASA has completed approximate 82% of cleaning of the High Priority Areas during FY2019.
    - Large diameter sewer cleaning will be performed by specialized contractors through public bid processes within the CIP prioritization process.
- Several areas of concern (19) within the Puerto Nuevo WWTP system were identified on 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 and such request was granted. In addition, on 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. As a result of the Force Majeure Events of COVID-19 pandemic, certain actions for the areas of

concern related to interim measures, such as inspecting and monitoring sewer system during April 2020 were not fully undertaken.

- 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 WWTP's and WTPs) and final NPDES limits. Notwithstanding, the Force Majeure events impact to treatment facilities and water sampling equipment have affected PRASA's effluent monitoring data activities. Therefore, despite preparatory measures and best efforts taken, PRASA has been unable to meet the full breath of its water quality sampling and analysis, and reporting obligations under the CWA and 2015 USEPA Consent Decree for all its facilities. 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. The design/build phase for the new PRASA Central Laboratory has been awarded and construction is expected to begin during FY2021. However, the temporary lab is partially certified, approximately for 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 WWTP's, WTP's, and STSs were too jeopardized by the passing of the hurricanes. Until facilities and sewer lines repairs are completed PRASA compliance with permit and 2015 USEPA Consent Decree limitations is compromised. 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. All the samples during the earthquakes event in January 2020 could not be collected, analyzed, or reported as required. Furthermore, in March 2020 the COVID-19 pandemic impacted Puerto Rico and therefore PRASA operations causing labor interruptions because of the need of the implementation of occupational safety and health measures protocols (COVID-19 Protocol). Due to the novelty of the event, complexity of logistics, limitation of personnel availability, personal protective equipment, among other challenges faced certain required monitoring, sampling, analysis, or reporting could not be carried out. For NPDES obligations not being complied, including new restrictive limits of some parameters, PRASA continues to seek interim limits protection.
        - For the period covered by the BPRs No. 8, 9, and 10, there were renegotiations of Interim Limits. Appendix 9 of the Joint BPR No. 9 and 10 includes a letter of the Interim Limits Renegotiation Summary during this period sent on to USEPA. Parameters renegotiated include: Total Suspend Solid, Dissolve Oxygen, Enterococci, Phosphorus, Total Nitrogen, Copper, Cadmium, Silver, Zinc, Lead, among others.
- 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 Biannual Reports No. 8, 9, and 10 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.

  - Corrosion Control Program (CCP): Although PRASA met the deadline of June 1, 2017 to submit the CCP, as per USEPA approved extension, the development of such program has been impaired by the effects of the 2017 Hurricanes. PRASA began implementation of the CCP with site visits conducted on September 3rd, 2019. However, the implementation 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. During the period of March 1st, 2019 to August 31st, 2020, PRASA hired 50 operators. Only five operators have completed the NPDES training and 13 are still within the six months window from the hiring date and the training is already scheduled. The remaining 20 operators are expected to take the online training no later than December 2020. The trainings delay was mainly caused as a result of the Force Majeure events occurred in FY2020. NPDES training requirement was not fully undertaken. Furthermore, PRASA offered 157 training courses included in the approved training program. In accordance with recent restructuring 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. As per the Joint Biannual Report No. 9 and 10, the PCS revision and update requirements are part of the ongoing Consent Decree modification expected to be filed before the Court. PRASA will implement revised and updated PCSs at the STSs and WWTPs in the Metro and West Regions by June 30, 2021 For East, North, and South Regions according to the scheduled discussed with USEPA, the PCS revisions and updates are expected to be completed by June 30th, 2022.
- Spill Response and Cleanup Plan (SRCP): The review process of the updated SRCP submitted was interrupted by the 2017 Hurricanes. Moreover, meetings for further discussion between USEPA and PRASA in regard to the SRCP updates were delayed due to implications associated with the COVID-19 pandemic. Pending meetings for the discussion and review of the updated SRCP are expected to be resumed.
- Monitoring, records and reporting requirements for *Unpermitted* STS: In accordance with Section XIX, Paragraph 66 of the Consent Decree the STSs identified pending NPDES Permit applications at the time of lodging of the Consent Decree are and their NPDES Permit status is:
  - For the period covered on the BPRs No.8, 9, and 10 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: In accordance with 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 several equipment (flow meters and totalizers) that were reported out of service on the Joint BPR No. 9 and 10 that are expected to be repaired between March 2021 and October 2021.

Stipulated Penalties: During the period from March 1st, 2019 to August 31st, 2020, consisting of BPRs No. 8, 9, & 10, 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 46 through 50 covering the period from July 1st, 2019 through September 30th, 2020. 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 September 30, 2020 is described below.

- Long-Term Measures 3: LTP3 projects have completion deadline of December 2021. As of the period evaluated, July 1st, 2019 through September 30th, 2020 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. In regards of these projects, PRASA submitted to PRDOH a proposal including interim remedial measures for Ceiba Sur WTP while the construction of Valenciano WTP is completed, so these plants can be eliminated. Two of the remedial measures are going to be renegotiated with the PRDOH to be eliminated; these are El Duque WTP and Canalizo WTP projects. Two projects (Monte del Estado WTP and Culebras) were included in the Prioritization List of the 2015 USEPA Consent Decree with expected completion date in 2032 and 2033, respectively. PRASA expects to renegotiate with PRDOH some of the completion dates for the outstanding projects.
- 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 are included in each of the corresponding Settlement Agreement Reports.
    - QSAR No. 46 states that PRASA submitted the required compliance certification and the status of the Continuous Monitoring Equipment for the period of July, August, and September 2019 to the PRDOH as agreed in the Section VII of the Settlement Agreement.
    - QSAR No. 47 states that PRASA submitted the required compliance certification and the status of the Continuous Monitoring Equipment for the period of October, November, and December 2019 to the PRDOH as agreed in the Section VII of the Settlement Agreement.
    - QSAR No. 48states that PRASA submitted the required compliance certification and the status of the Continuous Monitoring Equipment for the period of January, February, and March 2020 to the PRDOH as agreed in the Section VII of the Settlement Agreement.
    - QSAR No. 49 states that PRASA submitted the required compliance certification and the status of the Continuous Monitoring Equipment for the period of April, May, and June 2020 to the PRDOH as agreed in the Section VII of the Settlement Agreement.
    - 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 the 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 for the discussion of the development of the

Process Control Program focused on the compliance with DBPs. As per Quarterly Progress Report No. 47, on December 18, 2019, PRASA met with the PRDOH where was established and agreed a draft language to be incorporated in the Control Plan in addition to the strategies to address DBPs non- compliance water systems. PRASA developed the Process Control Plan and was submitted to the PRDOH. Currently, PRASA is in the process of addressing the comments made by the PRDOH, however this has been delayed due to the COVID-19 situation. Also, PRASA must implement preventive measures on those systems with frequent DBPs violations as stipulated in Section IX. PRASA will discuss with the PRDOH the amendment to the agreement.

- Training Program: As stipulated in Section XI, PRASA must train all personnel for the adequate operation and management of its facilities. As per QSAR No. 50, there were 391 employees pending to complete the required training as stipulated in the 2006 PRDOH Settlement Agreement. This is expected to be completed during the first quarter of 2021. In accordance with recent restructuring, 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.
- Stipulated Penalties: During the period from July 1st, 2019 to September 30th, 2020 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 $196,800, as summarized in **Table 6-4**. Furthermore, it is important to note that 51% of the penalties were related to Primary Standard DBPs exceedances, 39% was associated to missing or late Deliverables and 9% to Mitigation Measures; while other penalties including Primary Standards such as Bacteriology, Turbidity, and CT, and Remedial Measures represented only 1% of the total amount. 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 6-4. Stipulated Penalties

Reporting Period	Penalty Amount
July 1, 2019 to September 30, 2019	$66,200.00
October 1, 2019 to December 31, 2019	$37,200.00
January 1, 2020 to March 31, 2020	$32,500.00
April 1, 2020 to June 30, 2020	$27,200.00
July 1, 2020 to September 30, 2020	$33,700.00
Total	**$196,800.00**

- Supplementary Environmental Project (SEP): The SEP project presented to PRDOH, was divided in three projects which were 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.
- Through a bidding process, PRASA awarded the 2nd SEP project to Environmental Quality Inc. and the contract was signed on July 18th, 2019.
- As per QSAR No. 50, PRASA has made three requests of disbursement to the PRDOH from the escrow account between November 2019 and August 2020 for the 2nd SEP project. **Table 6.5** includes a summary of 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 6-5. 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	Pending for approval
	Total	**$486,695.98**	**$235,047.25**

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. With respect to the new discharge limits for residual chlorine, nitrogen, and phosphorus, PRASA is mostly using interim limits due to their inability of meeting the new lower limits for the abovementioned parameters as a result of 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, on 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 which 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 that 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. On February 20, 2020, USEPA issued preliminary determinations to regulate PFOA and PFOS. This is an ongoing and high priority effort for USEPA.

- Also, as previously noted, PRASA will be likely required to implement remediation measures in water wells that, under the GWUDI regulation, are found to be 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 to develop the well remediation program and action plan where needed. 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 for the revision of the Lead and Copper Rule. Under the proposal new actions include but not limited to identifying the most impacted areas, strengthening drinking water treatment, replacing lead lines, increase drinking water sampling reliability, improving risk communication to customers, and better protecting children in schools and child facility cares. PRASA must be wary of these new rules, if approved.

Finally, 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 and/or maintain the PWSs in compliance. However, any additional projects identified and included in PRASA's CIP will be subject to prioritization system.

6.7 America's Water Infrastructure Act of 2018

America's Water Infrastructure Act (AWIA) of 2018, Section 2013 mandates that community water systems serving more than 3,300 people must develop or update risk and resilience assessments (RRAs) and emergency response plans (ERPs). Community water system owners such as PRASA are required to take an all-hazards approach and expand the consideration of risk and resilience to include natural, proximity, and dependency threats in addition to malevolent threats. The all-hazards approach is a fundamental difference between the AWIA requirements and previous vulnerability assessments completed under the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Bioterrorism Act of 2002).

To comply with AWIA of 2018, organizations must produce two deliverables for each system: the RRA and an ERP that addresses the risks identified in the RRA. Both deliverables must be reviewed and updated (as needed) every five years. A certification of completion of the RRAs and the ERPs and each five-year review and update (as needed) must be submitted to the USEPA in accordance with the requirements stipulated in AWIA of 2018 and deadlines outlined in **Table 6-6** and **Table 6-7.** Findings and recommendations identified through the RRAs and ERPs shall be considered by PRASA and addressed through its CIP, R&R program, or through operational measures.

Table 6-6. AWIA 2018 RRA Certification Deadlines

Population Served	Deadline	Next Five-Year Update Deadline
Large System: Greater than 100,000 people	March 31, 2020	March 31, 2025
Medium System: Between 50,000 and 99,999 people	December 31, 2020	December 31, 2025
Small System: Between 3,301 to 49,999 people	June 30, 2021	June 30, 2026

Table 6-7. AWIA 2018 ERP Certification Deadlines

Population Served	Deadline (6 months after RRAs are certified but no later than)	Next Five-Year Update Deadline
Large System: Greater than 100,000 people	September 30, 2020	September 30, 2025
Medium System: Between 50,000 and 99,999 people	June 30, 2021	June 30, 2026
Small System: Between 3,301 to 49,999 people	December 31, 2021	December 31, 2026

Based on the Potable Water System Identification (PWSID) number, PRASA must certify 98 water systems: five large systems, five medium systems, and 88 small systems. PRASA completed the certification of the five large systems on March 26, 2020. The ERPs for large systems are projected to be certified in October of 2019. PRASA is on track to meet the deadlines for the certification of RRAs of medium and small systems and ERPs for medium and small systems.

6.8 10-Year Master Plan

The current Master Plan was last completed in 2010 and then revised in 2014 to account for adjusted population projections. As noted in the 2020 PRASA Fiscal Plan, PRASA will embark on the update and development of a 10-year plan, to be developed with results from the 2020 U.S. Census. The 10-year Master Plan will provide a long-term roadmap to transform PRASA's system into a simpler, safer, operationally efficient, and financially sustainable system and serve to consolidate recommendations from other plans and strategies including: Fiscal Plan, Emergency Response Plans, Climate Change Adaptability Plan, RRAs, resilience initiatives, etc. Additionally, the 10-year Master Plan will include a review of PRASA's project prioritization process and updates to said process, as necessary. PRASA expects to procure a qualified consultant to support in the preparation of the 10-year Master Plan. This procurement is projected to be completed in FY2021. The 10-year Master Plan development work is projected to begin in FY2022.

6.9 Conclusions

PRASA's six-year CIP generally addresses the needs of the System and complies with PRASA's existing commitments with Regulatory Agencies. It includes projects that cover a broad array of current and future needs, as identified by PRASA, and as required by consent decrees and agreements. However, it does not address all

findings and recommendations presented in Section 4 of this Report, nor findings and needs identified under other efforts completed to date by PRASA including the Climate Change Adaptability Plan[21] and the RRAs and ERPs being completed to comply with AWIA of 2018, among others. Also, it is important to indicate, that some of the findings can be addressed through the R&R program or maintenance and repair budget.

The six-year CIP 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 Renewal & Replacement and Emergency/Permanent Work projects. However, as noted in previous reports, given PRASA's high rate of leaks and overflows and continuing aging infrastructure, additional funds and a reactivation and acceleration of the Operations R&R program are required to reduce and minimize these incidences. Furthermore, as PRASA's10-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, as well as for other necessary infrastructure projects (i.e., fleet and building renovation, safety, NRW reduction and technological improvements) essential to maintaining and preserving the utility assets.

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. One of these future regulations is the Lead and Copper Rule, which is currently under revision to become more stringent.

PRASA continues to evaluate the potential impact of new regulations; however, the full impact of future regulations and other regulatory requirements on PRASA's System are 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 construction of new treatment processes and intensive repair programs. As the impact of future regulations becomes more defined, CIP modifications may be required to adequately accommodate resulting needs. These CIP needs, as negotiated or as currently being negotiated with Regulatory Agencies, will be prioritized and implementation schedules will depend on PRASA's financial capacity.

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. The delay in CIP reactivation and implementation could further affect the condition of the System and PRASA's ability to meet regulatory obligations, including environmental compliance regulations under the SDWA and the CWA. However, PRASA expects to escalate the CIP projects during FY2021 with the PMC's contracting.

[21] PRASA informed that an update to the Climate Change Adaptability plan will be included in PRASA's Master Plan Update, which is scheduled to be procured in FY2021.

7 Insurance Program

7.1 Introduction

Section 7.08 of the MAT establishes that "[PRASA] shall employ an Insurance Consultant to review the insurance program of the Authority from time to time (but not less frequently than biennially). If the insurance Consultant makes recommendations for the increase of any coverage PRASA shall increase or cause to be increased such coverage in accordance with 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 and determined its adequacy 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 a previous evaluation originally made by MARSH and validated or commented by AON, PRASA's Broker of Record (BOR) in FY2016. The Property Coverage BOR for FY2017 and FY2018, Lone Star Insurance Producers, LLC (Lone Star), was consulted to verify if the recommendations were addressed in the policy renewals or if they were not adopted. For FY2020 PRASA changed its BOR from Goas & Associates, Inc (GOAS) to Fedelta Insurance, who currently remains as PRASA's BOR. Furthermore, despite the stricter subscription, risk assessments and premium increases to FY2019 policies (as an effect of the upshot of the hurricanes that struck Puerto Rico on September 2017, other catastrophic events, and the impact to the insurance market), there are some changes to FY2020 policies. 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 that is directed towards management of 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 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 in 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 an increase in 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, which is liability arising from financial loss incurred by other that does not result in physical injury to persons or property.
10. Reputation risk which includes incidents, events or human actions which seriously damage the image and reputation of the organization.
11. Epidemic or pandemic that causes wide-spread 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 an increase in operating expenses to continue operations.

7.3 Assessment of Insurance Program

This section of the report provides outstanding recommendations, and BOR's responses/confirmation with respect to 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 FY2020 placed through MAPFRE PRAICO Insurance Company (MAPFRE) and Certain Underwriters at Lloyd's and International Markets. PRASA's Schedule of Values amounts to $11,021,002,890.00.

PRASA's property is insured by a policy issued by MAPFRE and includes the London & International Markets. Renewal of the policy occurred on April 1, 2019 and extended until April 1, 2020. PRASA's premium for all coverage under this policy was $16,112,931; $13,500,000.00 for Primary coverage and $2,612,931 for 1st Layer coverage. Other insurance companies are shown on the MAPFRE policy as "subscribers." This means they have each agreed to bear a portion of each loss, as follows:

Primary of $150M excess of $100M Self-Insure Retention (SIR):

- MAPFRE – assumed 42% of $150M primary; PRASA's premium share for this policy amounts to $5,670,000.00.
- International General Insurance (IGI) – assumed 43% of $150M primary. PRASA's premium share for this policy amounts to $5,805,000.00.
- Houston Casualty Company (HCC) – assumed 15% of $150M primary. PRASA's premium share for this policy amounts to $2,025,000.00.

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

- MAPFRE – assumed 42% of $150M in excess of $150M; PRASA's premium share for this policy amounts to $1,097,431.00.
- Certain Underwriters at Lloyd's – assumed 29% of $150M in excess of $100M deductible. PRASA's premium share for this policy amounts to $757,750.00.
- Sompo International – assumed 10% of $150M in excess of $100M deductible. PRASA's premium share for this policy amounts to $261,293.00.
- Axis – assumed 9% of $150M in excess of $100M deductible. PRASA's premium share for this policy amounts to $235,164.00.
- International General Insurance (IGI) – assumed 10% of $150M in excess of $100M deductible. PRASA's premium share for this policy amounts to $261,293.00.

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. FY2020 Property Coverage, Limits and Deductibles

Coverage	Limit	Deductible
Stop Loss Limit	$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

Coverage	Limit	Deductible
		Windstorm, Flood, Earthquake and Boiler & Machinery
Earthquake (EQ)	$300 million coverage afforded under Primary Limit and 1st Layer Limit. 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	$300 million coverage afforded under Primary Limit and 1st Layer Limit. 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	Coverage included within the limits	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Extra Expense	Coverage included within the limits	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Contingent Business Interruption	Sublimit of $35 million, within the limits	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Professional Services Fees	Sublimit of $2 million, within the limits	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Newly Acquired Locations	Coverage included within the limits	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including Windstorm, Flood, Earthquake and Boiler & Machinery
Boiler and Machinery	Coverage included within the limits	$100 million Each and every occurrence combined for Property Damage and Business Interruption, including

Coverage	Limit	Deductible
		Windstorm, Flood, Earthquake and Boiler & Machinery

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.

PRASA was able to collect the $300M coverage in the policy from the Insurance for the Hurricane Maria event after deductible of $25M. About half went to cover Business Interruption and the remaining will be used for projects. Moreover, PRASA is still in the process of negotiations with the Insurance for the claims regarding Hurricane Irma and post hurricane heavy rains; and investigation of damages due to the 2020 earthquakes in excess of the $100M SIR. However, the claim for the 2020 earthquakes was closed after letter from the insured stated that the loss sustained did not reach the deductible. PRASA can claim up to the limit of $300M for each event. Furthermore, it is important to note that PRASA has claimed FEMA for assistance to pay for the damages not covered by the Insurance.

Renewal of this policy for FY2021 covers from April 1, 2020 and extends until April 1, 2021. The policy coverages, limits and deductible for the primary and each excess layer remain the same as presented in **Table 7-1**. As the policy premiums significantly increased from FY2018 to FY2019, remained the same for FY2020, but for FY2021 there was a 12% increase in premium to $18,000,000.00 ($15M for Primary Limit premium and $3M for 1st Layer premium).

The new FY2021 Policy coverage is as follows:

- Stop Loss Limit of $300M.
- Primary of $150M with $100M SIR. Details of primary coverage is unknown as PRASA did not provide FY2021 policy for updating.
- First Layer of $150M in excess of $150M, in excess of $100M deductible. 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, in excess of $150M 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, the impact of the 2020 earthquakes (under evaluation), the Business Interruption loss due to the COVID-19 pandemic, 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 by MARSH including AON comments, regarding PRASA's property insurance policy. Also, included is confirmation of action by Lone Star of said recommendations:

1. The current Probable 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, MARSH strongly recommended that PRASA undertake a new PML Study.

   AON agreed with this recommendation. Lone Star indicated that PML analysis was performed for underwriting purposes only, resulting in FY2018 policy limits being accepted by PRASA.

   Nevertheless, Arcadis still recommends that PRASA undertake a new PML study particularly after the impacts and lessons learned from the September 2017 major hurricanes, the 2020 earthquakes and more recently the COVID-19 pandemic.

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 on September 18, 2019 and extended until September 18, 2020. The policy premium increased 75% to $50,000. However, the significant change in premium lead to a decrease in deductibles for each crime coverage from $75,000 to $50,000.

Table 7-2. FY2020 Crime Coverage, Limits and Deductibles

Coverage	Limit	Deductible
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

Coverage	Limit	Deductible
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
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 FY2021 should cover from Sep 2020 and extend until Sep 2021. Coverage and limits are unknown as PRASA did not provide policy for review.

7.3.3 General Liability

PRASA's FY2020 commercial general liability program is issued by MAPFRE with the limits detailed in **Table 7-3,** below. Renewal of policy occurred on July 1, 2019 and coverage extended until July 1, 2020. 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 as respects to claims adjustment expenses per policy year, so once this amount is paid by PRASA, the Insurance Company will pay these amounts from the first dollar and the SIR would apply to indemnity payments only. Additionally, 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. FY2020 General Liability Coverages and Limits

Coverage	Limit
General Liability – Each Occurrence	$1,000,000
General Liability – General Aggregate	$2,000,000
Personal and Advertising Injury	$1,000,000
Products - Completed Operations Aggregate	$2,000,000
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 $1M limit Aggregate. The deductible for Employees Benefits Liability is $1,000.

Renewal with MAPFRE of this policy for FY2021 covers from July 1, 2020 and extends until July 1, 2021. Coverage and limits remain the same, as shown in **Table 7-3**. The premium remains the same at $920,550. There were some changes within the General Liability Declaration, the location list was expanded, and all are listed on the Premium Basis of Payroll. Also, aggregate limits as per ISO forms CG-2504 (03-97), and CG-2503 (05-09) were not included.

Recommendations & Responses

The following pending recommendations were previously made by MARSH including AON comments regarding PRASA's general liability program. Included recommendations are:

1. Under the "Special Conditions" endorsement attached to the MAPFRE policy; MARSH recommended the following amendment be performed.
    a. Severity of Interest (item 9) should be revised to read Severability of Interest.

    Arcadis agrees with AON previous recommendation and recommends that it should be included in the next policy renewal.

    Change was included in the FY2020 renewal.

    Although the recommendation was addressed in FY2020, in the FY2021 Renewal it was written as Severity of Interest (item 4) under "Special Conditions". Again it should be revised to read Severability of Interest.

2. Commercial General Liability program excludes coverage for any Terrorism event. Considering the Insured operations and act of Terrorism is an important and potentially severe exposure with considerable

implications. It is recommended that Terrorism coverage should be considered under PRASA's Commercial General Liability program.

This was not included in the FY2020 policy nor the FY2021 renewal. 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.

7.3.4 Automobile Liability

PRASA maintains automobile liability coverage through MAPFRE. Renewal of policy occurred in July 1, 2019 and extended until July 1, 2020 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. Hired autos not considered under this coverage.
- Drive 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%.
- 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.
- Road Assistance Coverage is included for 135 units classified as either private passenger auto, or light truck weighing less than 7,100 pounds.
- 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 each trailer; $35,000 each tank/refrigerated unit; $20,000 each non-refrigerated or van unit; and $15,000 each flatbed, chassis and "Gen set". All subject to a $500 Comprehensive and Collision deductible. Losses to chassis will be paid under replacement cost basis. Coverage excludes the exchange of any container, moving trailer, or related equipment between municipalities or governmental agencies.
- Temporary Substitute Vehicle Coverage extends only during the period provided, prior use of vehicle, the insured's employee obtains permission from the Named Insured. Subject to limit of liability:
    - Private Passenger Type $40,000
    - Commercial Type $40,000
    - Comprehensive: Stated amount less $500 deductible
    - Collision: ACV less $500 deductible

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". 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. Premium for this coverage totaled $18,000.

Renewal with MAPFRE of the commercial auto policy for FY2021 covers from July 1, 2020 and extends until July 1, 2021. Coverage and limits remain the same as presented above. Number of units covered are unknow, as PRASA did not provide requested information. Premium stayed the same at $593,700.

The Garage Keeper's coverage for FY2021 remains the same as well. No increase in premium.

Recommendations & Responses

The following pending recommendations were previously made by MARSH, including AON comments regarding PRASA's Commercial Auto and Garage Keeper's programs. Also, included is confirmation of action by Lone Star of said recommendations:

1. MARSH recommended that form U-6 (11-93) "Liability Coverage Exclusion Endorsement" be eliminated since the language utilized is too broad and may present coverage interpretations unfavorable to PRASA.

   AON agreed with this recommendation and submitted it to the insurer for review and approval.

   Lone Star indicated that it submitted recommendation to insurer for the FY2018 policy and the specifications for the FY2019 renewal but were not adopted by the Insurance.

   Arcadis revised the FY2020 policy and FY2021 Renewal and the form was not eliminated. Recommendation remains to eliminate Liability Coverage Exclusion Endorsement from next renewal period.

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. Underlying insurance limits: $1MM for Bodily injury and Property Damage per each occurrence; $2MM for injury and damage per General Aggregate /per Products-completed operations; and $1MM for personal and advertising injury per person or organization/per each accident/per each employee/per employee aggregate. Renewal of policy occurred on July 1, 2019 and extended until July 1, 2020. Coverage is provided through MAPFRE on a $850,000.00 premium.

Renewal with MAPFRE of the umbrella policy for FY2021 covers from July 1, 2020 and extends until July 1, 2021. 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 two excess layers of directors & officers (D&O) liability insurance. Coverage provided through Chubb. Renewal of policy occurred on July 1, 2019 and extended until July 1, 2020. 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 1, 2010 on the first excess issued by Liberty, second excess layers by Berkley and Liberty, and July 1, 2016 for the last second excess layer issued by AIG. The D&O carriers and limits are shown in **Table 7-4.**

Table 7-4. FY2020 Directors and Officers Liability

Insurer	Limit	Premium
Chubb Insurance Company (Primary)	$15 million	$172,500
Liberty Mutual Insurance Company (First Excess Layer)	$10 million excess of $15 million	$57,500
Berkley Insurance Company (Second Excess Layer)	$10 million excess of $25 million	$46,000
Liberty Mutual Insurance Company (Third Excess Layer)	$10 million excess of $35 million	$40,250
AIG Insurance Company (Fourth Excess Layer)	$5 million excess of $45 million	$30,000
Total D&O Limit	$50 million	$346,250

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. The premium for Primary, First Excess Layer, Second Excess Layer and Third Excess Layer coverage increased 15%. The Fourth Excess Layer premium increased 20%.

Renewal of this policy for FY2021 covers from July 1, 2020 and extends until July 1, 2021. Details of coverage could not be verified as copy of the FY2021 Policy was not provided at the time of this Report.

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 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, 2019 and extended until July 1, 2020. PRASA's premium for the primary policy increased 15% to $155,681.00 and 105% to $77,840.00 for the excess policy.

A benchmarking study, shown in **Figure 7-1** based on limits carried by other public corporations in the industry class with similar level of corporate and economical 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 maintain those limits.

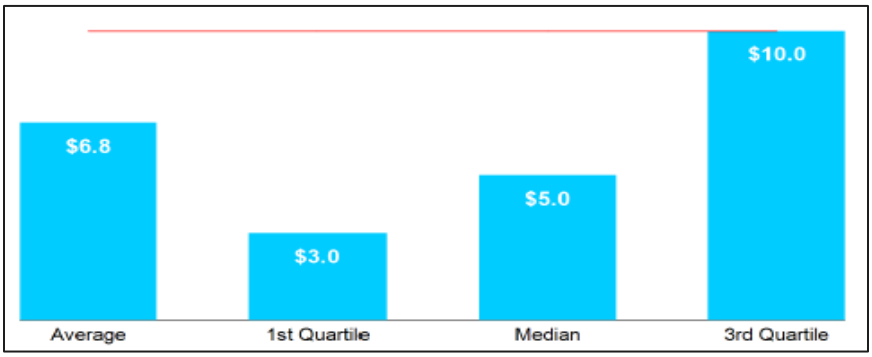

Figure 7-1. Employment Practices Liability Benchmarking Analysis

Renewal of the EPL for FY2021 covers from July 1, 2020 and extends until July 1, 2021. Details of coverage could not be verified as copy of the Policy was not provided at the time of this Report.

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. Policy was renewed on July 1, 2019 and extended until July 1, 2020. A retroactive date of July 1, 2002 applies. PRASA's premium for this policy remained at $253,740.00. An added coverage for "Terrorism Risk Insurance Act" was offered but not accepted by PRASA due to higher premiums.

Renewal of this policy for FY2021 covers from July 1, 2020 and extends until July 1, 2021. Coverage, limits and premium could not be verified as copy of the Policy was not provided at the time of this Report.

Recommendations

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

7.3.9 Accident Liabilities for Travel and Divers

PRASA's FY2020 accident coverage program for travel is issued by Chubb with the limits detailed in **Table 7-5**, below. Renewal occurred on July 12, 2019 and extended until July 1. 2020. Policy has a $2.5M annual aggregate limits. Coverage is available for PRASA employees named as Insured. PRASA's premium for this policy remained at $1,000.

Table 7-5. FY2020 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 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 FY2021 covers from July 1, 2020 and extends until July 1, 2021 Coverage, limits and premium could not be verified as copy of the Policy was not provided at the time of this Report.

In addition, PRASA maintains an accident coverage program for divers, as issued by Chubb. Renewal occurred on July 12, 2019 and extended until July 1, 2020. Policy has a $750,000 annual aggregate limits. Coverage is available for PRASA employees named as Insured. Coverage includes $250,000 limit for Accidental Death as well as for Accidental Dismemberment. PRASA's premium for this policy remained at $19,900. Same caveat for Accidental Medical Expense reimbursement as for Accident (Travel).

Renewal of this policy for FY2021 covers from July 2020 and extends until July 2021. Coverage, limits, and premium could not be verified as copy of the Policy was not provided at the time of this Report.

7.3.10 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 had an impact on 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 by MARSH including AON comment regarding PRASA's cyber liability policy:

1. **Consider cyber liability coverage.** MARSH recommended that PRASA complete a self-assessment to determine potential areas of weakness as compared to international standards and also to determine the potential frequency and severity of a breach. These two studies will help to gauge limits. With this information in hand, MARSH 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.

AON agreed with this recommendation to purchase a Privacy & Cyber Liability Policy and advocated so at the time for renewals but was not approved by PRASA.

PRASA requests such professional policy from subconsultants (IBM, Accenture, etc.), however are 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 on-site dedicated payroll, except as otherwise endorsed into the policy. 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, 2019 to April 23, 2020. Coverage applies to all risks of direct physical loss, except as excluded by the policy. Estimated value of all projects $26,103,605.00. The maximum contract value per contract/project is US$18,000,000.00 and maximum project period is 18 months. The Limit of Liability in any one occurrence and in the annual aggregate for the policy term is US$26,103,605.00. Policy period Aggregate Limits of Liability are $26,103,605.00 for Earthquake and Windstorm, and $10,000,000.00 for Flood. Since the value of projects for FY2020 was reduced by approximately $124M, the maximum limit per project decreased 28% while the maximum project period remained the same. Also, the Aggregate Limits of Liability were reduced about 50%.

Certain sub limits apply to additional exposures, such as off-site storage, inland transit, and debris removal, but 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 maximum limit of liability. Due to the changes in coverage value PRASA's premium for this policy decrease by 78% to $156,622.00 and includes Sublimit as shown in **Table 7-6**.

Table 7-6. FY2020 OCIP Builder's Risk Sublimit 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

Coverage	Sublimit*
Principal's Existing Property	$1,000,000- each and every loss in the annual aggregate
Offsite Storage	$2,000,000 any one storage location
Expediting Expense	$1,000,000 or 25% 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	25% of the amount of loss
Plans, Blueprints, Drawings or Other Documents	$250,000
Flood	$24,000,000 – per occurrence
Existing/Surrounding Property	$1,000,000 – per occurrence
Extra Charges-Overtime/Others	$150,000 – per occurrence
Testing and Commissioning Period	4 weeks, 10% of loss, Minimum of $100,000

***In no event shall these sublimit increase the Limit or Aggregate Limits of Liability of US$100,000,000.**

The Physical Loss of or damage to property insured deductible is US$20,000.00 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$50,000.00 deductible in any one occurrence applies for damage to Principal's Existing Property; and US$100,000.00 deductible for Property insured while undergoing Testing and Commissioning. The last two deductibles increased 150% and 100% respectively.

Renewal of the Builder's Risk policy for FY2021 with CHUBB covers from April 23, 2020 and extends until April 23, 2021. The premium is $317,382.00, which more than doubled because the value of all projects under the insurance also increased significantly to $52,897,036.00 The maximum contract value per contract/project remained at US$18,000,000.00 and maximum project period is 18 months. The Limit of Liability in any one occurrence/project and in the annual aggregate for the policy term is US$18,000,000.00. 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**, except for the Offsite Storage, which went back to $1,000,000 any one storage location and the Expediting Expense change to 20% instead of 25% of loss.

Recommendations & Responses

The following outstanding recommendations were previously made by MARSH, including AON comments regarding PRASA's OCIP builder's risk policy. Also, included is confirmation of action by Lone Star of said recommendations:

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.

   AON agreed with this recommendation and submitted it to the insurer for review and approval.

   Lone Star confirms that this was not included in the FY2018 policy renewal. Arcadis requested confirmation from PRASA. No response was provided for the FY2019 policy nor the FY2020 renewal. The endorsement does not appear to be included in the FY2020 policy.

   Confirmation from PRASA was requested by Arcadis and no response has been provided to confirm whether the recommendation was adopted for the FY2021 renewal period.

2. MARSH 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.

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

   Lone Star confirms that this was not included on the FY2018 policy renewal. Due to the ongoing fiscal situation PRASA is hesitant to add additional costs. Arcadis requested confirmation from GOAS via PRASA. No response was provided for the FY2019 policy nor the FY2020 policy and no response has been provided to confirm whether the recommendation was adopted for the 2020-2021 renewal period.

7.4.2 Commercial General Liability

The OCIP general liability policy is as "per occurrence" policy provided by Chubb and includes the limits shown in **Table 7-7**. Policy period covers from March 9, 2019 to March 9, 2020.

Table 7-7. FY2020 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. Policy is silent as to who is responsible for deductibles. The OCIP Manual states the Contractor should assume this deductible.

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. PRASA's premium for this policy is $99,194.00, 13% less than FY2019's policy.

Renewal of this policy for FY2021 covers from April 23, 2020 and extends until April 23, 2021. Coverage, limits remain the same as presented above, however, premium for this coverage increased 102% to $201,009.00.

Recommendations & Responses

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

AON states that this kind of amendment will require additional premium. PRASA maintained the five years Completed Operations coverage extension period for the FY2020 policy.

PRASA maintained the 5 years in the FY2021 policy renewal, as it is cautious to increase premium costs due to the dire fiscal situation.

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$1,000,000.00 Policy aggregate, in excess of the primary OCIP commercial general liability limits of insurance. PRASA's premium for this policy is $52,207.00, 13% less than FY2019's policy. Policy period covers from April 23, 2019 to April 23, 2020.

The Completed Operations coverage extension is for five years from the termination date of the policy 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 FY2021 covers from April 23, 2020 and extends until April 23, 2021. Coverage, limits and SIR remain the same as presented above but with a US$25MM policy aggregate. However, premium for this coverage increased 103% to $105,794.00.

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 from April 23, 2019 to April 23, 2020. Policy details could not be verified, PRASA did not provide policy in time for review, only confirmation that it was provided.

7.4.5 Professional Liability

PRASA did not provide evidence of this policy, as such, it could not be verified.

7.5 Conclusions

The insurance program covering PRASA's exposures to risks of accidental property and liability losses arising from on-going operations provides reasonable coverage. However, several recommendations to PRASA's insurance program have been provided. Also, findings and recommendations stemming from the preparation of ERPs under AWIA of 2018 should be considered by PRASA.

Particularly, PRASA should address the following key recommendations:

1. Conduct a PML Study considering new CAT Modellings and parameters. Specially after the lessons learned in the aftermath of the September 2017 Hurricanes, the 2020 earthquakes and more recently the COVID-19 pandemic.
2. In addition to their Rainy-Day Fund, 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.
3. Consideration to 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.
4. Consideration to Terrorism Coverage, which is excluded under all current PRASA's Insurance Programs.
5. 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.
6. 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 is for five years from the termination date of the policy or its renewal(s). Should also consider 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 FY2020. The statement relies on most recent preliminary data available from and provided by PRASA. Also, Arcadis evaluated PRASA's financial forecast as included in the 2020 PRASA Fiscal Plan as certified by the Oversight Board on June 29, 2020 (2020 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, 2019. 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 $6,236.3M (net of accumulated depreciation).

Table 8-1. Preliminary Fixed Assets Balance through June 30, 2019 ($, Millions)

	Book Value	Accumulated Depreciation	Net Book Value[1]
Fixed Assets	$10,691.8	($4,881.9)	$5,809.9
Construction (Work) in Progress	351.4	-	351.4
Land and other Non-Depreciable Assets	75.0	-	75.0
Total Capital (Fixed) Assets	$11,118.2	($4,881.9)	$6,236.3

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

Table 8-2 summarizes PRASA's preliminary book value of capital (fixed) 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 $6,062.7M (net of accumulated depreciation).

Table 8-2. Preliminary Fixed Assets Balance through June 30, 2020 ($, Millions)

	Original Cost	Accumulated Depreciation	Book Value[1]
Fixed Assets	$10,678.6	($5,134.8)	$5,543.8
Construction (Work) in Progress	443.8	-	443.8
Land and other Non-Depreciable Assets	75.1	-	75.1
Total Capital (Fixed) Assets	$11,197.5	($5,134.8)	$6,062.7

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

Table 8-3 provides a summary of the fixed assets changes from FY2018 to FY2019 and from FY2019 to FY2020.

Table 8-3. Fixed Assets Changes ($, Millions)

	FY2018[1] to FY2019[2]	FY2019 to FY2020[2]
Fixed Assets (Net of Accumulated Depreciation)	($240.1)	($266.1)
Construction (Work) in Progress	29.9	92.4
Land and other Non-Depreciable Assets	-	0.1
Total Fixed Asset Changes	($210.2)	($173.6)

[1]Considers impairment losses related to the 2017 Hurricanes registered in FY2018. See PRASA FY2018 Financial Statements.

[2] 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 further amended the rate structure for Non-Residential accounts. These are summarized in **Tables 8-4 through 8-10**. Furthermore, to cover all projected operating expenses, CIP needs, and debt service obligations (assuming debt restructuring, or new external financing is attained), the 2020 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 another on July 1, 2018 and again on July 1, 2019. The latest rate adjustment implemented was as of July 1,2020.

The 2020 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 FY2025. **Table 8-11** summarizes the proposed annual adjustment amounts by customer type. Note, the 2020 PRASA Fiscal Plan assumes a 2.5% 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 8-4. 2013 Residential Monthly Base Charge per Account

(includes first 10 cubic meters of monthly consumption)

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

Table 8-5. Residential Volumetric Rate per Cubic Meter

Use Block (m^3)	Water	Wastewater	Water & Wastewater
>10 – 15	$1.25	$1.02	$2.27
>15 – 25	1.99	1.59	3.58
> 25-35	2.69	2.14	4.83
>35	2.84	2.27	5.11

Table 8-6. 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 8-7. 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 8-8. 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 8-9. Industrial Volumetric Rate per Cubic Meter

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

Table 8-10. 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
12"	9,479.50	9,479.50	18,959.00

As stated previously, to cover all projected operating expenses, CIP needs, and debt service obligations (assuming debt restructuring, or new external financing is attained), the 2020 PRASA Fiscal Plan included moderate annual rate increases (as required by the Oversight Board). Assuming that all initiatives will be implemented, and that debt relief will be achieved through the current negotiations, the following rate increases shall be effective on July 1st annually through FY2025.

Table 8-11. PRASA's Proposed Fiscal Plan Annual Rate Adjustments by Customer Type

Customer Type	Annual Rate Increase FY2020 – FY2022	Rate Increase FY2023-FY 2025
Residential	2.5%	2.5%
Commercial	2.8%	2.5%
Industrial	3.5%	2.5%
Government	4.5%	2.5%

The rate increases due on July 1st, 2020 have been implemented in compliance with the 2020 PRASA Fiscal Plan. PRASA expects to implement the rate changes through FY2022 automatically as permitted by the provisions, as amended, approved under Resolution No. 2167. However, to implement the rate increases shown in FY2023 and beyond, it is expected that PRASA will need to follow the formal rate increase approval process required under Act 21 of 1985, as the limit on the cumulative increase of 25% (since January 1, 2018) is expected to be reached by FY2022. 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 8-12. 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
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 the development of a report by the Official Examiner that would include his/her findings and recommendations, to be considered by PRASA's management and Governing Board prior to final approval of the proposed rate structure modifications and increases. Following this, the report is published for public commentary.
- The final step is the review and final approval by PRASA's Governing Board, in consideration of the Official Examiner's recommendations.

8.4 FY2020 Preliminary Results and FY2021-FY2025 Forecast

Arcadis reviewed the financial information provided by PRASA, the 2020 PRASA Fiscal Plan and the FY2020 budget amendment that incorporates the benefit of the federal debt restructuring as approved by PRASA's Governing Board in October 2019, and later certified by the Oversight Board on June 12, 2020. 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 FY2020 and the reasonableness of PRASA's assumptions in the preparation of the five-year financial projections (the forecast period or the Forecast) from FY2021-FY2025, 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 DSC, for the forecast period.

The following information, provided by PRASA, was reviewed:

- MAT, as amended and restated
- Preliminary revenue and expense projections for FY2020
- Revenue and expense projections for FY2021
- PRASA's June 29, 2020 certified Fiscal Plan (2020 PRASA Fiscal Plan)
- PRASA's FY2021 Annual Budget certified and approved on June 30, 2020 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 FY2021-FY2025
- The amount received and expected to be received from PRASA's insurance company and FEMA as a result of the impacts from Hurricanes Irma and María
- The amounts expected to be received from federal programs to fund PRASA's CIP such as the SRF and RD Programs

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)."*

PRASA's annual Operating Revenue projections for FY2020 through FY2025 net of 1) the 2020 PRASA Fiscal Plan revenue enhancing initiatives and 2) the expected insurance reimbursement from revenue loss from the September 2017 Hurricanes impact, presented on a cash basis in accordance with the MAT, are summarized in **Table 8-13**.

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

Fiscal Year	Operating Revenues
FY2020 Projection based on Preliminary Results	$1,038.4
FY2021 Annual Budget[1]	$1,073.1
FY2022 Projected	$1,102.0
FY2023 Projected	$1,150.7
FY2024 Projected	$1,199.4
FY2025 Projected	$1,239.8

[1] As certified by the Oversight Board on June 30, 2020.

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 FY2020 PRASA Fiscal Plan Adjustment (annual rate adjustment). **Table 8-14** provides a breakdown of PRASA's Service Billings (Net of Subsidies) for FY2020 through FY2025, including rate increases that were implemented starting in 2018, as well as future projected rate increases.

Table 8-14. PRASA Service Billings, Net of Subsidies ($, Millions)

Service Billings Category	FY2020 Preliminary[3]	FY2021 Annual Budget	FY2022 Projected	FY2023 Projected	FY2024 Projected	FY2025 Projected
Base Fee, Volume Charges, and ECRC and Special Charges[1]	$975.3	$982.9	$968.0	$954.8	$943.2	$932.1
Rate Increases[2]	72.1	109.6	140.4	167.8	195.1	223.0
Total (Net of Subsidies)	**$1,047.4**	**$1,092.6**	**$1,108.4**	**$1,122.6**	**$1,138.4**	**$1,155.1**

[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 2020 PRASA Fiscal Plan; net of new electronic bill discount.

[3] Preliminary projections as presented in the 2020 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, 2020.

Table 8-15. Water and Wastewater Subsidized Customer Accounts FY2020

Subsidy	Number of Customers	Percent of Total Residential Customers[1]
PAN Subsidy	67,271	5.7%
TANF Subsidy	9,654	0.8%
ASES Subsidy	5,776	0.5%
Fixed Tariff (Public Housing)	50,402	4.3%

[1]Based on a total number of Residential customers of 1,172,805 provided by PRASA as of June 30, 2020.

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.
- 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 2020 PRASA Fiscal Plan may differ from projections.

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

Growth and Consumption Assumptions

PRASA has experienced a compound annual reduction in number of accounts of about 0.1% per year in the last five fiscal years. Furthermore, as shown in **Table 8-16**, from FY2019 to FY2020 the number of customer accounts slightly decreased but overall remained mostly the same.

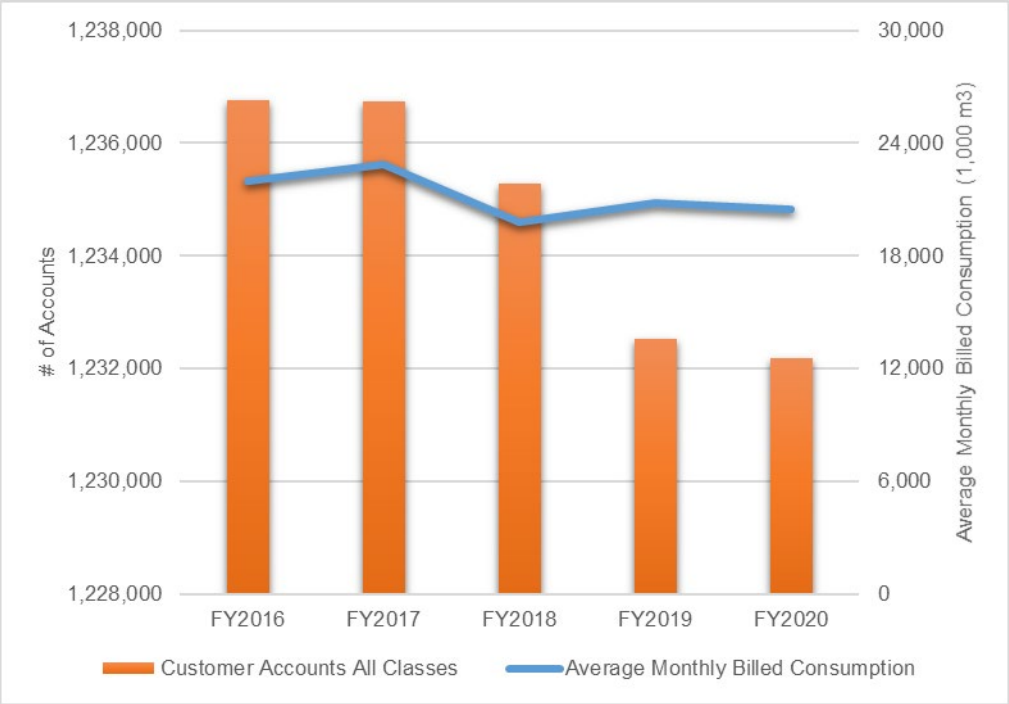

Figure 8-1: Customer Accounts and Average Monthly Billed Consumption FY2016-FY2020

Table 8-16. PRASA Customer Accounts

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2019[1]	1,173,437	49,167	753	9,169	1,232,526
FY 2020[2]	1,173,681	48,909	742	8,864	1,232,196
% Difference	**0.0%**	**-0.5%**	**-1.5%**	**-3.3%**	**0.0%**

[1] Number of accounts by customer class through June 30, 2019.

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

In FY2017, PRASA's average monthly billed consumption per account increased by approximately 4.1% compared to FY2016. This increase, however, was expected as customer consumption stabilized after the 2015 drought ended. That said, FY2019 and FY2020 consumption results were lower than those registered prior to the drought period: in FY2014, PRASA's average monthly consumption per account was 20.6 m3 whereas in FY2019 and FY2020 it was 16.9 m3 and 16.6 m3, respectively, suggesting customer consumption had not reached pre-drought conditions.

In FY2020, the total average monthly billed consumption decreased by approximately 1.8% compared to FY2019, while the average billed consumption per account decreased by 1.8% as compared to FY2019, as shown in **Tables 8-17 and 8-18**.

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

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2019[1]	14,851	2,445	1,177	2,373	20,845
FY 2020[2]	14,644	2,390	1,138	2,292	20,463
% Difference	**-1.4%**	**-2.3%**	**-3.3%**	**-3.4%**	**-1.8%**

[1] Based on billed consumption through June 30, 2019.

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

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

Fiscal Year	Customer Class				Equivalent Average
	Residential	Commercial	Industrial	Government	
FY 2019[1]	12.7	49.7	1,562.7	258.8	16.9
FY 2020[2]	12.5	48.9	1,533.6	258.5	16.6
% Difference	**-1.4%**	**-1.8%**	**-1.9%**	**-0.1%**	**-1.8%**

[1] Based on information through June 30, 2019.

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

According to the U.S. Census Bureau, there was a 1.8% annual decline in Puerto Rico's population between 2012 and 2019.[22] The Oversight Board projects Puerto Rico's population dropped by approximately 4.1% since FY2017 because of the outmigration from the 2017 Hurricanes[23]. Prior to the hurricanes impact, the Oversight Board was projecting that Puerto Rico's population was going to continue to decline over the next ten years at an estimated annual rate of 0.25%. Post 2017 Hurricanes, the Oversight Board developed updated and more aggressive population projections to account for the population outmigration experienced, and to be experienced, because of the 2017 Hurricanes. The updated estimates project an average 1.5% annual population decline through FY2025, which is an approximate decline of 9.0% from FY2019 to FY2025. This trend in population decline is one of the reasons for the water consumption reduction pattern experienced in the recent years, which worsened in 2016 due to the drought that affected a large portion of the Island towards the end of FY2015 and the first half of FY2016; and declined even further because of the 2017 Hurricanes. However, this level of population decline is not reflected in PRASA's numbers of active accounts.

[21] The U.S. Census Bureau shows Puerto Rico population estimate as of July 2012 was 3,634,488 and 3,193,694 as of July 2019.

[23] The Central Government's New Fiscal Plan for Puerto Rico (June 29, 2020) estimates the population for FY2019 to be at approximately 3.2 million.

Table 8-19 contains the projected macroeconomic indicators provided used by the Oversight Board for the 2020 Fiscal Plan:

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

FY	Population Change (compared to prior year)	GNP Change (compared to prior year)
2021	-1.6%	0.5%
2022	-1.6%	-1.5%
2023	-1.5%	-1.9%
2024	-1.4%	0.5%
2025	-1.3%	-0.1%

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 2020 PRASA Fiscal Plan and presented in **Table 8-11**. PRASA expects to obtain a total of approximately $908M additional revenues by FY2025 from the annual rate increases, from which $109.6M additional revenues are projected and included in the FY2021 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:

- Despite the consumption adjustment from FY2016 to FY2017 after the drought, historical results show that average consumption per account has continued a downward trend in recent years.
- Continued strain on the economy, the high unemployment rate in Puerto Rico[24], and the reduction in new construction permits and economic activity index[25], among other economic factors, could continue to materially affect consumption profiles, resulting in further declines in the consumption patterns and/or 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 2020 PRASA Fiscal Plan. With that being said, alternative revenue enhancing, and cost saving measures would be attempted prior to PRASA adjusting the currently planned rate increases.

[24] Based on the U.S. Bureau of Labor Statistics, as of February 2020 the unemployment rate in Puerto Rico was 8.8%; Source: www.bls.gov/lau/

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

- 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 FY2020 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.

However, due to the impact of the COVID-19 pandemic, collection rate assumptions across all customer segments were adjusted. Leading up to March 15, PRASA gathered 96% of forecasted collections in FY2020. After March 15, once social distancing measures went into effect and the Government approved Act 39-2020 (which prevented PRASA from disconnecting residential customer's water services due to non-payment), weekly collection rates dropped as low as 40% in April. As of May 31, PRASA reported that actual collections were 18%, or $60 million, lower than PRASA's year-to-date budgeted projections. PRASA is anticipating collecting 85% of the overdue bills that occurred due to the pandemic between April and June 2020 during FY2021.

In its FY2021 Annual Budget, PRASA has projected a recovery in collections to 96% for residential, commercial, and industrial accounts, and 91% for government accounts by January 2021. After achieving these collections levels in FY2021, PRASA expects to remain at the 96% collections rate for residential, commercial, and industrial accounts for the remainder of the forecast period. For government accounts, PRASA is projecting a 91% collections rate starting in January 2021, increasing by 1% each fiscal year thereafter and reaching 95% by FY2025.

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 consumption adjustments or further reductions in number of accounts, 2) if collections from Government accounts do not improve because of cost controls and budgetary actions imposed under PROMESA or by the Central Government, or 3) changing/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. Although a transfer to the Rate Stabilization Account was originally a part of the FY2020 Annual Budget and about $10.6M worth of deposits had been made, PRASA approved an amendment to the budget on April 9, 2020 via Resolution 3160, in response to the COVID-19 pandemic, that

reversed the transfers to the Rate Stabilization Account to offset the anticipated impact to revenues for FY2020. 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 FY2021 fees were about $500 each for water and sewer connections ($1,000 total per unit for both). Special Assessments depend on the fees paid by developers of new projects and it is expected that the current economic situation will continue to impact the local new housing market during the foreseeable future.

   PRASA's Other Income revenues for FY2020 preliminary projections totaled $2.9M, of which approximately $1.4M are from Miscellaneous Income and $1.5M from Special Assessments. PRASA is projecting $2.0M from Miscellaneous Income annually during the forecast period. Special Assessment revenues are projected to hold steady at the $1.5M annual amount for each fiscal year in the forecast period and miscellaneous revenues at $0.5M per year. Thus, PRASA projects an average of approximately $2.0M additional revenues annually from Other during the forecast period.

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

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 2020 PRASA Fiscal Plan: metering and customer service optimization, 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 8-20. 2020 PRASA Fiscal Plan Revenue Enhancing Initiatives ($, Millions)

	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025
Initiatives[1]	**Preliminary Projections**	**Annual Budget**	**Projected**	**Projected**	**Projected**	**Projected**
Metering and Customer Service Optimization	$0.0	$6.0	$29.5	$60.5	$89.2	$108.8
Adjustment Policy Revision	1.9	2.0	2.0	2.0	2.0	2.0
Disconnection Fee	1.0	1.2	1.2	0.9	0.9	0.9
Government Accounts Collections	18.0	1.0	3.9	6.0	8.1	10.3
Total Additional Revenues	**$20.9**	**$10.1**	**$36.7**	**$69.4**	**$100.3**	**$122.0**

[1] 2020 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 effect of this report.
[2] Numbers may not add up due to rounding.

Metering and Customer Service Optimization

As stated in the 2020 PRASA Fiscal Plan, PRASA understands the importance of reducing commercial water losses and improving customer experience and satisfaction. Therefore, the main objectives PRASA has identified for this revenue enhancing initiative includes:

- Efficiency and Customer Service Optimization
  - Improve customer service operations and client satisfaction
  - Increase commercial activities efficiency
- Commercial Water Loss Reduction
  - Unauthorized water consumption detection and improved collection rate
  - Geodatabase update and improved data quality
  - Water leaks reporting
- Private Funding for Advanced Meter Infrastructure
  - Replacement of all water meters to improve metering accuracy
  - Implementation of new technologies (remote reading)

Per the 2020 PRASA Fiscal Plan, this initiative aims to install real-time smart meter technologies and pursue activities that would help decrease commercial water losses and—to a lesser degree—physical water losses. By increasing the accuracy of water meters, PRASA will be able to transition away from estimated commercial losses and achieve a greater level of precision in its measurements. By reducing the uncertainty of the System's apparent losses, PRASA will be able to recover revenues lost to theft and unmetered usage and determine with greater accuracy the volume of real physical water losses. Ultimately, through this

measure, PRASA should be able to better determine its CIP needs and intelligently address the renewal and replacement of its linear (pipe) assets to reduce real losses.

PRASA can implement this measure either on its own or through a P3 agreement that is currently under negotiation with a selected proponent.

According to the 2020 PRASA Fiscal Plan, should PRASA enter a long-term P3 agreement, the evaluation must be based on the benefits generated throughout the term of the underlying agreement. This measure, over the proposed 20-year term, is expected to generate net benefits to PRASA, at nominal value, of approximately $570M on a fiscal basis—which excludes the avoided capital costs for meter replacement—and approximately $870M on a capital basis—which includes the benefit for the avoided capital costs for meter replacement.

The FY2021 Annual Budget reflects an increase in incremental revenues of approximately $6.0M because of this initiative. The 2020 PRASA Fiscal Plan projects continued increases in incremental revenues in each year of the Forecast worth $29.5M in FY2022, $60.5M in FY2023, $89.2M in FY2024, and $108.8M in FY2025.

However, as meter replacement ramps up during the first years of the measure, there is a negative net impact on PRASA's financial results due to initial payments to the proponent for meter installation and system setup. The incremental costs associated with the initiative are further discussed in Section 8.4.3.

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 FY2020, PRASA is projecting $2M and has included $2M in savings in its FY2021 Annual Budget and for each year of the Forecast thereafter.

Disconnection Fee

Also, Regulation 8901 creates a $15 charge for the cost of disconnecting service (in addition to the reconnection fee already in place). PRASA expects that the disconnection fee will deter clients from having their services suspended, thereby reducing the projected amount of annual disconnections performed. PRASA's FY2020 preliminary projections for disconnection fees totaled $0.7M and $1.2M in its FY2021 Annual Budget. The FY2020 PRASA Fiscal Plan projects disconnection fees to remain at the $1.2M level in FY2022, then drop to $0.9M in each year of the Forecast thereafter.

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 customer's water services due to non-payment) is still in effect, with no specific end date identified. This may delay or have a negative impact on the revenues collected from the disconnection fee policy initiative in FY2021 and beyond.

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 in FY2018 and FY2019 was 94.5% and over 100%, respectively; it recovered $55.9 million of Government accounts receivables in FY2018 and $72.6 million in Government and public corporations accounts receivables in FY2019. FY2020 projections have PRASA collecting $18M worth of aged accounts receivable, while the FY2021 Annual Budget reflects an improvement on government account collections worth approximately $1.0M. The 2020 PRASA Fiscal Plan projects continued improvement on government account collections resulting in revenue enhancements of $3.9M in FY2022, $6.0M in FY2023, $8.1M in FY2024, and $10.3M in FY2025.

Support from the Central Government and AAFAF is crucial for the successful implementation of this initiative.

5. Insurance Reimbursement from Revenue Loss (Exhibit 1, Line 5) – PRASA has made claims under its insurance policies for business interruption and property damage and has requested FEMA disaster grants for property repair, replacement, and restoration in excess of insurance proceeds and for certain emergency expenses. Arcadis reviewed the MAT, as amended, to determine the adequacy of the allocation of both insurance proceeds and FEMA reimbursements/grants to be obtained as a result of the impact of the 2017 Hurricanes; whether these proceeds can be applied as Operating Revenues or Authority Revenues. Arcadis requested PRASA to obtain legal opinion on the appropriateness of these assumptions.

   As per the definition established in the MAT for Operating Revenues (as defined in Section 2.1 of this report), "insurance proceeds (except use and occupancy insurance) or condemnation awards, are in no event to be included as Operating Revenues…". Additionally, the MAT includes the following in the definition of Operating Revenues; "Operating Revenues shall mean all moneys received by or on behalf of the Authority, including…(ii) any proceeds of use and occupancy insurance on the Systems or any part thereof…". Use and occupancy insurance refers to business interruption insurance coverage. Hence, proceeds for business interruption insurance have been included as part of the Operating Revenues for the FY2020 preliminary projections and in the FY2021 Annual Budget evaluated herein.

   FEMA grants, on the other hand, do not cover loss of income. FEMA grants and insurance proceeds to the extent that they are to reimburse PRASA for Current Expenses have been treated as a deposit to the Current Expense Fund. Insurance proceeds and FEMA grants received for the repair, replacement, or reconstruction of the damaged or destroyed property have been applied to the CIP.

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 FY2020 through FY2025.

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."*

PRASA's Operating (Current) Expenses are presented on an accrual basis as required by the MAT. PRASA's preliminary Operational Expenses for FY2020 and operating expense projections for FY2021 to FY2025 net of (i) capitalized expenses, (ii) the 2020 PRASA Fiscal Plan expense reduction initiatives, and (iii) the September 2017 Hurricanes impact, are presented in **Table** 8-21.

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

Fiscal Year	Operating Expenses w/o FEMA Reimbursements	Operating Expenses net of FEMA Reimbursements
FY2020 Preliminary	$721.1	$714.1
FY2021 Annual Budget	$713.7	$670.7
FY2022 Projected	$722.3	$722.3
FY2023 Projected	$745.1	$745.1
FY2024 Projected	$771.2	$771.2
FY2025 Projected	$793.4	$793.4

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 2020 PRASA Fiscal incorporates the Oversight Board's inflation rates projections, averaging about 0.94% for the forecast period (FY2021 through FY2025), that is from 0.26% in FY2021 to 1.21% in FY2025. However, Puerto Rico's inflation rate during the last quarter of FY2020 was recorded at about -1.7% (June 2020) and projections show a projected increase to approximately -0.2% by end of FY202126.

1. Payroll and Benefits (Exhibit 1, line 12) – 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 2020 PRASA Fiscal Plan expense savings initiatives, 2) the September 2017 Hurricanes impact on operating expenses, and 3) capitalization:

   - PRASA's FY2020 Payroll and Benefits preliminary results amounts to $328M.
   - For FY2021, PRASA is projecting Payroll and Benefits in the amount of $328.5M.
   - For the remainder of the forecast period, the 2020 PRASA Fiscal Plan is projecting only minor annual increases in the Payroll and Benefits expense.
     - FY2022 = $329.7M
     - FY2023 = $330.3M
     - FY2024 = $331.1M
     - FY2025 = $331.9M

   The Payroll and Benefits costs assumptions includes the cost of PRASA's pension costs on a pay-go basis, net of expected savings with the implementation of Act 26-2017. The 2020 PRASA Fiscal Plan is projecting a headcount of 4,700 employees by the end of FY2021 and for each year thereafter. However, in FY2021, was reduced to 4,600 because of the cost control measures as recommended by the Oversight Board. Arcadis

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

finds that the Payroll and Benefits budgeted amount is reasonable based on the historical results and the assumptions made by PRASA in its projections (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, 2020, PRASA had a total headcount of 4,584 employees (including 321 employees qualified under the Voluntary Pre-Retirement Program to be discussed in more detail below).

As of June 30, 2020, PRASA's hiring plan focused mainly in employing personnel for the Maintenance and Operations Departments. Staffing needs identified involve water and wastewater brigades, electromechanics, plant operators, heavy equipment operators, and supervising and managerial positions in both departments.

The FY2021 Annual Budget assumes a total of 4,700 employees in the baseline projections. The 2020 PRASA Fiscal Plan holds the headcount steady at 4,700 for each remaining year of the forecast period. However, the assumed number of employees for the forecast period was reduced to 4,600 starting in FY2021 via the headcount cap cost saving initiative implemented by the FOMB. This will be further explained in section 8.4.3.

Based on FY2020 preliminary results through June 30, 2020, the current overtime level is at approximately 9% of total payroll costs, slightly higher than the 8% PRASA had estimated in its FY2020 Annual Budget. PRASA has assumed a rate of overtime of 9% (as percentage of payroll) in the FY2021 Annual Budget. For 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 FY2020, PRASA employees' benefits include:

- Vacation licenses accumulate at a rate of 2.5 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 Christmas bonuses, 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. PRASA expects to pay the Christmas bonus to its qualifying employees up to $600 per year. Nonetheless, the Oversight Board requested the elimination of such payment as further explained below. PRASA has indicated that 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 for the economy to undergo a transition process. Besides the reduction of 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, 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 2020 PRASA Fiscal Plan cost savings initiatives discussed in line 18 of Exhibit 1.

Some of the eligible PRASA employees occupied positions that are managerial or supervisory in nature, which may create organizational challenges. As of June 30, 2020, over 321 employees are retired under the Voluntary Pre-Retirement Program.

Collective Bargaining Agreements Assumptions

In FY2012, PRASA and its larger employee union, the 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 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 also have an impact on PRASA's Payroll and Benefits expenses. Under Act 66-2014, PRASA was able to negotiate 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 will 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 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 OMB. Act 3-2017 extends until June 30, 2021, the termination date of any CBA (including the Authority's CBAs) in respect of its non-economic clauses and those clauses not affected by Act 3-2017. Non-economic clauses that have a direct or indirect economic impact on the Authority's operational budget are suspended, except for certain terms relating to on-the-job safety. After the expiration of Act 3-2017, those unions that represented employees as of July 1, 2014, may begin negotiating new CBAs. Government entities are required to negotiate based on the legal framework applicable during the negotiations and consider, primarily, the fiscal and economic situation of the entity and of the government in general.

Pension Costs Assumptions

The Central Government's ERS has been facing a significant number of 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 its retired employees on a Pay-Go basis due to the lack of sufficient liquid assets in the ERS. Therefore, PRASA's FY2020 preliminary projections and FY2021 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 FY2020, PRASA preliminarily projects $91M to cover employees' retirement benefits on a Pay-Go basis. In its FY2021 Annual Budget, PRASA forecasts $96.7M in pension Pay-Go costs per the Oversight Board's projection. Per the 2020 PRASA Fiscal Plan, pension Pay-Go costs are projected to be $95.5M in FY2022, $94.7M in FY2023, $94.0M in FY2024, and $93.3M in FY2025.

2. Electric Power (Exhibit 1, line 13) – PRASA's FY2020 preliminary projections for Electric Power total $140.9M, prior to 1) reductions due to the 2020 PRASA Fiscal Plan expense savings initiatives, and 2) the impact of the 2017 Hurricanes. PRASA has projected an electric power expense of $130.5M for FY2021, assuming a standard PREPA rate of $0.202 per kWh ($0.020 per kWh decrease from the FY2020 rate) and a more consistent projected electric power consumption as PREPA's service interruptions reduce. Per the 2020 PRASA Fiscal Plan, electricity consumption is expected to slightly decrease in FY2022 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 $0.207 in FY2022, $0.216 in FY2023, and $0.228 in FY2024, resulting in increasing electric power expenses of $133.4M, $139.0M, and $146.2M, respectively. By FY2025, the PREPA rate is projected to escalate to $0.238 per kWh resulting in an electric power expense of $152.9M (a total cost increase of $12.0M from the FY2020 preliminary projections). PRASA's projected cost

of electric power considers the projected and expected reductions in consumption from PRASA's Comprehensive Energy Program initiatives that have been completed YTD.

Arcadis finds PRASA's forecast period projection for Electric Power reasonable. However, PRASA is susceptible to varying prices. Close monitoring of electric energy usage must continue and PRASA shall adjust its projections, as necessary. Additional discussion on PRASA's Electric Power assumptions is provided below.

Electric Energy Tariff Assumptions

As stated previously, PRASA's PREPA rate for FY2020 was $0.222 per kWh and PREPA's projected rates applicable to PRASA for FY2021 is $0.202 per kWh. In recent months, PRASA has indicated that the average PREPA (blended) rate cost has varied between $0.18-$0.23 per kWh. For FY2022 through FY2025, PRASA is projecting PREPA (blended) rate costs of $0.207, $0.215, $0.226, and $0.237 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 $0.217 per kWh, which falls within the historical observed range and takes into consideration the great variability and fluctuations of oil barrel costs as well as PREPA's restructuring plan under development.

Comprehensive Energy Management Program and Regional Initiatives Assumptions

PRASA has included projected savings in consumption and costs as a result of its Comprehensive Energy Management Program, which PRASA has undertaken to help manage and reduce its electricity expense. 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 were placed on hold since FY2016. Three out of the six EPCs under the contract were completed (Caguas, Barceloneta and Bayamón 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 because of the September 2017 Hurricanes and subsequently cancelled. PRASA projects that the other three EPCs (Sergio Cuevas, Superaqueduct and Puerto Nuevo) will remain on hold during FY2021; PRASA has not budgeted any additional savings from EPCs in FY2021.
- **Regional Initiatives**: PRASA has implemented a Regional level commitment to execute energy conservation measures in its WTPs and WWTPs, as well in other facilities, and find savings at the operational level (with minimum or no investment). PRASA is also leveraging 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 FY2021, PRASA projects that the PPA initiative will generate 11.4 million kWh at $0.15 per kWh blended rate. For the remainder of the Forecast, PRASA assumes the $0.15 per kWh

blended rate to remain constant, while the consumption generated by the PPA initiative will slightly decrease year over year (11.34M kWh in FY2022, 11.26M kWh in FY2023, 11.2M kWh in FY2024, 11.10M kWh in FY 2025). 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 627 million kWh in FY2020. For FY2021, PRASA is projecting that its total consumption will be 650 million kWh, of which 639 million kWh will be power consumption bought from PREPA, net of the physical losses' initiative (refer to the 2020 PRASA Fiscal Plan cost savings initiative in Line 18 of Exhibit 1). This PREPA consumption projection also considers the Regional Initiatives expected to be achieved in FY2021 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 647 million kWh, of which an average of 636 million kWh will be power consumption bought from PREPA, net of the physical losses' initiative (refer to the 2020 PRASA Fiscal Plan cost savings initiative in line 18 of Exhibit 1).

3. Maintenance and Repair (Exhibit 1, Line 14) – The FY2021 Annual Budget for Maintenance and Repair is $57.0M, which is about $3.3M more than the FY2020 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 2020 PRASA Fiscal Plan projects Maintenance and Repair expenses of $57.6M, $58.2M, $58.8M, and $59.5M for FY2022 through FY2025, respectively.

   Arcadis believes PRASA's forecast period projections for Maintenance and Repair expenses are optimistic. Although PRASA is projecting increases for the Forecast, the projected increases are minor, averaging only about 0.94% 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 15) – PRASA's FY2020 preliminary projections for Chemical costs amount to $38.8M, prior to the 2020 PRASA Fiscal Plan expense savings initiatives. Although Chemical costs are usually affected by inflation and worldwide demand as they are mostly commodities, over the past few years PRASA has been able to control these costs with consumption optimization savings, and by negotiating costs given the high volumes of chemicals purchased. In FY2021, PRASA is projecting approximately $39.8M in Chemical costs, prior to the 2020 PRASA Fiscal Plan expense savings initiatives and the September 2017 Hurricanes impact. For FY2022 through FY2025, PRASA has applied an annual increase based on the assumed inflation rate (1.11% average over forecast period) on Chemical expenses, resulting in Chemical expenses of $40.3M in FY2022, $40.7M in FY2023, $41.1M in FY2024, and $41.6M in FY2025 (prior to the 2020 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 2020 PRASA Fiscal Plan, consumption increases due to new requirements from the regulatory agencies, or inefficient chemical dosing.

5. Insurance (Exhibit 1, Line 16) – Preliminary projections for Insurance expenses in FY2020 total $19.3M. PRASA has budgeted $21.2M for Insurance expenses in FY2021. 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 (1.11% average over forecast period) on Insurance expenses throughout the forecast period, resulting in Insurance expenses of $21.4M in FY2022, $21.6M in FY2023, $21.9M in FY2024, and $22.1M in FY2025.

Arcadis believes the projections for Insurance expenses are reasonable and its coverages are adequate. However, Arcadis has provided several recommendations to PRASA that include modifying existing insurance coverage programs and/or adding new insurance coverages related to cyber security and terrorism. If PRASA adopts these recommendations, if the inflation rate is higher, and/or if insurance premiums increase, PRASA's Insurance expense could be higher than projected.

6. Other Expenses (Exhibit 1, line 17) – Other Expenses includes, for example: the Superaqueduct O&M contract, professional services (i.e. the NRW recovery office and call centers), materials and supplies, security, sludge treatment and disposition, rentals, and water transport.

   FY2020 preliminary projections for Other Expenses total $154.9M prior to the 2020 PRASA Fiscal Plan expense savings initiatives and the September 2017 Hurricanes impact. PRASA has included $159.4M for Other Expenses in its FY2021 Annual Budget, prior to the 2020 PRASA Fiscal Plan expense savings initiatives and the September 2017 Hurricanes impact, which assumes return to 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 FY2021, will increase year-over-year based on the adjusted assumed inflation rate (1.11% average over forecast period), resulting in Other Expenses of $155.9M in FY2022, $157.5M in FY2023, $159.2M in FY2024, and $161.2M in FY2025.

   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 2020 PRASA Fiscal Plan Operating and Capital Expense Savings Initiatives (Exhibit 1, Line 18) – The Operating and Capital Expense Savings initiatives as included in the 2020 PRASA Fiscal Plan comprise: reduction of physical water losses, elimination of the Christmas bonus, uniform healthcare, chemical expense reduction, pension reform, headcount cap, electricity cost reduction, additional expenses attributed to the P3 initiative, pre-retirement program, capital delivery optimization, 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 will be 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 8-22. 2020 PRASA Fiscal Plan Operating and Capital Expense Savings Initiatives ($, Millions)

	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025
2020 PRASA Fiscal Plan Initiatives	**Preliminary**	**Annual Budget**	**Projected**	**Projected**	**Projected**	**Projected**
Physical Water Losses	$0.0	$(1.5)	$(0.1)	$1.9	$4.2	$6.3
Electricity Cost Reduction	0.0	0.6	1.3	2.0	3.7	5.5
Headcount Cap	0.0	1.8	3.6	3.6	3.6	3.6
Christmas Bonus Elimination[2]	0.0	3.1	3.1	3.1	3.1	3.1
Chemical Expense Reduction	0.0	0.0	0.0	1.0	1.0	1.0
Uniform Healthcare	0.0	1.6	2.3	2.4	2.5	2.7
Pension Reform[2]	0.0	0.0	3.0	6.1	6.0	6.0
P3 Additional Expenses	0.0	(14.9)	(31.4)	(52.9)	(72.8)	(89.0)
Pre-Retirement Program	7.4	6.2	6.2	6.2	6.2	6.2
New Financing for CIP	11.3	84.4	173.1	117.9	25.6	8.9
Capital Delivery Optimization	0.0	0.0	6.8	17.6	16.1	13.6
Total Expense Savings[1]	**$18.7**	**$81.4**	**$168.0**	**$108.9**	**($0.8)**	**($32.1)**

[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 headcount cap and electricity cost reduction initiatives are optimistic, considering PRASA's existing operational needs, current condition of its assets, and the budgeted electric power costs. Also, the cost savings from new financing for CIP as well as the capital delivery optimization are optimistic.

Physical Losses Reduction Initiative

As previously discussed, physical losses are the largest component of Non-Revenue Water (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 is expecting the initial costs to install master meters and to start the leak detection measure deployment to exceed the expected return by $1.5M in FY2021 and $0.6M in FY2022, with net savings expected to start by FY2023. PRASA projects a net savings of $1.9M in FY2023, $4.2M in FY2024, and $6.3M in FY2025. The projected net savings for the forecast period is $10.9M.

PRASA's long term goals include reducing water production in the System by approximately 41 MGD by FY2025, 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 second largest operating expense of the System, PRASA must continue reducing electricity costs and consumption through efficiency measures and distributed generation. PRASA has reported the following measures in the 2020 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 FY2021, $1.3M in FY2022, $2.1M in FY2023, $3.7M in FY2024, and $5.5M in FY2025. Total project savings during the forecast period equate to $13.2M.

Headcount Cap

As of May 2020, PRASA's workforce consisted of 4,581 employees, 119 less than PRASA's FY2020 target of 4,700 employees. Since the most recent labor capacity and productivity assessment completed in 2014, PRASA has struggled in achieving its target employee headcount on an annual basis. Also, the Oversight Board has determined that the PRASA headcount cap should be 4,600 employees for FY2021 and held at that level for the remainder of 2020 PRASA Fiscal Plan forecast period until an updated labor capacity and productivity assessment is performed, which will focus on determining the adequate personnel resources to operate and maintain PRASA's System in optimal conditions.

By capping PRASA's headcount at 4,600, the 2020 PRASA Fiscal Plan allows PRASA to continue its hiring efforts and provides sufficient funding to increase its current workforce by an additional 19 employees. If circumstances are such that PRASA needs additional funds for hiring beyond the 4,600 cap, PRASA and the

Oversight Board will discuss feasibility, scope, and alignment of potential modifications with the 2020 PRASA Fiscal Plan. FY2021 headcount cap was increased to 4,649 by the Oversight Board on September 2020.

Cost savings for the headcount cap initiative is projected in the amount of $1.8M in FY2021, then $3.6M annually from FY2022 through FY2025. Total projected savings amounts to $16.3M during the forecast period.

While meeting these staffing targets would benefit PRASA from an operational cost perspective, as discussed in Sections 4 and 5 of this Report, current vacancies in the Operations Department must be filled to improve operations at treatment facilities as well as to address System repairs in a timely manner. Therefore, in addition to assessing productivity and capacity, necessary adjustments in staffing mix should be considered to not only meet the cap but assure that critical vacancies are filled.

Christmas Bonus

The Oversight Board has requested PRASA to include in its Fiscal Plan the elimination of the Christmas bonus starting in FY2021, to achieve cost savings in the amount of $3.1M in its FY2021 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. As such, PRASA paid the Christmas bonus to its employees in FY2020 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 projected to be PRASA's fourth largest operating expenditure for FY2021 at $38.9 million. 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 2020 PRASA Fiscal Plan, to get a better understanding of the impact to raw water quality on the System, PRASA has started monitoring conditions at their three main water reservoirs: La Plata, Carraizo, and Cidra. Also, PRASA has identified four potential cost saving mechanisms that would reduce chemical usage and spending in the future:

- Chemicals Inventory and Application – 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, and control and monitor chemical consumption by region.
- Coagulant and Flocculant Cost Reduction – Procurement process to consolidate purchase of coagulants and flocculants for all treatment plants. The RFP is projected to be issued in 2021 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.

- Liquid Chlorine Cost reduction – Pursue a liquid chlorine procurement process to provide for island-wide requirements for all PRASA's facilities based on various levels of concentration and sizing. The bulk bid must be started in the first half of FY2021 with the expectation that bulk negotiations will lead to pricing optimization.
- Water Reservoir Laminar Aeration – Currently 65% of PRASA's raw water supply is from water reservoirs. The eutrophic state of most of the dams (18 of 19) limit the water extraction to 35%-50% of their total capacity. Under drought events, the water available falls drastically due to algae concentration. With the reduction of organic waste (e.g., algae) the water treatment plants receiving the raw water will require less chemicals for treatment. PRASA has already successfully implemented a laminar aeration process in the Toa Vaca reservoir, reducing chemicals consumption at the three water treatment plants (WTPs) supplied by this reservoir by 20-40%. A procurement process for laminar aeration at Carraizo water reservoir was issued on June 2, 2020; once completed, the project is expected to generate a reduction in chemical requirements for Sergio Cuevas WTP by approximately 20%.

While PRASA cannot currently and reasonably estimate the benefit of the chemical cost savings initiatives, the Oversight Board projected in the2020 PRASA Fiscal Plan a benefit from an estimated $1M in annual cost savings starting in FY2023 if these initiatives are implemented successfully.

Uniform Healthcare

PRASA issued a Request for Proposals (RFP) for health plan services in November 2019 with the goal of reducing the healthcare costs. On June 1, 2020, PRASA awarded the contract for FY2021 to the preferred proponent. Cost savings for the uniform healthcare initiative is budgeted in the amount of $1.6M in FY2021, and projected at $2.3M in FY2022, $2.4M in FY2023, $2.5M in FY2024, and $2.7M in FY2025. The total savings projected for the forecast period is $11.5M.

Pension / Labor Reform

A pension reform measure was proposed and incorporated by the Oversight Board in the 2020 PRASA Fiscal Plan. 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 $1,200 per month starting in FY2022 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 savings of $3M in FY2022 and approximately $6M annually for FY2023 through FY2025.

P3 Incremental Expenses

As meter replacement ramps up during the first years of the initiative, there is a negative impact on PRASA's financial results due to initial payments to the proponent for meter installation and system setup. The projected additional expenses in the FY2021 Annual Budget equal approximately $14.9M. Thus, the net financial impact of this initiative on the System, taking the incremental revenues into account, in FY2021 is approximately -$8.9M. There is a negative net financial impact once again projected for FY2022 of -$1.8M, with additional expenses projected at approximately $31.4M, but by FY2023, and for each remaining year of the Forecast, PRASA is projected to experience a positive net financial impact. However, that being said,

PRASA is still projected to experience an increase in additional expenses in FY2023 through FY2025 of $52.9M, $72.8M, and $89.0, respectively.

Pre-Retirement Program

As stated in the 2020 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 reduce the workforce progressively and voluntarily, allowing employees to retire with an orderly transition process. The resulting vacant positions created from the retirement program must be closed.

The FY2020 preliminary projections for the cost savings achieved via the Pre-Retirement Program equate to $7.4M while the FY2021 Annual Budget assumes a cost savings of $6.2M. The 2020 PRASA Fiscal Plan projects cost savings of $6.2M annually for the remainder of the forecast period.

Capital Delivery Optimization

According to the 2020 PRASA Fiscal Plan, the Oversight Board understands that PRASA should take steps to deliver its CIP more efficiently. Currently, PRASA applies a 1.6 factor when budgeting for a construction project. This means that on average, PRASA assigns a budget for its estimated construction plus an additional 60% to cover overheads and expected contingencies.

Cost savings from capital delivery optimization is not expected to have a financial impact on the FY2021 Annual Budget, as savings are projected to begin starting in FY2022. In FY2022, capital delivery optimization savings are projected by the Oversight Board at $6.8M. For FY2023 through FY2025, savings levels are projected at $17.6M, $16.1M, and $13.6M, respectively.

New Financing for CIP

After the reprogramming of Federal Debt, PRASA recovered access to future funding from USEPA SRF Loans and the USDA RD Program once again. As a result, the FY2020 preliminary projections expect new financing for CIP through these two programs in the amount of $11.3M and $84.4M in the FY2021 Annual Budget. For the remainder of the forecast period, the 2020 PRASA Fiscal Plan projects to receive $173.1M in FY2022, $117.9M in FY2023, $25.7M in FY2024, and $9.0M in FY2025 from these programs for their CIP in lieu of more costly financing options.

8. Capitalized Expenses (Exhibit 1, Line 19) – 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%. FY2020 preliminary results for Capitalized Expenses amount to $7.5M reflecting a reduced level of CIP investments. PRASA has included in its FY2021 Annual Budget $25.8M for Capitalized Expenses based on the capitalization rate of 3.7% of operating expenses. For FY2022 through FY2025, PRASA is projecting Capitalized expenses of $27.8M, $28.6M, $29.6M, and $30.5M, 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. Finally, PRASA should consider re-validating its capitalization rate in FY2021.

9. Hurricanes' Impact on Operational Expenses (Exhibit 1, line 21) – In the 2020 PRASA Fiscal Plan, PRASA estimated a total hurricane impact to operational expenses in the amount of $220M. The projection of the total incremental expenses due to the 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 related to address the hurricanes' impact. PRASA is forecasting to receive FEMA funding reimbursement at a 90% recovery rate of the total estimated incremental expenses of $220M ($198M reimbursement).

    Arcadis reviewed the MAT, as amended, to determine the adequacy of the allocation of both insurance proceeds and FEMA reimbursements/grants to be obtained as a result of the impact of the September 2017 hurricanes, and Arcadis requested PRASA legal opinion on this matter. As provided by PRASA's legal advisor, FEMA funds shall not be treated as Operating or Authority Revenues. FEMA does not provide grants to substitute Operating Revenues. Rather, FEMA funds are directed at disaster-related expenses to be used exclusively to cover costs of the eligible emergencies, permanent works, or resiliency projects approved by FEMA. To the extent FEMA funds are received by PRASA as mentioned, such funds shall not be subject to the gross pledge set forth under the MAT as these funds cannot be used to pay bondholders. FEMA funds shall therefore be deposited to the credit of the Current Expense Fund if they are intended to reimburse PRASA for Current Expenses. FEMA grants received for 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 FY2020 projections, PRASA is projecting net deposits of $6.3M and $43M, respectively, to the credit of the Current Expense Fund. No additional deposits are included FY2022-FY2025.

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[27] (which

[27] Capitalized terms as defined in the MAT, as amended.

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 with respect to Senior Indebtedness for the current fiscal year;
- Operating Revenues shall be sufficient to be at least equal to 200% of annual debt service with respect to 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 with respect to 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 8-23. 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 & 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) takes 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 or priority:
    - 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.

8.5.2 Debt Service Coverage

A summary of PRASA's existing debt service obligations and coverages for FY2020 through FY2025 are presented in Exhibit 1 and summarized in **Tables 8-24 through 8-27**.

PRASA's debt service includes: Senior Bonds (the 2008 Series A and B Senior Lien Revenue Bonds and the 2012 Series A and B Senior Lien Revenue Bonds), as well as the USDA RD and USEPA SRF loan debts, among others.

Commonwealth Guaranteed Indebtedness (CGI) includes those of PRASA's existing obligations which are guaranteed by the Commonwealth of Puerto Rico, which currently are the 2008 Revenue Refunding Bonds.

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 8-24. 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

In addition to the CGI, 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, 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, nevertheless, a limited obligation of PRASA, payable solely from appropriations made by the Government.

A summary of PRASA's debt service obligations and projections for FY2020 and the forecast period are presented in **Tables 8-25 and 8-26**, respectively. FY2020 debt service obligations, including CSO debt, totaled $281.1M, of which $251.2M were Senior lien obligations. As shown, PRASA did not make payments for CSO debt.

Table 8-25. FY2020 Debt Service Obligations and Preliminary Results ($, Thousands)

Debt Category	FY2020 Obligations[1]	FY2020 Preliminary Results[2]
Senior Debt	$251,206	$251,206
Senior Subordinated Debt	-	-
Subordinated Debt	-	-
Commonwealth Guaranteed Indebtedness (CGI)	20,920	20,920
Commonwealth Supported Obligations (CSO)	8,999	-
Total	**$281,125**	**$272,126**

[1] Considers the full debt service obligations due in FY2020 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 8-26. FY2021-FY2025 Debt Service Obligations ($, Thousands)

Debt Category[1]	FY2021 Projection	FY2022 Projection	FY2023 Projection	FY2024 Projection	FY2025 Projection
Senior Debt	$253,271	$260,532	$265,786	$267,540	$268,676
Senior Subordinated Debt	-	-	-	-	-
Subordinated Debt	-	-	-	-	-
Commonwealth Guaranteed Indebtedness (CGI)	25,956	27,935	28,360	31,962	32,047
Commonwealth Supported Obligations (CSO)	-	-	-	-	-
Total Debt	**$279,227**	**$288,467**	**$294,145**	**$299,502**	**$300,724**

[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 8-27. FY2020 - FY2025 Debt Service Coverage

Debt Service Level	DSC Requirement	FY2020 Preliminary DSC	FY2021 DSC	FY2022 DSC	FY2023 DSC	FY2024 DSC	FY2025 DSC
Senior Debt[1]	**2.50**	4.13	4.24	4.23	4.33	4.48	4.61
Senior Subordinated Debt[1]	**2.00**	4.13	4.24	4.23	4.33	4.48	4.61
Subordinated Debt [1]	**1.50**	4.13	4.24	4.23	4.33	4.48	4.61
All Obligations[2]	**1.00**	0.94[3]	1.00	0.99	0.99	0.99	1.01

[1] DSC calculated with respect to Operating Revenues.

[2] DSC calculated with respect to Authority Revenues.

[3] Preliminary the coverage of all obligations per MAT is estimated at less than 1.0 as a result of the COVID-19 pandemic impact on the financial results, but final coverage will be calculated once the audited financial statements are available

As shown in **Table 8-27**, FY2020 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. However, PRASA does not project to meet the 1.0x DSC on All Obligations most years of the forecast period. In FY2020, PRASA's preliminary DSC on All Obligations was 0.94, which is attributable to the extraordinary circumstances involving the COVID-19 pandemic which drastically impacted the billing collections rate and PRASA's system operations in FY2020 and has the potential to have a lasting impact on PRASA throughout the forecast period. Final DSC for FY2020 will be recalculated after the issuance of the FY2020 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 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 $32.4M in the Operating Reserve Fund during FY2020 (funding approximately 1/5 of the Operating Reserve Fund requirement). This deposit will continue for one additional year, during which PRASA expects to achieve the reserve fund target of three months of current expenses. Deposits for the forecast period are projected to be in accordance with the

MAT, as amended. As of June 30, 2020, the Operating Reserve Fund balance stood at $139.5M (inclusive of the $32.4M deposit made in FY2020). For FY2021, PRASA is projecting to deposit $33.5M in the Operating Reserve Fund. By the start of FY2022, PRASA is forecasting to have a total deposit balance in its Operating Reserve Fund of $173.0M, meeting its requirement to maintain funds equal to three months of current expenses. 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 $85.5M from Operating Revenues in the Capital Improvement Fund during FY2020 to finance a portion of its projected CIP. This deposit is net from the FEMA/Insurance proceeds and other restricted funds, and the PRASA FY2020 Fiscal Plan New Federal Funds initiative estimated at $11.7M (excluding the costs related to such funds as they are already included as a part of the debt service) for FY2020.

In its FY2021 Annual Budget, PRASA projects to make a deposit to the Capital Improvement Fund of $90.9M from Operating Revenues, net from FEMA/Insurance proceeds and net from the PRASA FY2020 Fiscal Plan New Federal Funds initiative estimated at $86.9M (excluding the costs related to such funds as they are already included as a part of the debt service).

From FY2022 through FY2025, PRASA projects to make deposits in the Capital Improvement Fund in the amounts of $89.0M, $120.9M, $139.6M, and $130.9M from Operating Revenues. Also, PRASA projects additional federal funds (SRF and RD) of $182.8M, $132.9M, $42.4M, and $26.8.0M, 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:

(ii) 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,

(iii) 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, during the period between July 2016 through July 2019 PRASA had entered into forbearance agreements for its SRF and RD debt (previously classified as CGI debt). In July 2019, PRASA completed the restructuring of its SRF and RD debt. The 2008 Revenue Refunding Bonds is the only debt remaining at CGI level after the federal debt modification.

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 FY2021 Annual Budget, PRASA projects to make a $26.0M deposit to the Commonwealth Payment Fund. Also, as part of the 2020 PRASA's Fiscal Plan debt service reduction initiatives, PRASA has eliminated the outstanding annual $9M debt service payments related to the CSO which is reflected in the deposits budgeted to be made during the forecast period. For the remainder of the forecast period, the 2020 PRASA Fiscal Plan projects to make annual deposits averaging approximately $30.0M 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. Although a transfer to the Rate Stabilization Account was originally a part of the FY2020 Annual Budget (reflected in the FY2020 Budget Review Report), PRASA approved an amendment to the budget, in response to the COVID-19 pandemic, that eliminated the transfer to the Rate Stabilization Account to offset the anticipated impact to revenues. Thus, the FY2020 projections and the FY2021 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 (see Exhibit 1) reflects the financial projections included in the 2020 PRASA Fiscal Plan certified by the Oversight Board on June 29, 2020. Despite PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total deficit of $96.1M. PRASA plans to bridge this gap with funds in deposit in the Current Expense Fund. To bridge any remaining gap, PRASA should identify and secure additional revenue sources or financing, implement higher rate increases, implement additional controls in Operating Expenses, modify the projected deposits to the Capital Improvement Fund, or use a combination of these actions.

While 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 not 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 not projecting to meet its Rate Covenant requirement of 1.0x coverage of its current obligations throughout the Forecast. PRASA may need to reduce its projected CIP investments, increase projected annual rate adjustments, or implement additional operational cost controls to

meet its obligations. Furthermore, 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 following events could have material negative effects on PRASA's Forecast, which may negatively impact PRASA's financial situation going forward:

- Lower revenues or savings achieved, or timeliness of the 2020 PRASA Fiscal Plan initiatives.
- Higher impact from Hurricanes Irma and María on revenue, expenses or damages on PRASA infrastructure (continuing under revision and refinement by PRASA).
- 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 PREPA electric costs (per kWh) and/or lower savings achieved through its Comprehensive Energy Management Program.
- Higher expense costs because of not eliminating the Christmas bonus or reducing the pension costs without identifying other sources of saving 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. **PRASA's ability to implement the necessary annual rate increases –** PRASA is projecting to implement annual modest rate increases that will generate about $908M between FY2020 and FY2025. 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 2020 PRASA Fiscal Plan initiatives –** The 2020 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 more than $1.7 billion over the forecast period. The implementation of the CIP, particularly of the recovery projects, depend on timely reimbursements and disbursements of funding sources (ie., FEMA funds). Lower than anticipated FEMA/insurance reimbursements, 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)	FY2020 PRELIMINARY[b]	FY2021 ANNUAL BUDGET	FY2022 PROJECTION	FY2023 PROJECTION	FY2024 PROJECTION	FY2025 PROJECTION
	OPERATING REVENUES						
1.	Service Billings (Base Fee and Service Charges, Net of Subsidies)[c]	$965,469	$1,060,931	$1,063,023	$1,079,319	$1,097,102	$1,115,771
2.	Transfer from / (to) Rate Stabilization Account	0	0	0	0	0	0
3.	Other Income (Miscelaneous/Special Assessments)	2,000	2,000	2,000	2,000	2,000	2,000
4.	Fiscal Plan - Revenue Enhancing Initiatives[d]	20,900	10,120	36,660	69,417	100,253	122,019
5.	Insurance Reimbursement from Revenue Loss	50,000	0	0	0	0	0
6.	**Total Operating Revenues [Sum Lines 1-5]**	**$1,038,369**	**$1,073,052**	**$1,101,683**	**$1,150,737**	**$1,199,355**	**$1,239,791**
	ADDITIONAL REVENUES						
7.	Transfer from Budgetary Reserve Fund	0	0	0	0	0	0
8.	General Fund Grants/Appropriations/Contributions	0	0	0	0	0	0
9.	Reimbursements to the Authority Revenues	0	0	0	0	0	0
10.	**Total Other Sources of Revenue [Sum Lines 7-9]**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
11.	**Total Authority Revenues [Line 6 + Line 10]**	**$1,038,369**	**$1,073,052**	**$1,101,683**	**$1,150,737**	**$1,199,355**	**$1,239,791**
	OPERATING EXPENSES						
12.	Payroll and Benefits	$320,698	$328,512	$329,680	$330,276	$331,053	$331,884
13.	Electric Power	140,921	130,517	133,380	139,012	146,169	152,917
14.	Maintenance and Repair	53,694	56,957	57,567	58,157	58,815	59,526
15.	Chemicals	38,789	39,830	40,256	40,669	41,129	41,626
16.	Insurance	19,284	21,181	21,408	21,627	21,872	22,136
17.	Other Expenses	154,914	159,403	155,854	157,451	159,233	161,158
18.	Fiscal Plan - Cost Saving Initiatives[e]	-	3,065	11,912	26,568	42,525	54,634
19.	Capitalized Operating Expenses	(7,213)	(25,769)	(27,752)	(28,629)	(29,629)	(30,484)
20.	**Total Operating Expenses [Sum Lines 12-19]**	**$721,087**	**$713,696**	**$722,305**	**$745,131**	**$771,167**	**$793,398**
	ADDITIONAL EXPENSES						
21.	Hurricane Impact on OPEX/Expected FEMA Reimbursements[f]	(7,000)	(43,000)	0	0	0	0
22.	**Total Additional Expenses [Line 21]**	**($7,000)**	**($43,000)**	**$0**	**$0**	**$0**	**$0**
23.	**Total Operating Expenses [Line 20 + Line 22]**	**$714,087**	**$670,697**	**$722,305**	**$745,131**	**$771,167**	**$793,398**
	DEPOSITS						
24.	Deposit to the Senior Bond Fund	$251,206	$253,271	$260,532	$265,786	$267,540	$268,676
25.	Deposit to the Senior Debt Service Reserve Fund	0	0	0	0	0	0
26.	Deposit to the Senior Subordinate Bond Fund	0	0	0	0	0	0
27.	Deposit to the Senior Subordinate Debt Service Reserve Fund	0	0	0	0	0	0
28.	Deposit to the Subordinate Bond Fund	0	0	0	0	0	0
29.	Deposit to the Subordinate Debt Service Reserve Fund	0	0	0	0	0	0
30.	Deposit to the Current Expense Fund	0	0	0	0	0	0
31.	Deposit to the Operating Reserve Fund	32,384	33,535	7,598	5,706	6,509	5,558
32.	Deposit to the Capital Improvement Fund (Net of Projected New Federal Funds)	85,528	90,944	88,947	120,865	139,598	130,908
33.	Deposit to the Construction Fund	0	0	0	0	0	0
34.	Deposit to the Commonwealth Payments Fund[g]	20,920	25,956	27,935	28,360	31,962	32,047
35.	Deposit to the Surplus Fund	0	0	0	0	0	0
36.	**Total Deposits, excluding existing deposits available in the Current Expense Fund [Sum Lines 24-29 and 31-35]**	**$390,038**	**$403,706**	**$385,012**	**$420,716**	**$445,609**	**$437,190**
37.	**Net Authority Revenues After Obligations and Deposits [Line11-Line 23-Line 36]**	**($65,756)**	**($1,350)**	**($5,635)**	**($15,110)**	**($17,421)**	**$9,203**
	DEBT SERVICE PAYMENTS DUE						
38.	Senior (S)	$251,206	$253,271	$260,532	$265,786	$267,540	$268,676
39.	***DS Coverage Required = 2.50***	***4.13***	***4.24***	***4.23***	***4.33***	***4.48***	***4.61***
40.	Senior Subordinated (SSUB)	0	0	0	0	0	0
41.	***DS Coverage Required = 2.00***	***4.13***	***4.24***	***4.23***	***4.33***	***4.48***	***4.61***
42.	Subordinated (SUB)	0	0	0	0	0	0
43.	***DS Coverage Required = 1.50***	***4.13***	***4.24***	***4.23***	***4.33***	***4.48***	***4.61***
44.	Commonwealth Guranteed Indebtedness (CGI)	20,920	25,956	27,935	28,360	31,962	32,047
45.	Commonwealth Supported Obligations (CSO)	0	0	0	0	0	0
46.	Debt Not Covered Under the MAT	0	0	0	0	0	0
47.	**Total Debt Service Including Debt Not Covered Under the MAT, Net of Existing Deposits**	**$272,126**	**$279,227**	**$288,467**	**$294,145**	**$299,502**	**$300,724**
48.	***DS Coverage on All Obligations (Coverage Required = 1.00)***	***0.94***	***1.00***	***0.99***	***0.99***	***0.99***	***1.01***

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

[b] Based on projected results as presented in PRASA's June 29th, 2020 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 Fiscal Plan: Metering and Customer Service Optimization (P3), Government Collections, Disconnection Fee, and Adjustment Policy Revision.

[e] Projected operating and capital expense reductions from initiatives included in Fiscal Plan: Physical Water Losses, Electricity Cost Reduction, Headcount Cap, Christmas Bonus Elimination, Chemical Expense Reduction, Uniform Healthcare, Pension Reform, Pre-Retirement Program, and Caddditional expenses related to the P3 initiitve. Excludes New Financing for CIP initiative as the $11.3M savings is included in Line 32.

[f] Includes amount to be deposited from FEMA funding reimbursement. FEMA funds shall be deposited to the credit of the Current Expense Fund as they are used to reimburse PRASA for Current Expenses.

[g] No funds are projected to be deposited in the Commonwealth Supported Obligations Account for payment of the Puerto Rico Public Finance Corporation (PFC) debt included in the CSO. Per the MAT, this is not considered an Event of Default and per Section 5.02(c), any deficiency in the amounts required to be deposited into the Commonwealth Payments Fund to pay for the CGI or the CSO shall not be cumulative and shall be deemed to be eliminated upon interest or principal payment date.

9 Conclusions and Recommendations

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 the 2020 PRASA Fiscal Plan financial projections.

1. PRASA's headcount are below the optimum staffing level stipulated by the Executive Management Team and the staffing mix is not yet optimal and 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. Also, PRASA should 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, to compete with the market and retain personnel.
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. KPI and metrics being measured, along with stronger management oversight continue to contribute to operational and organizational improvements, although FY2020 KPI results were below established goals, mostly due to the COVID-19 pandemic.
3. Arcadis visited a total of 181 facilities throughout PRASA's five Operational Regions, including the 8 regulated dams, between January and September of 2020 to conduct a condition assessment of water and wastewater facilities. Overall, facilities were found to be in the adequate range, however, almost half of the facilities rated as adequate (63 of 133) were scored below 2.0. If identified issues are not addressed in a timely manner the

condition of these facilities could continue to deteriorate causing the rating to fall in the future from Adequate to Poor or even Unacceptable. Furthermore, 25% of the visited facilities are in the unacceptable to poor range. 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.

- In FY2020, all eight of PRASA's regulated dams were inspected. Overall, a declining tendency of ratings for all indicators and on all dams was observed. The condition of PRASA's regulated dams was rated as Adequate to Poor condition. Minor improvements were noticed compared to the 2018 and prior inspections, which resulted in the overall depreciation of ratings across the board. Special consideration should be given to maintaining the dams' instrumentation and keeping records of its readings for further evaluation, strengthening of its Integrated Maintenance Program and the development of targeted rehabilitation actions to meet the needs of the critical aspects of these structures, the development of Potential Failure Modes Analysis for each dam, and investing in training in dam safety for all relevant PRASA staff.

- Overall, the WTPs were rated within the adequate condition and, 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 potable water supply in compliance with applicable regulations. Facility ratings decreased in staff/training criteria compared to the 201 inspections. The greatest concern currently is the physical condition of the facilities, which continues to deteriorate as capital and R&R improvements are delayed. Also, even though there were no changes for the WTPs in performance with respect to compliance with limits of the SDWA and effluent discharge parameters, 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 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 in overall rating with equipment/maintenance as the categories of primary concern. Out of the 28 facilities inspected, eight (29%) received an overall poor rating and 20 (71%) received an adequate rating, with six of those eight facilities with a poor rating in terms of equipment/maintenance. As observed, the greatest concern currently is the physical condition of the facilities, which continues to deteriorate as capital and R&R improvements are delayed. 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. The regulatory compliance rating showed an increase in the assessment scoring. Although some of it could be attributed to operations adjustments, most is due to having interim limits and/or monitoring only parameters associated to waivers requested. Improvements are necessary not only to meet current interim limits but also future permanent, and more stringent limits. Furthermore, PRASA should verify the flood zone levels at all WWTPs to identify vulnerabilities of assets in these facilities and determine if the potential flood risks merit mitigation actions. A detrimental trend may continue to be observed if projects are not executed or continue to be delayed.
- Overall rating for ancillary facilities continues to decrease to different degrees for wells, WPS, and WWPS. WPSs deteriorated significantly to Poor, while wells and WWPSs remain in the lower end of Adequate, and if left unattended could continue to deteriorate. WSTs facility criteria rating did not have a significant change as it remained within the Adequate rating. Although, considering the minimal

equipment installed on WSTs and the slower deterioration rate compared to the rest of the ancillary facilities is was observed more signs of concrete deterioration, cracks, bugholes, and spalling than previous years. Notwithstanding, a number of the deficiencies identified for ancillary facilities can be addressed through PRASA's R&R program and may not require major capital improvements. Finally, 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. However, PRASA has continued to improve its response time and attention/repair effectiveness, after the impacts and the after effect of the 2017 Hurricanes. PRASA continues to work on and improve its leak detection and monitoring practices and continues to aggressively address leak occurrences (as allowed by the current pandemic situation). Currently, PRASA is remotely monitoring levels of a number of tanks in the distribution system to avoid tank overflows and improve the water distribution balance and continues conducting periodic water audits which are used to implement the necessary controls and develop action items to address NRW. Also, PRASA is implementing the 2020 PRASA Fiscal Plan WRO initiatives, which shall help reduce physical water losses. Additionally, PRASA is implementing sanitary sewer evaluations and repair plans to reduce levels of I/I that must be treated in their WWTPs. However, the progress of this initiative has been affected by the slow recovery from the impact of the 2017 Hurricanes and most recently the COVID-19 pandemic, in addition to the ongoing fiscal and budgetary situation affecting PRASA.

5. PRASA's O&M costs are within industry standards despite its higher degree of System complexity. Reducing NRW is a high priority goal for PRASA, and it is one of the three key focus areas of the 2020 PRASA Fiscal Plan. PRASA is redefining their NRW goals and metrics to phase out calculations that still use estimation methods, moving towards use of real 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 PRASA's P3 project will further support PRASA's efforts to reduce NRW. Furthermore, PRASA has established an NRW team (TeamORA) that integrates not only WRO staff, but also operations personnel for a more comprehensive approach to address the 2020 Fiscal Plan NRW initiatives. 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 expects that the CIP will be reactivated during FY2021 and anticipates the implementation of projects will address some of the major issues. Also, the Strategic Plan is expected to be completed and published during FY2021. Lastly, the FY2020 PRASA's KPI results remained low because of the delays in the recovery efforts, the fiscal situation hindering the implementation of certain initiatives, the 2020 earthquakes and the COVID-19 pandemic impacting PRASA's operations.

6. Except for buried infrastructure improvement needs not visible and not identified after the 2017 Hurricanes, 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 Renewal & Replacement and Emergency/Permanent Work projects. However, as noted in previous reports, given PRASA's high rate of leaks and overflows and continuing aging infrastructure, additional funds and a reactivation and acceleration of the R&R program are required to reduce/minimize these incidences. Furthermore, when PRASA's upcoming 10-year Master Plan update 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, as well as for other necessary infrastructure projects (i.e., fleet and building renovation, safety, NRW reduction and technological improvements) essential to maintaining and preserving the utility assets.

In addition, after continuous efforts of PRASA to explore and find opportunities for funding of compliance projects, on July 26, 2019, PRASA was able to reach a debt restructuring agreement with the funding programs of USDA RD, and USEPA CWSRF and DWSRF. This has allowed PRASA to access new funding sources through these programs 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. One of these future regulations is the Lead and Copper Rule, which is currently under revision to become more stringent.

7. The insurance program covering PRASA's exposures 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 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 Modellings and parameters. Specially after the lessons learned in the aftermath of the September 2017 Hurricanes, the 2020 earthquakes and more recently the COVID-19 pandemic.
   - In addition to their Rainy-Day Fund, 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.
   - Consideration to 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.
   - Consideration to Terrorism Coverage, which is excluded under all current PRASA's Insurance 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 is for five years from the termination date of the policy or its renewal(s). Should also consider same action for the OCIP Commercial Umbrella Liability Policy.

8. PRASA's Forecast (see Exhibit 1) reflects the financial projections included in the Fiscal Plan certified by the Oversight Board on June 29, 2020. Despite PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total deficit of approximately $96.1M. PRASA plans to cover this need with funds in deposit in the Current Expense Fund. To bridge any remaining gap, PRASA should identify and secure additional revenue sources or financing, implement higher rate increases, implement additional controls in Operating Expenses, modify the projected deposits to the Capital Improvement Fund, or use a combination of these actions.

9. While 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 not 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 not projecting to meet its Rate Covenant requirement of 1.0x coverage of its current obligations throughout the Forecast. PRASA may need to reduce its projected CIP investments, increase projected annual rate adjustments, or implement additional operational cost controls to meet its obligations. Furthermore, 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:

   a) **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.
   b) **PRASA's ability to implement the necessary annual rate increases –** PRASA is projecting to implement annual modest rate increases that will generate about $920M between FY2020 and FY2025. 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.
   c) **PRASA's ability to continue to successfully implement the 2020 PRASA Fiscal Plan initiatives –** The 2020 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.
   d) **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.
   e) **PRASA's ability to secure and receive expected funding for the execution of the forecasted CIP** – PRASA has forecasted capital investments of more than $1.7 billion over the forecast period. The implementation of the CIP, particularly of the recovery projects, depend on timely reimbursements and disbursements of funding sources (ie., FEMA funds).

10. PRASA shall continue monitoring the receipt of FEMA/insurance reimbursements related to 2017 Hurricanes. Lower than anticipated FEMA/insurance reimbursements, or the exclusion of these proceeds from Authority Revenues, will impact PRASA's ability to meet DSC obligations. In addition, FEMA/insurance reimbursement receipts have been lower than budgeted. PRASA should increase efforts to maximize reimbursements from FEMA or insurance, specifically reimbursements related to Operating Expenses which are included as Authority Revenues.
11. PRASA shall closely monitor its level of billings and collections and adjust its budget if material deviations are experienced, particularly as it relates to population projections, customer accounts, consumer trends, and possible temporary adjustments in reaction to rate increases and the COVID-19 pandemic.

12. PRASA should consider implementing a higher rate adjustment to increase the coverage for All Obligations above a 1.0x. This will provide further confidence to PRASA in meeting its FY2021 debt service obligations as required by the MAT.

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