

Puerto Rico Aqueduct and Sewer Authority



GOBIERNO DE PUERTO RICO
Autoridad de Acueductos y Alcantarillados

FISCAL YEAR 2016 AND 2017 CONSULTING ENGINEER'S REPORT FOR THE PUERTO RICO AQUEDUCT AND SEWER AUTHORITY

To satisfy the requirements of Section 7.07 of the 2012 Master Agreement of Trust by and between PRASA and Banco Popular de Puerto Rico as Trustee; and Section 3.5 of the 2012 Fiscal Oversight and Support Agreement by and between PRASA, the Commonwealth of Puerto Rico and the Puerto Rico Fiscal Agency and Financial Advisory Authority (previously the Government Development Bank of Puerto Rico)

December 2017

FISCAL YEAR 2016 AND 2017 CONSULTING ENGINEER'S REPORT FOR THE PUERTO RICO
AQUEDUCT AND SEWER AUTHORITY



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**FISCAL YEAR 2016
AND 2017
CONSULTING
ENGINEER'S REPORT
FOR THE PUERTO
RICO AQUEDUCT AND
SEWER AUTHORITY**

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ACRONYMS AND ABBREVIATIONS

ABT	Additional Bonds Test
AMR/AMI	Automatic Meter Reading and/or Advanced Metering Infrastructure
AOP	All Other Perils
ASD	Automatic Shutdown
AWWA	American Water Works Association
B	Billion
BOR	Broker of Record
CAA	Coefficient of Annual Adjustment
CAGR	Compound Annual Growth Rate
CT	Contact Time
CBA	Collective Bargaining Agreement
CCL	Contaminant Candidate List
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
FOA	Fiscal Oversight and Support Agreement
FOG	Fats, Oil and Grease

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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	Hermanidad 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
M	Million
M&V	Measurement and Verification
MAPFRE	MAPFRE PRAICO Insurance Company
MARSH	Marsh Saldaña
MAT	Master Agreement of Trust
MDT	mobile data terminal
MG	Million Gallons
MGD	Million Gallons per Day
NMC	Nine Minimum Controls
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
NRW	Non-Revenue Water
OCIP	Owner Controlled Insurance Program
O&M	Operation and Maintenance
OMB	Office of Management and Budget

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OSHA	Occupational Safety and Health Administration
OTC	Operator Training Center
P3	Public Private Partnership
PAN	Programa de Asistencia Nutricional
PMC	Program Management Consultant
PML	Probable Maximum Loss
PO	Purchase Order
PPA	Power Purchase Agreement
PRASA	Puerto Rico Aqueduct and Sewer Authority
PRDOH	Puerto Rico Department of Health
PREPA	Puerto Rico Electric Power Authority
PRFAFAA	Puerto Rico Fiscal Agency and Financial Advisory Authority
PROMESA	Puerto Rico Oversight, Management, and Economic Stability Act
PRPB	Puerto Rico Planning Board
PWS	Potable Water Systems
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

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TANF	Programa de Asistencia Temporal para Familias Necesitadas
TOC	Total Organic Carbon
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
WPS	Water Pump Station
WST	Water Storage Tank
WTP	Water Treatment Plant
WWPS	Wastewater Pump Station
WWTP	Wastewater Treatment Plant
XCU	Explosion, Collapse or Underground

DISCLAIMER

This Consulting Engineer's Report (CER) considers the ten-year financial projections and Capital Improvements Program (CIP) included in the Puerto Rico Aqueduct and Sewer Authority's (PRASA) 2017 Certified Fiscal Plan dated August 26, 2017 (2017 Certified Fiscal Plan). The financial projections and CIP presented herein do not consider the impact of hurricanes Irma and Maria on PRASA's finances and infrastructure, nor any other revisions made by PRASA after August 26, 2017. However, a revised five-year CIP was presented to and approved by PRASA's Governing Board in December 2017, and a revised Fiscal Plan was submitted to the Financial Oversight and Management Board (the Oversight Board) established under PROMESA for evaluation and re-certification on January 24, 2018. The revised, re-Certified Fiscal Plan (currently under review by of the Oversight Board) including the revised five-year CIP will be presented in the FY2018 CER.

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Arcadis is required to make disclosures stating the limitations of the work contained within the 2016-2017 CER and its use. In accordance with the Securities Exchange Act of 1934, the following disclosure statements are incorporated into the 2016-2017 CER prepared by Arcadis. This 2016-2017 CER was prepared by Arcadis for PRASA; hereinafter referred to individually as the "Authorized Recipient."

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registered municipal advisors and other financial advisors and experts who the Authorized Recipient deems appropriate before acting on this information and material.

PRASA acknowledges that: (a) it shall retain the services of an independent registered municipal advisor, which, during the past two years, was not associated with Arcadis, and that (b) Arcadis is required to comply with the requirements set forth in the federal Exchange Act, Municipal Advisor Rule (17 CFR 200, 240, 249), which requires that the engineering company (i) receive from the municipal entity a representation in writing that it is represented by, and will rely on the advice of, an independent registered municipal advisor; (ii) provide written disclosure to the municipal entity that Arcadis is not serving as a municipal advisor and, with respect to the municipal entity, is not subject to the statutory fiduciary duty applicable to municipal advisors under the federal Exchange Act, and (iii) provide a copy of such disclosure to the municipal entity's independent registered municipal advisor. Arcadis does not provide opinions on or advocates for using a financial product (issuing debt) or the choice of financial products employed. As such, Arcadis submitted its work products to PRASA for review and approval.

Arcadis devoted effort in the construction and reparation of this document is consistent with (i) the degree of care and skill ordinarily exercised by members of the same profession currently practicing under same or similar circumstances and (ii) the time and budget available for its work in its efforts to endeavor to ensure that the data contained in the 2016-2017 CER is accurate as of the date of its preparation. This document was based on estimates, assumptions and other information developed by Arcadis from its independent research effort, general knowledge of the industry, and information provided by and consultations with the Authorized Recipient and the Authorized Recipient's representatives and consultants. No responsibility is assumed for inaccuracies in reporting by the Authorized Recipient, the Authorized Recipient's agents and representatives, or any third-party data source used in preparing or presenting this study. Arcadis assumes no duty to update the information contained in the 2016-2017 CER unless it is separately retained to do so pursuant to a written agreement signed by Arcadis and PRASA.

This opinion is based upon information provided by, and consultations with, PRASA. Arcadis did not independently verify the accuracy of the information provided by PRASA and others in creating this opinion; however, Arcadis's opinion is based upon the supposition that such sources are reliable, and the information obtained therefrom is appropriate for the analysis undertaken and the conclusions reached. To the extent, the information provided to Arcadis by PRASA and others is not accurate, or not inclusive of all details, the conclusions and recommendations contained in the opinion may vary, and are subject to change. Arcadis assumed and assumes no responsibility for inaccuracies in reporting by PRASA or any third-party data source used in preparing such opinion.

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use of this document not specifically identified within Arcadis's contract with PRASA, or otherwise expressly approved in writing by Arcadis, shall be at the sole risk of the party making such changes or adopting such use.

Arcadis relied on assumptions, forecasts, data and statistics provided by PRASA, its other consultants, and published industry references. Arcadis reviewed the PRASA-prepared forecast over a future five-year period of time and "forward-looking statements." These statements relate to Arcadis's expectations, beliefs, intentions, or strategies regarding the future. These statements may be identified by the use of words like "anticipate", "believe", "estimate", "expect", "intend", "may", "plan", "project", "will", "should", "seek", and similar expressions. The forward-looking statements reflect Arcadis's views and assumptions with respect to future events as of the date of this document and are subject to future economic conditions and other risks and uncertainties. Actual and future results and trends could differ materially from those set forth in such statements due to various factors, including, without limitation, those that will be discussed in this 2016-2017 CER. These factors are beyond Arcadis's ability to control or predict. Accordingly, Arcadis makes no warranty or representation that any of the projected values or results contained in this document will actually be achieved.

This 2016-2017 CER summarizes the work completed up to the date of issuance. Changed conditions occurring or becoming known after such date could affect the material presented and the conclusions reached herein to the extent of such changes. Arcadis has no responsibility for updating this report for changes that occur after the date of the report.

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

EXECUTIVE SUMMARY

E.1. Introduction

Arcadis Caribe, PSC (Arcadis), has been retained by the Puerto Rico Aqueduct and Sewer Authority (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 2012 amended and restated Master Agreement of Trust by and between PRASA and Banco Popular de Puerto Rico as Trustee, as further amended, (the MAT), and Section 3.5 of the 2012 amended and restated Fiscal Oversight and Support Agreement (2012 FOA) by and between PRASA, the Commonwealth of Puerto Rico and the Government Development Bank for Puerto Rico (GDB), as Fiscal agent to PRASA. However, pursuant to Act 21 of 2016 and amended by Act 2 of 2017, the Puerto Rico Fiscal Agency and Financial Advisory Authority (PRFAFAA) was established as an independent public corporation and governmental instrumentality that assumed all fiscal agency responsibilities previously assigned to GDB. PRFAFAA also acts as financial advisor and reporting agent of the Commonwealth and its public corporations, including PRASA.

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, as required by Section 3.5 of the 2012 FOA, PRASA must maintain a continuous disclosure policy with GDB and satisfy certain reporting requirements throughout the fiscal year (FY). To comply with this reporting requirements, Arcadis has prepared this CER for FY2016 and FY2017 (2016-2017 CER). The submittal of this report was delayed because of PRASA's on-going efforts during FY2015, FY2016 and FY2017 to finance its Capital Improvements Program (CIP) and to settle on a concrete Financial Plan under the current fiscal situation.

E.2. Puerto Rico's Current Fiscal Situation

Since FY2006, Puerto Rico has been facing an economic crisis that has severely impacted its residents. The recession remains ongoing, as the island has not been able to rise above the crisis due to several factors. Puerto Rico's current economic landscape, highlighted by a negative economic growth, increased poverty levels, and declining population and labor participation rates have negatively impacted PRASA's finances.

With the intention of improving the financial situation, over the past three years both the Federal and Puerto Rico's Governments, have enacted a series of laws. These laws include:

- Enactment of Act 66 of June 17, 2014 – Fiscal and Operational Sustainability Act for the Commonwealth of Puerto Rico (Act 66-2014). Act 66-2014 required among others, the following measures: 10% reduction in contracted services expense when compared to FY2014; 20% reduction in appointed employees' costs when compared to FY2012; and freeze or reduction of some payroll benefits or compensation.
- On July 12, 2016, after several revisions and cycles of amendments within the two legislative branches, PRASA's Revitalization Act (Act 68-2016), was signed into law by the Governor. Act 68-

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2016 encourages the restructuring of a portion of PRASA's existing Senior Lien debt and provides for the issuance of up to \$900M in new bonds to be issued by an independent securitization vehicle the law creates known as the PRASA Revitalization Corporation (the Corporation).

- Setting fiscal responsibility as a priority to recover its credibility from investors and financial markets to be able to restructure its debt, the Government passed Act 3 of 2017 (Act 3-2017). Act 3-2017 requires that all governmental instrumentalities (i.e. utilities, government agencies, and public corporations such as PRASA) implement certain measures to reduce its expenses. Among the temporary measures included for fiscal control and economic restructuring at all instrumentalities, are the freezing of salaries and vacant positions, the reduction of appointed positions by 20%, and the elimination all extraordinary payments and bonuses, as measures to decrease payroll costs.
- On April 29, 2017, Act 26 of 2017 (Act 26-2017) was enacted to ensure compliance with the Government's Fiscal Plan approved and finally certified by the PROMESA's Financial Oversight and Management Board on May 13, 2017. 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 freezes and reduces some payroll benefits or compensation.

The Financial Oversight and Management Board (the Oversight Board) established under PROMESA shall oversee the development of budgets and fiscal plans for Puerto Rico's Central Government and its instrumentalities, including PRASA. As required, PRASA's Fiscal Plan, which covers the forecast period from FY2017 through FY2026, was developed to ensure compliance with PRASA's mission. That is, the provision of quality water and sewer services at an affordable cost to its customers. Therefore, the Fiscal Plan provides for a safe, reliable and high-quality drinking water and wastewater treatment services to its customers to comply with federal environmental regulations, protect public health, safeguard environmental quality, and avoid potential penalties and criminal charges. The Fiscal Plan also provides for the required investment for the necessary infrastructure 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.

PRASA's Fiscal Plan includes: 1) a summary of the current financial situation and the actions already been taken by PRASA to improve its revenues, better control its expenses, fund the CIP and meet all debt service obligations; 2) baseline financial projections to present the initial financial need if no action is taken; 3) key efforts and new initiatives to reduce the estimated financial need (gap); 4) the governance and implementation of the Fiscal Plan; and 5) key risks and mitigation strategies to ensure the execution of a viable Fiscal Plan.

Furthermore, in its 2017 Certified Fiscal Plan, PRASA updated its CIP to cover a ten-year period from FY2017 to FY2026 (the ten-year CIP). The ten-year CIP was updated to: (1) Reprioritize non-regulatory compliance CIP projects to give more importance to efficiency projects; (2) further extend regulatory compliance timeframes so that PRASA can better coordinate capital spending to achieve other outcomes within the timeframe; and (3) address long-term infrastructure rehabilitation and replacement by increasing the amount of investment in capital renewal including buried infrastructure.

E.3. Organizational Updates and Changes

PRASA is organized into five operational Regions (North, South, East, West and Metro) and is managed by an Executive Management Team that provides the day to day management oversight and coordination for all institutional activities. It is supported by various departments in the organization 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 some challenges. Key PRASA leadership, including its Executive President, Strategic and Corporate Planning Vice President, Operations Vice President, Administration Vice President and Executive Director for the North Region, were newly appointed following the Government change in January 2017. Most of the support department directors are also newly appointed

PRASA's Governing Board, as restructured following Act 68-2016 to strive for a diversified and professionalized Governing Board, is composed of seven 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 practice 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 private citizen representing the Authority's customers, and
- Two ex-officio members, the Executive Director of the Association of Mayors and the Executive Director of the Federation of Mayors.

Currently, the PRASA Board has two customer's representatives since they were selected prior to the enacting of Act 68-2016 and their current term expires in June 2020. However, after their term ends, the PRASA Board will have only one Consumer Representative as stated by Act 68-2016. The customer representatives are elected through a public selection process under the jurisdiction of and directed by Puerto Rico Department of Consumer Affairs and shall serve for a three (3) year term. The Governor designated or elected board members shall serve for 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 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.

Although PRASA has achieved the optimum staffing level stipulated by the Executive Management Team, its staffing mix is not yet optimal. For example, PRASA continues to lack adequate personnel in the Operations Department, mostly operators for treatment facilities and meter readers, which results in overtime hours or, in the case of readers more estimated meter reads. PRASA needs to balance the employees with skill sets to fill technical and operator needs while maintaining the optimum staffing level. Also, it must consider the additional reduction of employees when personnel that qualify for the Voluntary

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Pre-retirement Program (approximately 351) retire from PRASA, after it is approved by OMB. Filling certain vacant position could help PRASA reduce overtime costs and address System Operation and Maintenance (O&M) needs more efficiently. In both FY2016 and FY2017, PRASA's customer accounts per employee ratio fell within industry range, but below the median; this can be attributed to PRASA's System's size and complexity. To the extent that PRASA is able to accelerate its staff management plan, additional cost efficiencies could be achieved.

PRASA's new Executive Management Team is currently in the process of revising and launching an updated Strategic Plan that is aligned with and supports the objectives included in the Fiscal Plan and in the Government of Puerto Rico's "Plan para Puerto Rico". Key Performance Indicators (KPIs) and metrics are also under revision.

E.4. Condition of System

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. Between January 2017 and April of 2017, Arcadis assessed the condition of PRASA's System through an inspection program of a sample of facilities that included a selection of the major elements of the System. Inspected facilities include: water treatment plants (WTPs) and wastewater treatment plants (WWTPs) not inspected in FY2015, and a selection of wells, water pump stations (WPSs), water storage tanks (WSTs), and wastewater pump stations (WWPSs). Dams were not included in this round of inspections because they were visited on January 2016 and included in the previous asset condition assessment report prepared by Arcadis. The purpose of these inspections was to identify the overall condition of the facilities in order to determine if they are being operated and maintained in a manner to achieve their operating goals, and to evaluate if PRASA's CIP is aligned with identified needs. Arcadis is conducting these facility inspections approximately every two years. As part of this effort, Arcadis also evaluated the compliance performance results for all PRASA WTPs and WWTPs for the period of July 1, 2015 through December 31, 2016. The next cycle of facility inspections will resume in FY2018.

Regarding the 2017 condition assessment, varied from those still in good condition to those requiring capital upgrades. In general, the condition of the facilities averaged an adequate rating, as shown in Table ES-1.

Table ES-1. FY2017 Asset Condition Ratings by Facility

Asset Category	Overall Condition Ratings							2017 vs. 2015	
	2008 CER	2009 CER	2010 CER	2012 CER	2014 CER	2015 CER	2017 CER	Change in Overall Score	Percent Change
Water Treatment Plants	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	0.0	-

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Asset Category	Overall Condition Ratings							2017 vs. 2015	
	2008 CER	2009 CER	2010 CER	2012 CER	2014 CER	2015 CER	2017 CER	Change in Overall Score	Percent Change
Wastewater Treatment Plants	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	0.1	5.3%
Wells	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	-0.1	-5.9%
Water Pump Stations	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	0.1	4.5%
Wastewater Pump Stations	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	-0.6	-25%
Water Storage Tanks	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	0.1	4.3%

Compliance with discharge permit limits and drinking water standards varied depending on the plant age, condition and experience of operators. Based on the regulatory compliance results evaluated, despite some operational (process control) and minor compliance issues, the treatment facilities are generally producing and delivering potable water and conveying and treating wastewater adequately.

Although approximately 95% of the 155 facilities inspected are in the adequate to good range, when compared to the previous inspection results, there was a noticeable decrease in number of facilities rated as good (17 facilities compared to 58). While most of the treatment facilities were rated as adequate (90 of 93), there is a concern pertaining to the physical condition (the equipment/maintenance criterion) as fifty-nine (38%) of the facilities visited where rated below 2.0. If unattended, the condition of these facilities could continue to deteriorate and fall to poor or unacceptable rating in the future

Even though most WTPs were classified as adequate, fifteen (21%) of the WTPs received a low-end rating that put them close to being rated poor. As mentioned, this was mostly driven by physical deterioration due the reduction and ultimate suspension of the CIP. Whereas PRASA acknowledges that it still has some challenges ahead with the Stage 2 D/DBPR compliance, it has developed an action plan to address exceedances to Total Tri-halomethane (TTHM) and Haloacetic Acid (HAA). This conscientious effort to improve Disinfection Byproducts (DBPs) in the System has improved compliance performance with Safe Water Drinking Water Act (SDWA) parameters. However, regulatory compliance results might be misleading since several National Pollutant Discharge Elimination System (NPDES) parameters include interim limits or are only being monitored. Moreover, several facilities lack Sludge Treatment System (STS) or have an STS that has been out of service for an extended period. It is recommended that the STS be repaired or constructed to achieve compliance with the NPDES parameters, as required by the 2015 USEPA Consent Decree.

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Regarding the WWTPs, evaluations generally ranged from poor to good condition with equipment/maintenance as the category of primary concern. Although there was only one facility rated as poor compared to nine in 2015, sixteen (70%) of the twenty-three facilities visited received a score below 2.0 and are in danger of continued deterioration. As with WTPs, the greatest current concern is the physical condition of the facilities which continues to deteriorate due to the reduction in capital investments. Process control also continues to be a challenge in some of the facilities, even though the plant operators indicated that standard operating procedures and control strategies are followed. Regarding the compliance criteria, the overall rating increased significantly since the previous inspection. However, as with the WTPs, much has to do with having several NPDES parameters with interim limits or only monitoring (as per consent decree and agreement requirements) and it is unknown whether the facility can meet the actual limit when the interim/monitoring limits expire. Moreover, PRASA should consider the stricter residual chlorine, fecal coliforms parameters for WWTPs with ocean outfalls and stringent phosphorus and nitrogen limits. Bringing facilities into consistent and sustained compliance with discharge parameters, addressing the shortcomings identified during inspections and additional operational improvements including new process equipment, process automation and process control optimization are some of the measures that PRASA must undertake to continue to improve and maintain the condition of its facilities.

Regarding the ancillary assets, a smaller sample of facilities were inspected this year since an emphasis was given to treatment facilities. There was an equivalent or slight improvement in overall scores for water storage tanks and WPS and a slight decrease for wells. The wells decrease from 2014 to 2015 and again in this year's inspection, maintaining the trend that deterioration will continue if CIP or Renewal and Replacement (R&R) investments are not made. Also, a significant lower rating of -0.6 rating in WWPS overall scores compared to the 2015 results. Furthermore, 67% of the visited WWPSs have recorded overflows during the evaluation period. Even though most of the deficiencies noted can be addressed through PRASA's R&R program and may not require major capital improvements, implementation of the R&R program also depends on PRASA's ability to identify and obtain funding sources.

PRASA recognizes that despite the recent improvement in Non-Revenue Water (NRW), current amount of NRW is high when compared to other utilities in the United States (U.S.) and Canada¹; however, it must be noted that PRASA owns and operates a much more complex network of water and sewer infrastructure. PRASA is implementing sound strategic programs and initiatives to measure, manage, and reduce water losses and NRW. PRASA continues to work on and improve its leak detection and monitoring practices and continues to aggressively address leak occurrences. Currently, PRASA is remotely monitoring levels of a number of the tanks in the distribution system to avoid tank overflows and improve the water distribution balance. Also, PRASA has established a resource and a NRW management team fully dedicated to NRW monitoring and continues conducting periodic water audits, which are used to implement the necessary controls and develop action items to address NRW.

PRASA's average NRW percentage from FY2002 through FY2011 has been about 61%, with a record high recorded in FY2011 of 64.5%. However, since FY2012, PRASA's NRW levels have been consistently declining. From FY2012 to FY2016, PRASA reports to have reduced the amount (volume) of water produced (139 MGD reduction), amount of water losses (90 MGD reduction), and NRW (101 MGD

¹ Refer to Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, AWWA (2016)

reduction). In FY2016, of the total 508 MGD produced, approximately 298 MGD was NRW (58.7%). Of this amount of NRW, 291 MGD (97.6%) was due to water losses (both apparent and real) and 7 MGD (2.4%) was due to unbilled authorized consumption. Of the total amount of water losses in FY2016, approximately 44 MGD (15%) was due to apparent (commercial) losses, while approximately 247 MGD (85%) was due to real (physical) losses. PRASA is currently working on the draft FY2017 Water Audit; hence, NRW results for FY2017 have not been included in this Report. The decreasing trend reported by PRASA since FY2012 demonstrates a positive change in PRASA's efforts to reduce water losses and NRW. PRASA attributes these reductions to the following main contributing factors: greater understanding and improvement of management practices regarding NRW and water losses, water system optimization measures, and corrections made in water production and data collection practices. Moreover, some of the actions and projects to be implemented by PRASA to achieve the additional reductions in NRW and water losses as included in PRASA's Fiscal Plan are: 1) the Public Private Partnership (P3) Project, intended to reduce mostly commercial losses; and 2) Physical Losses Reduction initiatives. Lastly, 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.

Although the number of sanitary overflows is also high compared to the U.S., for example; PRASA has continued to improve its response time and attention/repair effectiveness to minimize the duration of these overflow events and their environmental impact. PRASA is implementing sanitary sewer evaluations and repair plans to reduce levels of infiltration and inflow (I/I) that must be treated in their WWTPs. The progress of this initiative has been affected as well by the ongoing fiscal situation.

PRASA's goal is to reduce the System's total water production per year down to 450 MGD by FY2020. Also, in compliance with Act 68-2016, by FY2019 PRASA must reduce its NRW volume by 5% or 15 MGD as compared to FY2016.

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 2017 asset condition assessment effort previously described. Overall, Arcadis found PRASA's O&M practices to be adequate. However, process control continues to be a challenge in treatment facilities.

The majority of WTPs and WWTPs were found to be adequately operated and maintained. However, there were several WTP and WWTP facilities that lacked the appropriate operational tools (i.e., O&M manuals, process controls, and laboratory equipment) at the moment inspections were conducted. Also, despite needing some additional general upkeep and grounds maintenance ancillary facilities, for the most part, are also being adequately operated and maintained. Nevertheless, a number of these facilities were found to have at least one operational and/or maintenance shortcoming. Arcadis has observed that, throughout time, PRASA's operational efforts and practices have improved. However, there is still room for further improvement with respect to prioritization, scheduling, and execution of corrective and routine maintenance activities.

Arcadis evaluated PRASA's annual System O&M costs. PRASA's FY2016 O&M expenses were approximately \$620M, of which \$541M were directly related to the O&M of the System. The other \$79M

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were 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; customer service call centers; and water meter purchases, amongst others. PRASA estimates that during FY2016 approximately 72% of its System O&M budget (\$390M) was allocated to the water system and the remaining 28% (\$151M) to the wastewater system. For FY2017 PRASA's O&M expenses projection is approximately \$648M. 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. However, the implementation of most of these programs/initiatives has been hindered by the ongoing fiscal crisis that Puerto Rico is enduring and which is affecting PRASA. PRASA's FY2016 O&M budgets are favorably comparable to the most recently published median benchmark results published by the American Water Works Association in 2016², except for the water and wastewater O&M cost per 100 miles of pipe which are slightly above the each respective median.

Table ES-2 provides a comparison of PRASA's O&M costs to several key O&M cost benchmarks.

Table ES-3 presents a summary of PRASA's KPIs goals and results. In FY2016, PRASA achieved a compliance score of 61% of its KPIs on an island-wide basis. In FY2017, PRASA's scored was reduced to 48%, mostly because of PRASA's current fiscal situation. Based on the FY2016 results, the following are some of the KPIs for which PRASA did not meet its defined goals: overtime, billings vs. collections, unplanned work effectiveness, reported leaks and overflows, and repair time for leaks and overflows, among others. Although some of the KPIs were improved in FY2017, such as billings vs. collections, reported leaks and repair time for leaks and overflow, the others remained below PRASA's goal. In addition, other KPIs for which PRASA did not meet its goals for FY2017 are: billing adjustments, complaints in customer service (per 1000 active accounts), customers with service interruptions, customer service attention time, average water production, and employee training. These are key areas that PRASA should continue to work on in FY2018.

Table ES-2. PRASA Metrics vs. Water/Wastewater Utilities Benchmarks

Benchmark Category	2015 Benchmarks ¹			PRASA ²
	Top Quartile	Median	Bottom Quartile	
Water O&M Cost per Account	\$294	\$410	\$669	FY2010: \$292 FY2011: \$309 FY2012: \$321 FY2013: \$357 FY2014: \$350 FY2015: \$338 FY2016: \$315
Water O&M Cost per MG Processed	\$1,726	\$2,305	\$3,683	FY2010: \$1,555 FY2011: \$1,702 FY2012: \$1,777

² Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, AWWA (2016)

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Benchmark Category	2015 Benchmarks ¹			PRASA ²
	Top Quartile	Median	Bottom Quartile	
				FY2013: \$1,991 FY2014: \$1,993 FY2015: \$2,061 FY2016: \$2,100
Water O&M Cost per 100 miles of pipe	\$1,668,654	\$2,598,590	\$4,049,861	FY2014: \$2,948,365 FY2015: \$2,840,100 FY2016: \$2,639,588
Wastewater O&M Cost per Account	\$249	\$355	\$494	FY2010: \$214 FY2011: \$225 FY2012: \$236 FY2013: \$199 FY2014: \$192 FY2015: \$184 FY2016: \$198
Wastewater O&M Cost per MG Treated	\$1,727	\$2,597	\$3,904	FY2010: \$1,949 FY2011: \$2,067 FY2012: \$2,151 FY2013: \$1,692 FY2014: \$1,628 FY2015: \$1,646 FY2016: \$2,106
Wastewater O&M Cost per 100 miles of pipe	\$1,796,332	\$2,412,263	\$3,335,791	FY2014: \$2,418,931 FY2015: \$2,335,669 FY2016: \$2,526,535

¹ Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, AWWA (2016)

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-3. FY2016 & FY2017

Strategic Plan Initiative	Key Performance Indicator	FY2016 Goals	Results as of June 2016	FY2017 Goals	Results as of June 2017
Fiscal Health	Employees per Connection	3.35 or less Employees per 1,000 connections	3.30	3.34 or less Employees per 1,000 connections	3.25
	Overtime	Reduce to 8% or Below	11%	Reduce to 7% or Below	9%

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Strategic Plan Initiative	Key Performance Indicator	FY2016 Goals	Results as of June 2016	FY2017 Goals	Results as of June 2017
Operational Efficiency	Budget Compliance (Excludes Electricity Costs)	Below 100%	92%	Below 100%	86%
	Collection vs. Billings	Increase to 96% or Above	88.2%	Increase to 94% or Above	94.8%
	Compliance - Water System	Increase to 99% or Above	99.2%	Increase to 99% or Above	99.5%
	Compliance - Wastewater System	Increase to 97% or Above	98.3%	Increase to 97% or Above	97.9%
	Billing Adjustments	Reduce to 2.5% or Below	2.2%	Reduce to 2% or Below	3.0%
	Complaints in Customer Service (per 1000 Actives Accounts)	Reduce to 16.7 or Below	16.1	Reduce to 16.7 or Below	17.5
	Monthly Average of Customers with Service Interruptions (as a Percentage of Total Customers)	Reduce to 5% or Below	3.1%	Reduce to 5% or Below	6.8%
	Customer Service Attention Time (Commercial Office)	Maintain below 30 min.	24.11 min	Maintain below 30 min.	33.13 min
	Vehicle Availability	Increase to 92% or Above	84%	Increase to 92% or Above	80%
	Average Processing Time of Purchase Orders ¹	Less than 25 days	40 days	Less than 40 days	42.58 days
Preventive vs. Corrective Maintenance Ratio	Increase to 80%	78%	Increase to 80%	79%	
Average Time for Equipment Repairs	Less than 25 days	23 days	Less than 25 days	24.13 days	

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Strategic Plan Initiative	Key Performance Indicator	FY2016 Goals	Results as of June 2016	FY2017 Goals	Results as of June 2017
	Reported Leaks	Reduce to 3,296 monthly	3,682	Reduce to 4,598 monthly	3,935
	Reported Overflows	Reduce to 2,220 monthly	2,511	Reduce to 2,298 monthly	2,383
	Repair Time for Leaks ²	Reduce to 58.0 hrs	62.7 hrs	Reduce to 53.0 hrs	51.7 hrs
	Repair Time for Overflows	Reduce to 36.0 hrs	37.3 hrs	Reduce to 32.0 hrs	31.6 hrs
	Average Water Production (MGD) ³	Reduce to 558 MGD	508 MGD	Reduce to 505 MGD	509 MGD
	Percent of NRW ^{3,4}	Reduce to 56.9%	54.6%	Reduce to 53.2%	-
Infrastructure and Sustainability	Energy Consumption (Annual)	Reduce to 660.34 MkWh	624.41 MkWh	Reduce to 660.34 MkWh	630.91 MkWh
	Project Progress (CIP) ⁵	Greater or equal to 0.9	-	Greater or equal to 0.9	-
	Cost Performance (CIP) ⁵	Greater or equal to 0.9	-	Greater or equal to 0.9	-
Organizational Transformation	Training (Cumulative Hours per Employee)	More than 25 hrs per year	25.9 hrs	More than 26 hrs per year	23 hrs
	Unplanned Work Effectiveness (Absenteeism)	Reduce to 2 days	2.2 days	Reduce to 2 days	2.5 days
	Planned Work Effectiveness	Reduce to 10%	4%	Reduce to 10%	5%

¹ The Average Processing Time of Purchase Orders goal was modified for FY2017 to include the process time needed for the Lotus Notes process that was recently incorporated. Also, now calendar days are considered instead of business days. The new KPI goal considers 15 days required for the Lotus process and 25 days for the SAP process.

² In FY2016 Reported Leaks KPI metrics was modified to include only the in-line reported leaks (O12).

³ The Average Water Production and Percent of NRW KPIs reported for FY2016 are different from the ones presented in this table. The values used here are the official ones reported in the FY2016 Water Audit which were available after the KPIs report was published.

⁴ The Percent of NRW KPI is only measured annually and island-wide. PRASA's NRW Recovery Office is currently working in the FY2017 Water Audit and as of the date of this CER the information was not available.

⁵ Due to the suspension of the CIP, the Project and Cost Performance KPIs for FY2016 and FY2017 are not being measured.

PRASA's Operational Initiatives are well developed and address critical aspects of PRASA's operation such as NRW, energy management and efficiency, and revenue stream diversification. However, the development, implementation and overall schedules and benefits realization of these initiatives have been negatively affected due to funding issues and have either fallen behind their implementation schedule or have been postponed indefinitely or cancelled by PRASA. This, in turn, has affected the projected additional revenues and cost savings to be realized through some of these initiatives that had been projected for FY2016 and FY2017 and, more likely than not, for future fiscal years. Initiatives such as the reduction of NRW to be included in the P3 Project, is expected to generate benefits that will surpass those already achieved by PRASA under the Revenue Optimization Program. Once funding has been identified, PRASA shall prioritize efforts to reactivate other initiatives, such as the Comprehensive Energy Management Program, as soon as possible and continue searching for new opportunities that can provide increased revenues and cost savings.

E.6. Capital Improvement Program and Regulatory Compliance

PRASA runs and manages a CIP to improve and maintain its water and wastewater infrastructure. The CIP's main objectives are to maintain, modernize and simplify the Systems to achieve operational efficiency, protect public health and safeguard environmental quality, while enabling continued economic development and meeting all regulatory requirements. The CIP is a dynamic program that evolves and undergoes revisions as needs and sources of funds are identified, and as projects transition from planning through design, construction and startup phases. The program has been funded with external financing from bond issuances and federal assistance in accordance with standard utility financing practices. Bond financing of long-term capital improvements is consistent with PRASA's mission and results in lower, more affordable water rates than would be possible if these expenses were to be paid on a current basis (operating revenues). Since FY2007, PRASA has invested approximately \$3.7B in its CIP, with the intention of bringing the System into compliance and catch-up with capital needs that had been lacking in prior years. PRASA's Strategic Plan and public policies endorsed by its Governing Board included a tapered transition of financing the CIP with bonds, to self-financing a significant portion with revenues. PRASA's CIP includes projects that cover major capital improvements identified throughout PRASA's five Operational Regions (North, South, East, West and Metro), as well as island-wide initiatives such as technological advancements, telemetry, preventive maintenance, meter replacement, and R&R to the System.

Currently, execution of all regulatory-driven capital projects is on hold indefinitely. Important renewal work such as replacing inefficient meters and failed/leaking pipelines are also being deferred. 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 critical situation. Given the delays in the issuance of new revenue bonds and the resulting suspension of the CIP projects, PRASA accumulated an outstanding debt of more than \$150M owed to its CIP contractors and suppliers. As of June 2017, outstanding debt with contractors has been reduced to approximately \$60M. The suspension of CIP projects may have both a short and possible long-term effect on PRASA and Puerto Rico's economy. In the short-term, PRASA is in danger of non-compliance with regulatory mandates or administrative orders, increasing construction costs, and incurring liabilities associated with its non-payment to vendors. In the long-term, the cost of capital projects may also increase as vendors may price-in the risks associated with delays in payment or non-payments to contracted projects. The suspension of all CIP projects, as well as the continuation of

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the delays in payment to PRASA's CIP contractors will continue to cause substantial negative impacts to the local economy.

As required by PRASA's Governing Board, PRASA's Infrastructure Department must annually submit for its approval an updated five-year CIP plan. However, PRASA included in its 2017 Certified Fiscal Plan a modified ten-year CIP which includes all adjustments resulting from negotiations with Regulatory Agencies and the necessary investment to reflect PRASA's infrastructure current needs to ensure adequate operation and sustainability of the System. It covers the planning period from FY2017 through FY2026. Therefore, CIP discussions presented in this 2016-2017 CER refer to the ten-year CIP as included in PRASA's 2017 Certified Fiscal Plan. The approval and execution of this ten-year CIP is contingent upon funding availability and allocation³.

CIP projects, as recently redefined in PRASA's Fiscal Plan, are classified into the following mandatory and non-mandatory categories: Mandatory Compliance (2015 USEPA Consent Decree projects, 2006 PRDOH Drinking Settlement Agreement projects, Civil Actions, Administrative Orders, and other mandatory projects); Non-Mandatory Compliance; Non-Mandatory Renewal and Replacement; Non-Mandatory Quality and Growth; Non-Mandatory Other; Non-Mandatory Structure. Projects are further classified as either water or wastewater system projects. Water system projects include projects for improvements or construction of new facilities regarding: water supply, water distribution, WTPs, WPSs, tanks, amongst others. Wastewater system projects include projects for improvements or construction of new facilities regarding: wastewater collection, WWTP, WWPSs, amongst others. In addition to project classification, CIP projects are ranked according to a prioritization score. This score is 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 projects: Regulatory Compliance, Quality of Service and Reliability, Operational Efficiency and Improvements, and Population Impacted by Project. The implementation schedule of future projects, currently not included in PRASA's CIP, will be subject to the prioritization system and PRASA's financial capacity.

PRASA's ten-year CIP for FY2017 through FY2026 amounts to \$2,369.7M. The ten-year CIP is mainly composed of R&R projects, which account for half of the total forecasted expenditures. PRASA's complex and extensive system requires significant investments to maintain the condition of its infrastructure. Previously, PRASA had made significant investments in water pipe renewal, investing \$496M⁴ between 2011 and 2015. The ten-year CIP R&R category doubled from PRASA's previous five-year CIP, with an annual average expenditure of \$115M and a total of \$1,153M for R&R projects. The ten-year CIP includes \$396.3M for Mandatory Compliance projects, which represents 17% of all categories. Historically, the majority of PRASA's CIP investment (about 60%) was for mandatory and compliance driven projects. This reduction is mainly a result of the extensive renegotiation process that PRASA and the Regulatory Agencies entered to modify certain requirements of the existing consent decrees and agreements to re-align compliance priorities and, in turn, help alleviate PRASA's financial burden. In addition, PRASA included in its ten-year CIP, the payment of the balance owed to contractors.

³ A revised five-year CIP was presented to and approved by PRASA's Governing Board in December 2017. This revised CIP will be presented in the FY2018 CER.

⁴ Source: RFC Professional Opinion Report, August 2016

PRASA's ten-year CIP consists of a total of 426 projects. PRASA has identified a total of 31 critical projects that shall have priority once the CIP is reactivated. These include the 18 terminated construction projects and 13 other critical projects that are either in the planning, design or bid phases. As stated by PRASA, the execution and reactivation of the CIP will not take place until the appropriate funding is identified. The planned CIP along with the O&M initiatives are generally in alignment with the System needs. However, there may be additional R&R and CIP needs to address: 1) buried infrastructure improvements including, but not limited to, additional wastewater collection system repairs or improvements that PRASA may be required to implement to bring these into compliance, and 2) future regulations that may impact PRASA's System. The impact of these future regulations may require significant operational and capital investments. As the impact of future regulations becomes more defined, CIP modifications will be required to adequately accommodate resulting needs. However, as discussed and negotiated with the Regulatory Agencies, any future CIP needs will be included in the project prioritization system that considers, among other criteria, PRASA's financial capacity.

In FY2015 the last two tasks of the Master Plan Update were completed; Task 3: CIP Reconciliation, and Task 4: Prioritization and Scheduling. PRASA's objective was to gather the resulting projects from the Master Plan Update and consolidate with the CIP. Furthermore, PRASA's intention is to continuously revise the Master Plan to maintain its CIP updated with the System necessities. Additional modifications to PRASA's Master Plan may be warranted as conversations with Regulatory Agencies continue, additional regulatory requirements and needs arise, and PRASA Systems' needs change. Key recommendations from the Master Plan are included in the ten-year CIP.

Finally, as reported on previous CERs, PRASA completed a Vulnerability Study and Adaption Plan for its entire infrastructure in compliance with the February 2013 Executive Order signed by the Governor of Puerto Rico at the time. The Climate Change Vulnerability Study findings and the strategies selected in the Adaptation Plan will be further assessed and CIP projects shall then be developed. These projects will follow the same guidelines set in the prioritization system. These climate change based projects will serve as a roadmap for PRASA in the planning process and in its preparation towards the expected impacts of climate change in the near and not so distant future. Currently, PRASA's CIP does not include projects or studies for addressing identified climate change vulnerabilities or adaptation actions.

E.7. Insurance Program

To meet the requirements of the MAT as it regards 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 by AON, PRASA's Broker of Record (BOR) in FY2016. The current BOR, 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.

In the opinion of Arcadis, 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. Particularly, PRASA should address the following key recommendations:

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1. Re-Conduct a Probable Maximum Loss (PML) Study considering new CAT Modellings and parameters.
2. 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 & severity of a breach.
3. Consideration to Terrorism Coverage, which is excluded under all current PRASA's Insurance Programs.
4. Consideration to include in next Crime Policy renewal - Knowledge or Discovery of Loss clauses should be re-negotiated to specifically identify positions triggering knowledge of incidents to minimize the risk of carrier declines for late reporting.
5. Consideration to broaden Drive Other Car coverage to include both Physical Damage and Medical Payments coverage.

E.8. System Assets and Financial Analysis

In FY2016, PRASA had an estimated total book value of fixed (capital) assets of approximately \$6,777M. Additionally, PRASA has approximately \$409M of assets that are currently under construction or as "Work in Progress". Including land and other non-depreciable assets, as of June 30, 2016, the book value of PRASA's total fixed assets amounts to \$7,261M (net of accumulated depreciation). PRASA's Total Assets were estimated at \$7,872M as of June 30, 2016. Total Assets include: current assets (approximately \$338M), restricted assets (approximately \$246M in restricted cash and cash equivalents), total capital assets (\$7,261M as previously mentioned), and other assets (\$27M in deferred loss resulting from debt refunding). For additional discussion regarding PRASA's assets, please refer to PRASA's Audited Financial Statements available on PRASA's website, under Investor Relations section. FY2017 System additions and retirements will be reported after the issuance of FY2017 Audited Financial Statements.

Arcadis reviewed the financial information provided by PRASA as included in the Fiscal Plan, which is summarized in Exhibit 1, to provide an assessment of PRASA's financial condition, particularly as it relates to assessing PRASA's financial results for FY2016, projected results for FY2017, and the reasonableness of PRASA's assumptions in the preparation of the financial projections (the forecast period or the Forecast) from FY2017-FY2026. Arcadis assessed 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) and the 2012 FOA. Additionally, the Forecast illustrates the anticipated debt service coverage (DSC), for the forecast period.

The following information, provided by PRASA, was reviewed:

- MAT and FOA, as amended and restated
- Sixth Supplemental Agreement of Trust
- Audited financial statements for FY2016
- PRASA's FY2016 actual results

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- PRASA's FY2017 projections (through March 31, 2017)
- PRASA's FY2018 Annual Budget
- PRASA's Fiscal Plan, including revenue, CIP, debt service and expense projections
- Debt service schedules for all currently outstanding debt service and preliminary projected debt obligations, and DSCs

The Forecast presents PRASA's estimate of the expected results of operations and DSC for the forecast period. Thus, the Forecast reflects PRASA's judgment, based upon present circumstances, as to the most likely set of conditions and course of action. However, there will usually be differences between forecasted and actual results, because events and circumstances frequently do not occur as expected, and those differences may be material.

The Operating Revenues (presented on a cash basis as required by the MAT) include Service Revenues (net of subsidies), incremental revenues from the rate increase, adjustments for uncollectible accounts, revenues from operational initiatives including the Revenue Optimization Program, other sources of revenues such as interest income, developer fee contributions, fines, reconnecting charges, bulk water sales and new revenue from PRASA's Fiscal Plan initiatives. Operating Revenues also include transfers to and from the Rate Stabilization Account, but exclude funds from the Budgetary Reserve Fund or special assignments from the Central Government.

FY2016 actual results show that PRASA's Operating Revenues were approximately \$1,108M, while FY2017 preliminary results totaled \$1,042M. Operating Revenues are projected to range from \$1,088M in FY2018 up to \$1,394M in FY2026. This Forecast includes key assumptions including: subsidies, 0.25% year-over-year revenue reduction due to population/consumption decrease, impact of existing laws, adjustment for uncollectible accounts, and additional revenues from the Revenue Optimization Program and Fiscal Plan Revenue Enhancing Initiatives.

The projected Operating Revenues for FY2018 through FY2026 include additional revenues to be generated from annual rate increases to be implemented in each year as required by the Oversight Board. Therefore, the following annual rate increase per customer type shall be applied starting in FY2018 through FY2026:

Table ES-4. PRASA's Fiscal Plan Proposed Annual Rate Increase by Customer Type

Customer Type	Annual Rate Increase
Residential	2.5%
Commercial	2.8%
Industrial	3.5%
Government	4.5%

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As the proposed rate increase is less than 4.5% per year PRASA is expecting to implement the change through the automatic increase allowed by the existing Rate Resolution. The impact of these rate increases is further discussed in the next section.

The Operating (Current) Expenses projections (presented on an accrual basis as required by the MAT), include Payroll and Benefits costs, as well as Electric Power, Chemicals, Maintenance and Repair, among others. Expenses take into consideration the conditions of PRASA's negotiations and agreements with its unions and the projected savings to be achieved from implementation of the Fiscal Plan Expense Reduction Initiatives. Other expense projections such as Chemicals, Maintenance and Repair, and Other Expenses include provisions to account for inflation over the forecast period. PRASA has assumed that the annual rate of inflation will be on average about 1.3% over the forecast period (inflation rates fluctuate from 1.17% in FY2018, down to 0.97% and 0.99% in FY2019 and FY2020; increasing every year thereafter up to 1.56% in FY2025 and FY2026. Also, Payroll and Benefits expenses assume that PRASA will self-fund its pensions costs; however, if required to make contribution to the ERS, these costs would increase by as much as \$47M annually.

FY2016 actual results show that PRASA's Operating Expenses were approximately \$619.7M, while FY2017 preliminary results totaled \$648.3M. Operating expenses are projected to range from \$726.1M in FY2018 up to \$832M in FY2026.

FY2016 debt service obligations totaled \$328.6M, of which \$325.8M were Senior lien obligations, and \$2.7M were subordinated obligations. As shown in Table 8-22, PRASA met Rate Covenant requirements in FY2016. PRASA's FY2016 Senior Debt Service was approximately \$42.2M higher than the projected Senior Debt Service included in PRASA's FY2016 budget. The net increase results from a lower Senior Lien Bonds debt service obligation due to postponement of the bond issuance PRASA was planning to complete during FY2016 (\$230.8M due and paid, versus \$283.6M budgeted), and a payment of \$90M (excluding interest, legal, and financial costs) made by PRASA to repay the outstanding balance of certain lines of credit that were provided to PRASA in anticipation of the bonds and that were to be refinanced through the bond issuance and settled with bond proceeds.

Also, in FY2016 PRASA only made partial fund deposits in the Commonwealth Guaranteed Indebtedness (CGI) Account of approximately \$53.2M of the \$88.4M amount due according to the corresponding debt amortization tables. Payments of debt service that were due to the U.S. Department of Agriculture (USDA) and USEPA in July 2016 were not made by PRASA. Similarly, in FY2017 PRASA is projecting to only have made partial fund deposits in the CGI Account of approximately \$21.2M of the \$79.9M amount due according to the corresponding debt amortization tables.

As previously mentioned, PRASA entered into forbearance agreements with both USDA and PRIFA (as operating agent for the SRFs) which were granted extensions until April 30, 2018 and June 30, 2018, respectively. The forbearance agreements grant PRASA a reduction of principal and interest on both programs of approximately \$58.8M for FY2017, which was reduced from the total FY2017 CGI debt service leaving a balance to be paid of \$21.2M. Additionally, as in FY2015, no funds were deposited in the Commonwealth Supported Obligations (CSO) Account during FY2016 and FY2017, 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. Finally, during FY2016 and FY2017 PRASA did not make all the payments due under the Term Loan with the GDB. However, per bond counsel's opinion, this debt is not covered under the MAT. Finally, as communicated by the Trustee via letter dated August 1, 2017, as of July 31,

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2017, the Commonwealth Payments Fund deficiency is approximately \$98.2M. Nevertheless, such deposit and payment shortfalls are not considered to be an Event of Default under the MAT.

Projected financial and DSC results are included in Exhibit 1. Despite PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total deficit of \$965.2M. Annual deficits range from \$273.4M in FY2018 down to \$12.9M in FY2026. PRASA plans to bridge this gap with a debt restructuring and/or by identifying and securing additional revenue sources or financing. However, because negotiations with bondholders both at the Senior lien level and with federal agencies (CGI level) are ongoing and confidential, at this time there is no additional information available to determine the reasonableness of this assumption. PRASA has also assumed that over the forecast period, no deposits will be made into the CSO Account for payment of the PFC Bonds (a debt service reduction of \$9M in each year of the Forecast) and no payments will be made for the Term Loan with the GDB. PRASA is also assuming that it will be able to secure additional federal funds of about \$23.3M in each year of the Forecast after negotiations with federal agencies conclude. If PRASA is not able to complete its intended debt restructuring or secure the new federal funds, PRASA will be required to reduce its projected CIP expenditures and/or increase the proposed rate adjustments to successfully meet its obligations.

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 to meet All Obligations per the MAT which include the payment of the CGI and CSO debt service obligations in full. Therefore, PRASA will not meet its Rate Covenant requirement of 1.0x coverage of its current obligations throughout the Forecast. To the extent that PRASA can re-negotiate and restructure existing debt obligations, its ability to meet Rate Covenant requirements will improve. However, if this is not accomplished, PRASA will be forced to reduce its projected CIP investments or increase projected annual rate adjustments. 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 would further exacerbate PRASA's financial situation going forward:

- Lower revenues or savings achieved, or timeliness of the Fiscal Plan initiatives.
- Higher overtime than currently planned as a result of further delays in filling vacant positions.
- Higher energy costs as a result of lower savings achieved through its Comprehensive Energy Management Program and/or higher Puerto Rico Electric Power Authority electric costs (per kWh).
- Higher annual inflation rates.

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

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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 lower capital investment levels projected in future years.

Set forth below are the most relevant opinions which Arcadis has reached regarding the review of PRASA's System, CIP and financial projections as per the 2017 Certified Fiscal Plan.

1. Although PRASA has achieved the optimum staffing level stipulated by the Executive Management Team, it lacks sufficient personnel in the operations department, mostly operators for treatment facilities and meter readers, having to incur in extra hours or in the case of readers, estimate more consumption. PRASA needs to balance the employees with skill sets to fill technical and operator needs while maintaining the optimum staffing level. Also, it must consider the additional reduction of employees when personnel that qualify for the Voluntary Pre-retirement Program (approximately 351) retire. Filling certain vacant position could help PRASA reduce overtime costs and address System O&M needs more efficiently. As per AWWA's 2016 Benchmarking Performance indicators, PRASA's customer account per employee ratio falls on the lower side of the industry median, which can be attributed to the larger size and higher complexity of PRASA's System compared to U.S. systems. To the extent that PRASA is able to accelerate its staff management plan, additional cost efficiencies could be achieved.
2. PRASA's 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 have contributed to improvements and optimization of operations and overall organization. Notwithstanding, PRASA's new Executive Management Team is in the process of revising the Strategic Plan and the KPIs to make modifications as necessary, add new performance indicators, and establish aggressive metrics to meet the Fiscal Plan and the Government of Puerto Rico's "Plan para Puerto Rico".
3. In general, the condition of the facilities visited for the 2017 condition assessment, varied from those still in good condition to those requiring capital upgrades. Although approximately 95% of the 155 facilities inspected are in the adequate to good range, when compared to the previous inspection results, there was a noticeable decrease in number of facilities rated as good (17 facilities compared

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to 58). While most of the treatment facilities were rated as adequate (90 of 93), there is a concern pertaining to the physical condition (the equipment/maintenance criterion) as fifty-nine (38%) of the facilities visited were rated below 2.0. If unattended, the condition of these facilities could continue to deteriorate and fall to poor or unacceptable rating in the future. Even though most WTPs were classified as adequate, fifteen (21%) of the WTPs received a low-end rating that put them close to being rated poor. As mentioned, this was mostly driven by physical deterioration due to the reduction and ultimate suspension of the CIP. Whereas PRASA acknowledges that it still has some challenges ahead with the Stage 2 D/DBPR compliance, it has developed an action plan to address exceedances to TTHM and HAA. This conscientious effort to improve DBPs in the System has improved compliance performance with SDWA parameters. However, regulatory compliance results might be misleading since several NPDES parameters include interim limits or are only being monitored. Moreover, several facilities lack STS or have an STS that has been out of service for an extended period. It is recommended that the STS be repaired or constructed to achieve compliance with the NPDES parameters, as required by the 2015 USEPA Consent Decree. Regarding the WWTPs, evaluations generally ranged from poor to good condition with equipment/maintenance as the category of primary concern. Whilst there was only one facility rated as poor compared to nine in 2015, sixteen (70%) of the twenty-three facilities visited received a score below 2.0 and are in danger of continued deterioration. As with WTPs, the greatest current concern is the physical condition of the facilities which continues to deteriorate due to the reduction in capital investments. Process control also continues to be a challenge in some of the facilities. Concerning WWTP compliance criteria, the overall rating increased significantly since the previous inspection. However, as with the WTPs, much has to do with having several NPDES parameters with interim limits or only monitoring (as per consent decree requirements) and it is unknown whether the facility can meet the actual limit when the interim/monitoring limits expire. Finally, as it pertains to the ancillary assets, there was an equivalent or slight improvement in overall scores for WSTs and WPSs and a slight decrease for wells. The wells decrease from 2014 to 2015 and again in this inspection cycle, maintaining the trend that deterioration will continue if CIP or R&R investments are not made. Also, a significant lower rating of -0.6 rating in WWPS overall scores compared to the 2015 results. Furthermore, 67% of the visited WWPSs have recorded overflows during the evaluation period. Despite the fact that most of the deficiencies noted can be addressed through PRASA's R&R program and may not require major capital improvements, implementation of the R&R program also depends on PRASA's ability to identify and obtain funding sources. In addition, 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. PRASA recognizes that the current amount of NRW is high and is implementing sound strategic programs and initiatives to measure, manage, and reduce water losses and NRW. PRASA continues to work on and improve its leak detection and monitoring practices and continues to aggressively address leak occurrences. Currently, PRASA is remotely monitoring levels of a number of the tanks in the distribution system to avoid tank overflows and improve the water distribution balance. Also, PRASA has established a resource and a NRW management team fully dedicated to NRW monitoring and continues conducting periodic water audits, which are used to implement the necessary controls and develop action items to address NRW. The decreasing trend reported by PRASA since FY2012 demonstrates a positive change in PRASA's efforts to reduce water losses and

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NRW. Moreover, some of the actions and projects to be implemented by PRASA to achieve the additional reductions in NRW and water losses as included in PRASA's Fiscal Plan are: 1) the P3 Project, intended to reduce mostly commercial losses; and 2) Physical Losses Reduction initiatives. Lastly, 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.

5. Although the number of sanitary overflows is also high compared to the U.S., PRASA has continued to improve its response time and attention/repair effectiveness to minimize the duration of these overflow events and their environmental impact. However, it is important to indicate that the current fiscal situation can adversely affect the sewer overflow repair and attention rates as well.
6. PRASA's Operational Initiatives address critical aspects of PRASA's operation such as NRW, energy management and efficiency, and revenue stream diversification. However, the development, implementation and overall schedules and benefits realization of these initiatives have been negatively affected due to funding issues. This, in turn, has affected the projected additional revenues and cost savings to be realized through some of these initiatives that had been projected for FY2016 and FY2017 and, more likely than not, for future fiscal years. Nevertheless, the Revenue Optimization Program has continued to provide significant benefits to PRASA in the form of increased revenues as evidenced by recent and historical financial results.
7. Except for buried infrastructure improvements, PRASA's Board-Approved 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. It is important that PRASA maintain an adequate level of R&R spend to maintain and renovate the System. U.S. industry guidelines recommend that assets, particularly buried infrastructure, be replaced at a rate of 1% of total assets (within an asset class) annually. 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. Thus, CIP modifications will be required to adequately accommodate resulting needs. Notwithstanding, any additional CIP needs will be prioritized and implementation schedules will depend on PRASA's financial capacity. PRASA's CIP was suspended in FY2016 due to funding problems and PRASA accumulated an outstanding debt of approximately \$150M owed to its contractors and suppliers, which, as of June 2017, has been reduced to approximately \$60M. Furthermore, PRASA included in its ten-year CIP, the payment of the balance owed to contractors. The ten-year CIP was updated to: (1) Reprioritize non-regulatory compliance CIP projects to give more importance to efficiency projects; (2) further extend regulatory compliance timeframes so that PRASA can better coordinate capital spending to achieve other outcomes within the timeframe; and (3) address long-term infrastructure rehabilitation and replacement by increasing the amount of investment in capital renewal including the replacement of meters and buried infrastructure.
8. 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:
 - Re-Conduct a PML Study considering new Catastrophe (CAT) Modellings and parameters.

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- 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 & severity of a breach.
 - Consideration of Terrorism Coverage, which is excluded under all current PRASA's Insurance Programs.
 - Consideration to include in next Crime Policy renewal - Knowledge or Discovery of Loss clauses should be re-negotiated to specifically identify positions triggering knowledge of incidents to minimize the risk of carrier declines for late reporting.
 - Consideration to broaden Drive Other Car coverage to include both Physical Damage and Medical Payments coverage.
9. PRASA's Forecast (see Exhibit 1) reflects the Financial Plan submitted to and certified by the Oversight Board. Despite PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total deficit of \$965.2M. Annual deficits range from \$273.4M in FY2018 down to \$12.9M in FY2026. PRASA plans to bridge this gap with a debt restructuring and/or by identifying and securing additional revenue sources or financing.

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 to meet All Obligations per the MAT which include the payment of the CGI and CSO debt service obligations in full.

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

- PRASA's ability to maintain its Service Revenues, billings, and collections in a continuing challenging economic environment – Continued uncertainty and strain on the economy, and population shifts, and consumption patterns could continue to cause further declines in PRASA's billings (reflected in lower Service Revenues than budgeted) and collections (reflected in high Adjustment for Uncollectibles).
- PRASA's ability to implement the necessary annual rate increases – PRASA is projecting to implement annual, but more modest rate increases that will generate about \$1.1B between FY2018 and FY2026. Since FY2014, PRASA has not increased or changed its rate structure for water and sewer services as controlled by public policy. However, PRASA is bound to its 2017 Certified Fiscal Plan, which being revised⁵. The amount realized from the rate increases will depend on PRASA's financial results, CIP investments, customer base and consumption trends, among others.
- PRASA's ability to continue to successfully implement its Revenue Optimization Program and the new Fiscal Plan initiatives – PRASA's Forecast includes certain revenue enhancing and cost reduction initiatives that are currently underway and new ones proposed under the Fiscal Plan. Any changes to the funding, framework and execution of these initiatives would significantly alter

⁵ A revised Fiscal Plan was submitted to the Financial Oversight and Management Board (the Oversight Board) established under PROMESA for evaluation and re-certification on January 24, 2018.

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PRASA's projected financial results. Although PRASA has made a commitment to implement the initiatives described in this Report, there is a possibility that the projected results and, more specifically, the timing of those results may not be achieved.

- PRASA's ability to self-fund its pension costs – PRASA's plan to self-fund pension costs is underway; if PRASA is not able to fully fund pension benefits on a Pay-Go basis and is otherwise required to make the contributions to the ERS, PRASA's Payroll and Benefits costs could increase by as much as \$47M.
- PRASA's permanent debt restructuring – PRASA will have to reduce its debt service to reduce its forecasted annual deficits. PRASA continues to work with federal entities to negotiate a permanent restructuring of both USDA RD and USEPA SRF debt, and has engaged in negotiations with Senior bondholders. However, there is insufficient information available to determine if PRASA will be successful in either of these efforts.

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EXHIBIT 1

PRASA FINANCIAL FORECAST PRO FORMA* (\$ Thousands)	FY2016 ACTUAL RESULTS	FY2017 PROJECTION	FY2018 PROJECTION	FY2019 PROJECTION	FY2020 PROJECTION	FY2021 PROJECTION	FY2022 PROJECTION	FY2023 PROJECTION	FY2024 PROJECTION	FY2025 PROJECTION	FY2026 PROJECTION
OPERATING REVENUES											
1. Service Revenues (Base Fee and Service Charges, Net of Subsidies) ²	\$902,625	\$984,562	\$1,017,277	\$1,053,620	\$1,077,503	\$1,101,191	\$1,126,548	\$1,153,595	\$1,181,432	\$1,210,083	\$1,239,571
2. Transfer from Rate Stabilization Account	90,000	-	-	-	-	-	-	-	-	-	-
3. Operational Initiatives - Additional Billings	103,182	98,650	98,406	98,162	97,920	97,678	97,436	97,195	96,955	96,715	96,476
4. Operational Initiatives - Collections from Prior Years	8,516	4,500	4,500	3,600	-	-	-	-	-	-	-
5. Adjustment for Uncollectibles	(6,465)	(54,161)	(44,421)	(44,312)	(44,202)	(44,093)	(43,984)	(43,875)	(43,766)	(43,658)	(43,550)
6. Other Income (Miscellaneous/Special Assessments/ZumFiber-PRASA Holdings)	10,025	7,980	7,960	7,941	7,921	7,902	7,882	7,863	7,843	7,824	7,804
7. Fiscal Plan - Revenue Enhancing Initiatives ³	-	-	4,254	(4,404)	20,354	42,824	56,539	66,917	76,845	86,513	93,771
8. Total Operating Revenues [Sum Lines 1-7]	\$1,107,883	\$1,041,531	\$1,087,976	\$1,114,608	\$1,159,496	\$1,205,502	\$1,244,422	\$1,281,694	\$1,319,308	\$1,357,477	\$1,394,072
ADDITIONAL REVENUES											
9. Transfer from Budgetary Reserve Fund	-	-	-	-	-	-	-	-	-	-	-
10. General Fund Grants/Appropriations/Contributions	-	-	-	-	-	-	-	-	-	-	-
11. Reimbursements to the Authority Revenues	-	-	-	-	-	-	-	-	-	-	-
12. Total Other Sources of Revenue [Sum Lines 9-11]	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13. Total Authority Revenues [Line 8 + Line 12]	\$1,107,883	\$1,041,531	\$1,087,976	\$1,114,608	\$1,159,496	\$1,205,502	\$1,244,422	\$1,281,694	\$1,319,308	\$1,357,477	\$1,394,072
OPERATING EXPENSES											
14. Payroll and Benefits	\$293,511	\$327,824	\$353,609	\$345,209	\$348,567	\$351,976	\$359,212	\$367,586	\$376,014	\$384,496	\$393,033
15. Electric Power	141,743	140,788	153,263	168,641	166,297	178,943	183,741	196,529	199,482	197,344	201,374
16. Maintenance and Repair	36,200	52,271	52,884	53,399	53,926	54,535	55,253	56,071	56,939	57,827	58,730
17. Chemicals	27,765	32,198	32,576	32,893	33,218	33,592	34,035	34,539	35,074	35,620	36,176
18. Insurance	7,989	8,269	8,366	8,447	8,531	8,627	8,714	8,807	8,908	9,008	9,291
19. Other Expenses	134,356	163,874	165,796	167,409	169,063	170,970	173,224	175,788	178,510	181,293	184,123
20. Fiscal Plan - Cost Saving Initiatives ⁴	-	(50,103)	(12,045)	(13,770)	(16,262)	(24,343)	(23,972)	(20,167)	(19,899)	(18,456)	(18,033)
21. Capitalized Operating Expenses	(21,909)	(26,833)	(28,360)	(28,712)	(28,845)	(29,550)	(30,126)	(31,057)	(31,636)	(32,032)	(32,661)
22. Total Operating Expenses [Sum Lines 14-21]	\$619,656	\$648,287	\$726,088	\$733,515	\$734,495	\$744,750	\$760,109	\$788,159	\$803,491	\$815,241	\$832,033
DEPOSITS											
23. Deposit to the Senior Bond Fund	\$325,883	\$230,789	\$230,788	\$230,790	\$230,791	\$230,790	\$230,789	\$230,788	\$230,787	\$230,789	\$230,789
24. Deposit to the Senior Debt Service Reserve Fund	2,721	2,721	1,387	-	-	-	-	-	-	-	-
25. Deposit to the Senior Subordinate Bond Fund	-	-	-	-	-	-	-	-	-	-	-
26. Deposit to the Senior Subordinate Debt Service Reserve Fund	-	-	-	-	-	-	-	-	-	-	-
27. Deposit to the Subordinate Bond Fund	-	-	-	-	-	-	-	-	-	-	-
28. Deposit to the Subordinate Debt Service Reserve Fund	-	-	-	-	-	-	-	-	-	-	-
29. Deposit to the Current Expense Fund	-	-	-	-	-	-	-	-	-	-	-
30. Deposit to the Operating Reserve Fund	-	34,920	38,894	38,280	38,058	42,122	3,747	6,061	3,766	2,577	4,092
31. Deposit to the Capital Improvement Fund (Net of Projected New Federal Funds) ⁵	-	97,226	283,744	236,150	229,787	218,233	230,937	245,907	251,043	217,164	250,195
32. Deposit to the Construction Fund	-	-	-	-	-	-	-	-	-	-	-
33. Deposit to the Commonwealth Payments Fund ⁶	53,198 ⁹	21,164 ⁹	80,402	81,677	80,651	87,967	88,079	88,023	91,049	91,114	89,870
34. Deposit to the Surplus Fund	-	-	-	-	-	-	-	-	-	-	-
35. Deposit to the Rate Stabilization Account	-	-	-	-	-	-	-	-	-	-	-
36. Total Deposits [Sum Lines 30-37]	\$381,802	\$386,820	\$635,215	\$586,897	\$579,286	\$579,112	\$553,551	\$570,779	\$576,645	\$541,643	\$574,946
37. Net Authority Revenues After Obligations and Deposits [Line 13-Line 26-Line 29-Line 38-Line 39]	\$106,425	\$6,424	(\$273,327)	(\$205,804)	(\$154,285)	(\$118,360)	(\$69,238)	(\$77,243)	(\$60,828)	\$593	(\$12,906)
38. Net Authority Revenues Advanced to Pay CIP Related Expenses and Other Obligations	(\$106,425)	-	-	-	-	-	-	-	-	-	-
39. Final Balance [Line 38 - Line 39]	\$0	\$6,424	(\$273,327)	(\$205,804)	(\$154,285)	(\$118,360)	(\$69,238)	(\$77,243)	(\$60,828)	\$593	(\$12,906)
DEBT SERVICE PAYMENTS DUE											
40. Senior (S)	\$325,883	\$230,789	\$230,788	\$230,790	\$230,791	\$230,790	\$230,789	\$230,788	\$230,787	\$230,789	\$230,789
41. DS Coverage Required = 2.50	3.40	4.51	4.71	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
42. Senior Subordinated (SSUB)	2,721	2,721	1,387	-	-	-	-	-	-	-	-
43. DS Coverage Required = 2.00	3.37	4.46	4.69	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
44. Subordinated (SUB)	-	-	-	-	-	-	-	-	-	-	-
45. DS Coverage Required = 1.50	3.37	4.46	4.69	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
46. Commonwealth Guaranteed Indebtedness (CGI)	96,309	79,917	80,402	81,677	80,651	87,967	88,079	88,023	91,049	91,114	89,870
47. Commonwealth Supported Obligations (CSO)	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999
48. Debt Not Covered Under the MAT	2,393	-	-	-	-	-	-	-	-	-	-
49. Total Debt Service Including Debt Not Covered Under the MAT, Net of Existing Deposits	\$436,306	\$322,427	\$321,577	\$321,467	\$320,440	\$327,756	\$327,867	\$327,810	\$330,835	\$330,901	\$329,659
DS Coverage on All Obligations (Coverage Required = 1.00)	1.05	0.94	0.79	0.84	0.88	0.90	0.94	0.94	0.95	0.99	0.98
RATE STABILIZATION ACCOUNT BALANCE											
50. Rate Stabilization Account Balance, beginning of period	\$93,000	\$1,201	\$0.329	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
51. Rate Stabilization Account Balance, end of period	\$1,201	\$0.329	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

* Numbers may not add up due to rounding.

² Starting in FY2018, includes additional revenues from rate increases and electronic bill discount.

³ Projected additional revenues from initiatives included in Fiscal Plan: P3 Project, New Disconnection Fee, and Adjustment Policy Revision.

⁴ Projected expense reductions from initiatives included in Fiscal Plan: Physical Losses Reduction, Hydroelectric Power Generation, and Other Expense Reductions.

⁵ Amount to be deposited from PRASA Authority Revenues, net of annual new Federal Funds of about \$23.3M (average).

⁶ FY2019 through FY2020 includes debt service due on USDA RD bonds and USEPA SRF loans per amortization schedule, and excludes payments of the CSO debt. PRASA will seek to restructure and reduce its CGI obligations and eliminate CSO obligations.

⁷ Not all budgeted funds were deposited in the Commonwealth Guaranteed Indebtedness Account during FY2016 and FY2017 for the payment of the Commonwealth obligations of PRASA included in the CGI for the payment of debt service that was due during each fiscal year; a forbearance period was granted by USDA and USEPA on Rural Development and SRF loans, respectively.

⁸ No funds were deposited in the Commonwealth Supported Obligations Account during FY2016 for payment of the Puerto Rico Public Finance Corporation (PFC) debt included in the CSO, and, accordingly, no funds were transferred by PRASA to the trustee of the PFC Superaqueduct Bonds for the payment of debt service that was due in FY2016. Per the MAT, this is not considered an Event of Default.

1 INTRODUCTION

1.1 Introduction and Purpose

Since 2008, Arcadis Caribe, PSC in collaboration with Arcadis U.S., Inc. has been retained by the Puerto Rico Aqueduct and Sewer Authority (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 2012 amended and restated Master Agreement of Trust by and between PRASA and Banco Popular de Puerto Rico as Trustee (2012 MAT), and Section 3.5 of the 2012 amended and restated Fiscal Oversight and Support Agreement (2012 FOA) by and between PRASA, the Commonwealth of Puerto Rico and the Government Development Bank (GDB), as Fiscal Agent to PRASA. However, pursuant to Act 21 of 2016, the Puerto Rico Fiscal Agency and Financial Advisory Authority (PRFAFAA) was established as an independent public corporation and governmental instrumentality that assumed all fiscal agency responsibilities previously assigned to GDB. PRFAFAA also acts as financial advisor and reporting agent of the Commonwealth and its public corporations, including PRASA.

1.2 Consulting Engineers Report Requirement

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, as required in Section 3.5 of the 2012 FOA, PRASA must maintain a continuous disclosure policy with its Fiscal Agent and satisfy certain reporting requirements throughout the fiscal year. Among these reporting requirements is the preparation and filing of a report prepared by the Consulting Engineer. Because of the credit downgrades of PRASA's bonds to non-investment grade level in FY2013, FY2014 and FY2015, and in compliance with the MAT and 2012 FOA, Arcadis prepared this CER which covers FY2016 and FY2017 (2016-2017 CER or the Report). The submittal of this report was delayed as a result of PRASA's on-going efforts during FY2016 and FY2017 to complete a ten-year Fiscal Plan as required by PROMESA.

Arcadis's opinion with respect to technical, operational and financial condition and related matters of PRASA's System is presented for FY2016 and FY2017 or as otherwise noted in the Report. Any statements contained in this report involving estimates or matters of opinion, whether or not so specifically designated, are intended as such, and not as representations of fact. Arcadis has not independently verified the accuracy of the reports and other information indicated as being provided by PRASA for the conduct of this assignment. To the extent that the information provided to Arcadis by PRASA is not accurate, the conclusions and recommendations contained in this report may vary and are subject to change. Changed conditions occurring or becoming known after the issuance of or beyond the period covered by this 2016-2017 CER could affect the material presented to the extent of such changes. Arcadis has no responsibility for updating this report for changes that occur beyond the date of its issuance.

1.3 Conventions

PRASA's fiscal year begins on July 1st and ends June 30th. Throughout this 2016-2017 CER, fiscal year is identified as "FY" followed by the calendar year in which the fiscal year ends: FY2016 is the fiscal year from July 1, 2015 through June 30, 2016 and FY2017 is the fiscal year from July 1, 2016 through June 30, 2017.

1.4 Acronyms

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

2 PRASA'S CURRENT SITUATION

2.1 Overview

Since FY2016, Puerto Rico (PR) has been facing an economic crisis that has caused severe hardships to its 3.5 million residents as presented in Figure 2-1. This current economic landscape, highlighted by negative economic growth, increased poverty levels and declining population and labor participation rates have, in turn, negatively impacted PRASA's finances.

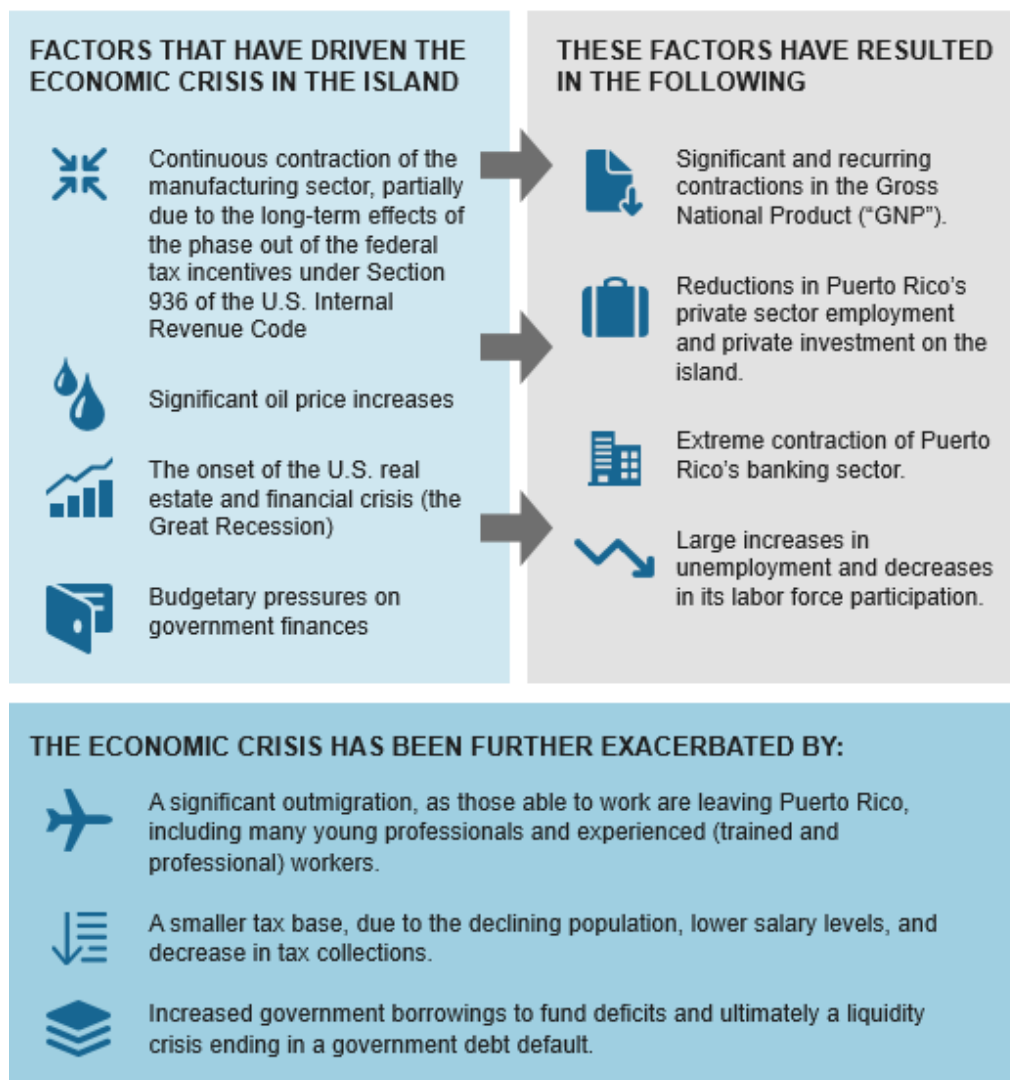


Figure 2-1. Economic Crisis Driving Factors and Effects

In addition to the detrimental results illustrated in Figure 2-1, PRASA has been affected by the rating agencies classification downgrades, which consequently has limited the ability to access capital markets to obtain financing.

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Over the past several years, the Government of Puerto Rico has been struggling with their financial situation. As a result, PRASA has also been adversely affected. The Government of Puerto Rico, through the enactment of Act 66 of June 17, 2014 – Fiscal and Operational Sustainability Act for the Commonwealth of Puerto Rico (Act 66-2014), discussed in more detail in the following Section, 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 66-2014 had primacy over any other law and was to remain in place through June 30, 2017 or until certain economic and financial conditions are met. Act 66-2014 required among others, the following measures:

- 10% reduction in contracted services expense when compared to FY2014
- 20% reduction in appointed employees' costs when compared to FY2012
- Freeze or reduction of some payroll benefits or compensation

Despite the Government and PRASA's fiscal situation, during 2015, PRASA looked to issue revenue bonds. However, due to the Governments' fiscal crisis and actions taken by the Central Government, among other factors; the conditions for the issuance were not favorable and PRASA had to postpone it. The Government's fiscal situation and classification 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 access the capital markets to obtain financing to cover its immediate Capital Improvement Program (CIP) related expenses. PRASA used operating funds to cover expenses related to its CIP projects for some time. However, in FY2016, after expending its surplus operating income and reserves to cover a portion of its unfunded CIP, PRASA was forced to essentially postpone or terminate the execution of all CIP projects. Despite the downgrades, the Rating Agencies consistently recognized PRASA's management and performance and distinguished PRASA from other Government corporations. Since FY2013, PRASA has had no access to the capital markets and, as a result, more than 140 infrastructure projects, totaling about \$600M have been suspended, roughly \$150M was owed to suppliers at the beginning of FY2017 (as of June 30, 2017 this debt has been reduced to approximately \$60M), and thousands of private sector workers are estimated to have lost their jobs.

In March 2016, PRASA introduced a new legislative project to the Senate for the creation of a new corporation that would allow PRASA to obtain the necessary financing to restart its CIP and cover outstanding debt with vendors through a securitization bond transaction. On July 12, 2016, after several revisions and cycles of amendments within the two legislative branches, PRASA's Revitalization Act (Act 68-2016), was signed into law by the governor. Act 68-2016 encourages the restructuring of a portion of PRASA's existing Senior Lien debt and provides for the issuance of up to \$900M in new bonds to be issued by an independent securitization vehicle the law creates known as the PRASA Revitalization Corporation (the Corporation), and for the tender/exchange of existing Senior Lien Bonds.

Although Act 68-2016 is still in effect, all efforts by the Government has moved towards the compliance of PROMESA, to be discussed in further detail below. In November 2016, a new Government was elected with a renewed platform and public policy. By the beginning of 2017, new projects were being proposed and new acts were being enacted. Setting fiscal responsibility as a priority to recover its credibility from investors and financial markets to be able to restructure its debt, the Government passed Act 3 of 2017 (Act 3-2017).

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On January 23, 2017 Act 3-2017 was signed to address Puerto Rico's fiscal, economic and budgetary crisis and requires that all governmental instrumentalities (i.e. utilities, government agencies, and public corporations such as PRASA) implement certain measures to reduce its expenses. Act 3-2017, among other measures (1) aims to guide the Government in the management and handling of the debt and obligations; (2) establishes prohibitions over the hiring of professional services; (3) amends Section 2101 of Act 120-1994, as amended, to extend the excise tax to the acquisition of certain properties and services; and (4) takes temporary emergency measures for the Government to remain operational and remain providing all the essential services to the Puerto Rican citizens. Additionally, Act 3-2017 requires all executive agencies and public corporations to report quarterly to the House of Representatives, the Senate of Puerto Rico and the Office of the Governor of Puerto Rico.

Among the temporary measures included for fiscal control and economic restructuring at all instrumentalities, are the freezing of salaries and vacant positions, the reduction of appointed positions by 20%, and the elimination all extraordinary payments and bonuses, as measures to decrease payroll costs.

Act 3-2017 will remain in effect until July 1, 2021. However, the effective period may end earlier if certain parameters are met, including that (1) Puerto Rico's economic growth rate forecast for the following fiscal year is 1.5% or higher; (2) a nationally recognized rating agency upgrades the credit rating of Puerto Rico's general obligations to investment grade level; and (3) Puerto Rico's preceding fiscal year ends without a budget deficit.

On April 29, 2017, Act 26 of 2017 (Act 26-2017) was enacted to ensure compliance with the Government's Fiscal Plan approved and certified by the PROMESA's Financial Oversight and Management Board (the Oversight Board) on May 13, 2017. 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 freezes and reduces some payroll benefits or compensation.

However, PRASA has not been a passive spectator of the financial constraints and setbacks it has endured in recent years. Since 2009, PRASA has incorporated a series of initiatives to improve its revenues and better control its expenses. The results achieved are the product of PRASA's commitment to becoming a self-sustainable entity, even while the Government's economic situation keeps worsening. The decrease in population and economic growth has resulted in a corresponding decrease of the number of residential and commercial customers as well as in their average consumption rates. Also, the reduction in manufacturing activity has directly impacted the PRASA's number of industrial accounts as well as the sector's average consumption rates. The number of industrial accounts has decreased at an approximate 5% per year rate over the past five fiscal years and average consumption has decreased by an annual average of 0.1%. When comparing the annual average billed consumption per account for industrial customers, there has been a 5.6% average yearly reduction during the past five fiscal years. Faced with significant changes in regulations, a declining population with decreasing consumption, and even a critical drought period experienced in FY2015, PRASA has managed to sustain its revenues and control its expenses.

2.2 Puerto Rico Oversight, Management, and Economic Stability Act

On May 25, 2016, the U.S. Congress passed PROMESA, designed to give Puerto Rico tools to address its economic crisis and restructure its debt. The bill 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 shall oversee the development of budgets and fiscal plans for certain Puerto Rico's instrumentalities and for the government, including PRASA. 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 board's responsibilities include:

- Certifying fiscal plans for entities designated as “covered entities” by the Oversight 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 provides the Government of Puerto Rico and its instrumentalities two distinct restructuring tools to address the island’s financial crisis: Title III and Title VI of PROMESA. 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 a requires a supermajority of its creditors to restructure the debt. Title III of PROMESA, on the other hand, is an in-court proceeding that follows a similar framework as a municipality bankruptcy under Chapter 9 of the Bankruptcy Code but is broader in scope. Title III incorporates the bankruptcy cramdown power, which allows for a plan of adjustment (to be approved by only a single impaired class) for nonconsenting classes of claims.

After a stay on litigation expired and negotiations with creditors were not resolving, on May 3, 2017, the Oversight Board filed a proceeding for bankruptcy before the U.S. District Court for the District of Puerto Rico against the Commonwealth of Puerto Rico under Title III of PROMESA. The goal of Title III of PROMESA is to file and confirm a Plan of Adjustment of Debts that will be binding upon all creditors and the Commonwealth. PROMESA does not contain a specific timetable for the conclusion of the Title III proceeding. The filing covers what are the Government’s central agencies. 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 Oversight Board request/mandate for the submission of a Fiscal Plan (the Fiscal Plan), on December 22, 2016, PRASA submitted its draft version. On February 21, 2017 and April 28, 2017, revised versions of the Fiscal Plan were resubmitted to the Oversight Board. On the latter date, PRASA’s Fiscal Plan was approved and certified by the Oversight Board as modified by the following three amendments to be to be addressed by PRASA:

- Include multi-year permanent rate increases that are distributed broadly across all customer types and categories, including residential, taking into consideration income of such customers. Increases must be a preapproved measure effective from January 2018 through at least the following 5 years and be supported by a commitment from PRASA to a detailed implementation plan and schedule to be developed, including PRASA’s Board led annual review of the rate increase and provide authority

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for revision as deemed necessary. The rate increase must be directed to achieve a structural balance and funding capital expenditure needs pre-debt service.

- Update the existing analysis of the impact of the rate increase by customer type and category to reflect the above updated rate proposal
- Include the updated electricity savings in line with the Puerto Rico Electric Power Authority (PREPA) Fiscal Plan and confirm the status of PREPA's involvement in, and collaboration with, the hydroelectric initiative.

On May 28, 2017, PRASA submitted to the Oversight Board a revised final version of its Fiscal Plan to incorporate the required amendments to the certified Fiscal Plan and to also include updates to reflect the impact of the legislation enacted after the certified Fiscal Plan was submitted. On August 26, 2017, the Oversight Board granted final certification on PRASA's Fiscal Plan.

2.3 PRASA's Fiscal Plan

PRASA's Fiscal Plan has been developed to ensure compliance with PRASA's mission. That is, the provision of quality water and sewer services at an affordable cost to its customers. Therefore, the Fiscal Plan provides for a safe, reliable and high-quality drinking water and wastewater treatment services to its customers to comply with federal environmental regulations, protect public health, safeguard environmental quality, and avoid potential penalties and criminal charges. As such, PRASA's Fiscal Plan provides for the required investment for the necessary infrastructure 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.

PRASA's Fiscal Plan includes: 1) a summary of the current financial situation and the actions already being taken by PRASA to improve its revenues, better control its expenses, fund the CIP and meet all debt service obligations; 2) baseline financial projections to present the initial financial need if no action is taken; 3) key efforts and new initiatives to reduce the estimated financial need (gap); 4) the governance and implementation of the Fiscal Plan; and 5) key risks and mitigation strategies to ensure the execution of a viable Fiscal Plan.

In its 2017 Certified Fiscal Plan, PRASA included its CIP to cover a ten-year period from FY2017 to FY2026 (the ten-year CIP). However, this ten-year CIP has not yet been approved by PRASA's Governing Board pending the identification of available funds to cover all required expenditures. The ten-year CIP was updated to: (1) reprioritize non-regulatory compliance CIP projects to give more importance to efficiency projects; (2) further extend regulatory compliance timeframes so that PRASA can better coordinate capital spending to achieve other outcomes within the timeframe; and (3) address long-term infrastructure rehabilitation and replacement by increasing the amount of investment in capital renewal including buried infrastructure. A detailed discussion on PRASA's ten-year CIP as included in PRASA's 2017 Certified Fiscal Plan is provided in Section 6.

PRASA's Fiscal Plan major revenue assumptions include a reduction in billings at a compounded annual growth rate (CAGR) of 0.25%, an increase in collection rates up to 96% of total billings, and the expiration of Act 66-2014 benefits effective FY2018. Expense assumptions reflect the impacts of active legislation such as Act 3-2017 and Act 26-2107 and consider the amended PREPA rates impact. A thorough

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discussion on PRASA's Fiscal Plan financial assumptions and projections is presented in Section 8 of this Report.

PRASA's management has identified several new efforts and initiatives that could provide additional financial benefits if implemented successfully. Some of these projects and initiatives are relatively new, while others have been discussed in the past but have not been executed. These key initiatives include:

- **Rate increases:** One of the amendments required by the Oversight Board is that the Fiscal Plan must include consistent, but moderate rate increases distributed broadly across all customer types and categories, including residential customers, taking into consideration income of such customers. As proposed in PRASA's Fiscal Plan, annual rate increases shall be applied in accordance with the current Rate Resolution adopted in 2013⁶ starting in FY2018 as follows:
 - Residential: 2.5%
 - Commercial: 2.8%
 - Industrial: 3.5%
 - Government: 4.5%
- **Public-Private Partnership Project (P3 Project):** In 2010, PRASA undertook a formal procurement process through the Puerto Rico P3 Authority, to among other things: incorporate advanced metering infrastructure, develop a geo-referenced customer database, and re-engineer, assume and operate all PRASA's commercial activities to guarantee the effectiveness and benefits of the technological improvements. During the procurement process, changes in the Government's public policy forced PRASA to modify the scope of work, making the proposed endeavor commercially impracticable and financially unfeasible. Therefore, the effort to pursue the P3 Project was discontinued.

Now, PRASA seeks to implement a P3 Project with one or more firms to reduce the current amount of NRW, optimize PRASA's metering system, and further enhance customer service activities efficiency and client satisfaction. With no access to capital markets and with a CIP program still in suspension, PRASA expects to leverage private sector capabilities and capital to, above all, improve metering accuracy and replace aged meters. To date, PRASA is currently working on clearly defining the scope of work and beginning the procurement process. All improvements and capital investments including the meter replacement program shall be assumed by the private firms.

- **Electronic Bill Discount:** PRASA has taken steps to modernize the way it interacts with its customers. In FY2016, PRASA created a "virtual office" in its website which allows customers to perform all transactions and claims via the internet. Additionally, a mobile application for smart phones has been developed. Also in FY2016, PRASA developed the capacity to send customers electronic bills. With this initiative PRASA proposes to provide a discount rate of \$1 per month to each customer subscribed to the electronic bill.
- **Adjustment Policy Revision:** In February 2017, PRASA's Governing Board Approved Regulation 8901, which among other customer service updated requirements and measures, states that

⁶ In 2005, PRASA incorporated into its standing rate resolution the ability to increase rates by 4.5% annually (maximum % after applying the adjustment coefficient calculation), until a cumulative 25% rate revenue increase is reached, without the need to go through the Act No. 21 process. This ability was also incorporated into PRASA's current rate resolution, adopted in 2013.

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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.

- **New Disconnection Fee:** Also, included in the Regulation 8901, this initiative consists on the implementation of a new \$15 charge for the cost of disconnecting the service (in addition to the reconnection fee already in place).
- **Physical Losses Reduction:** As will be further discussed in Section 5, physical losses are the largest component of PRASA's NRW. This initiative includes a series of efforts to reduce physical losses and thus NRW. Some of the identified efforts include: the continuation of the water leak detection program, monitoring systems' pressure to optimize flows, reducing the number of days required to repair leaks, and the installation of telemetry monitoring equipment at tanks to reduce overflows.
- **Hydroelectric Power Generation:** PREPA currently owns and operates 21 hydroelectric units (at 11 sites) with installed capacity of 100 MW. Additionally, PREPA operates three irrigation systems at a net economic loss. Hydroelectric facilities account for less than 2% of the total PREPA energy generation. Given PREPA's economic condition and need to upgrade its equipment to more efficient and economic thermoelectric units, very little capital is (or will be) available to improve, maintain or upgrade the water related assets. Because of this, the infrastructure has not been renewed or replaced, which is evidenced by the lack of maintenance of facilities and reservoirs, the amount of equipment in state of disrepair and the high levels of sedimentation in reservoirs.

In 2011 and 2012, PRASA and PREPA engaged in negotiations for the transfer of all water related assets from PREPA to PRASA. Initially, all hydroelectric generation assets (including the reservoirs) and all irrigation system assets would be transferred to the Authority. Nevertheless, as negotiations advanced, time ran out on the political cycle making the approval of required legislation to be impossible. The transaction evolved into an asset purchase transaction specifically for hydroelectric generating plants.

Between 2009 and 2013, the hydroelectric facilities generated an average of 129 million kilo-watt hours per year (kWh/yr). While this total generation represented less than 1% of PREPA's total energy generation at the time, it amounts to approximately 20% of the PRASA's total consumption. This creates a strong incentive for PRASA to operate such assets. With this initiative, PRASA expects to assume the operation of the hydroelectric generation units and all their related equipment. Among the benefits that this initiative offers are: lower energy costs for PRASA, better control and management of water resources, cost savings, leverages existing infrastructure and reduces the amount of future water/sewer rate increases. Currently, the P3 Authority, PREPA and PRASA are evaluating the feasibility of entering into a P3 agreement with a private entity to rehabilitate and operate the hydroelectric facilities.

- **Other Expenses:** PRASA expects to have an additional reduction in Other Expenses (excluding Payroll and Electricity) of about \$2M per year.
- **Forbearance Agreements with Federal Agencies:** Historically, PRASA has received federal funds for its CIP through various loans (the SRF Loans) granted by the U.S. Environmental Protection Agency (USEPA) through the Clean Water State Revolving Fund Programs (CWSRF) and the

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Drinking Water State Revolving Fund Programs (DWSRF), administered locally by the Government's Environmental Quality Board (EQB) and the Puerto Rico Department of Health (PRDOH), respectively; and, from bond proceeds from the USDA Rural Development Program by issuing revenue bonds as authorized under PRASA's Resolution No. 1224, adopted by PRASA on August 12, 1986, as amended (the RD Bonds). The SRF Loans and the RD Bonds are secured by a guaranty from the Government under Act No. 45 of the Legislative Assembly of Puerto Rico, approved on July 28, 1994, as amended. However, due to PRASA's fiscal situation, on June 30, 2016, PRASA entered into forbearance agreements related to both programs, which time periods were later extended in various occasions and are currently due and will terminate on April 30, 2018 (RD Bonds) and June 30, 2018 (SRF Loans). The current balance outstanding is around \$580M for SRF Loans and \$390M for RD Bonds, with an annual debt service of around \$60M. The forbearance agreements granted PRASA a reduction of principal and interest on both programs of approximately \$60M per year. The payment of the balances owed since June 2016 are expected to be included as part of a potential debt restructuring. Moreover, PRASA is currently in negotiation efforts with USEPA and USDA and expects to have agreements on debt restructuring and new federal funds provided in the upcoming months.

- **Superaqueduct Debt:** The Superaqueduct is one of the main assets owned and operated by PRASA, producing around 100 million gallons per day (MGD) or around 20% of water production. PRASA's debt balance includes a portion of the 2011 Series B Bonds issued by the PFC on December 2011 to refinance certain outstanding debt related to the construction cost of the North Coast Superaqueduct. In the past, PRASA and the Government agreed that PRASA will pay the debt service on the portion of this debt related to the Superaqueduct (\$162.7 million) only if sufficient funds were available for such purpose. However, this is not a general obligation of PRASA and is otherwise payable solely from appropriations received from the Government. PRASA has been unable to make such payments in recent years. As provided in the MAT, if PRASA is unable to make these payments, the obligation is not cumulative, and therefore does not carry forward to future periods. Therefore, since PRASA is not legally required to make this payment, the related debt service payments were eliminated from PRASA's Fiscal Plan financial projections.

Even though PRASA plans to implement all these new initiatives to enhance its revenues and reduce its expenses and obligations, PRASA would still need to plan for debt restructuring and secure additional external funding to be able to meet its financial projections as further discussed in Section 8.

2.4 Impact of Hurricanes Irma and María on September 2017

After Arcadis completed its evaluation of PRASA's Fiscal Year 2016 and 2017 CER Report, but prior to the submittal of the final report to PRASA and the Trustee, Puerto Rico was directly impacted by Hurricanes Irma and Maria. While Hurricane Irma did not cause major material damages to PRASA's infrastructure, the significant impact to the electric power infrastructure did affect continuity of water and sewer services to numerous customers throughout the island.

Hurricane Maria, on the other hand, did materially impact PRASA's infrastructure island-wide. Currently, PRASA is assessing physical damages and implementing emergency replacement and construction projects to restore services to its clients as soon as possible. However, given the catastrophic impact of

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Hurricane Maria on Puerto Rico's electric power system most of PRASA's facilities are currently operating with emergency power units; others are not yet in operation. Communications and access challenges are also affecting recovery efforts and services. PRASA's Executive Management Team expects that Operating Revenues for FY2018 will be materially affected because of:

1. significantly lower customer consumption (expected to continue until such time water and sewer services are normalized);
2. higher rate of uncollectibles of regular accounts (residential, commercial, and industrial customers) and government accounts;
3. likely reduction in number of accounts resulting from temporary relocations and permanent population migration; and
4. lower revenues from other services and fees (i.e., disconnection/reconnection fees).

Additionally, both FY2018 Operating Expenses and Capital Expenses are likely to be higher than considered for in PRASA's FY2018 Annual Budget. PRASA is currently working under the Central Government's umbrella for hurricane recovery efforts. To cover increased R&R and capital expenses, PRASA expects to receive allocations from the Federal Emergency Management Agency (FEMA) emergency and permanent construction funds as well as from other recovery funds that may be available. Additionally, PRASA is currently working with its insurance providers to determine insurance claims, recognizing that PRASA will be responsible for covering deductible amounts which had not been budgeted for in FY2018.

The impact of these hurricanes on PRASA's infrastructure and financials will be addressed in the FY2018 CER.

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 a result of the enactment of Act No. 92 on March 31, 2004 (Act 92-2004).



Figure 3-1. PRASA 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, and information systems. Figure 3-2 shows PRASA's organization as of June 30, 2017.

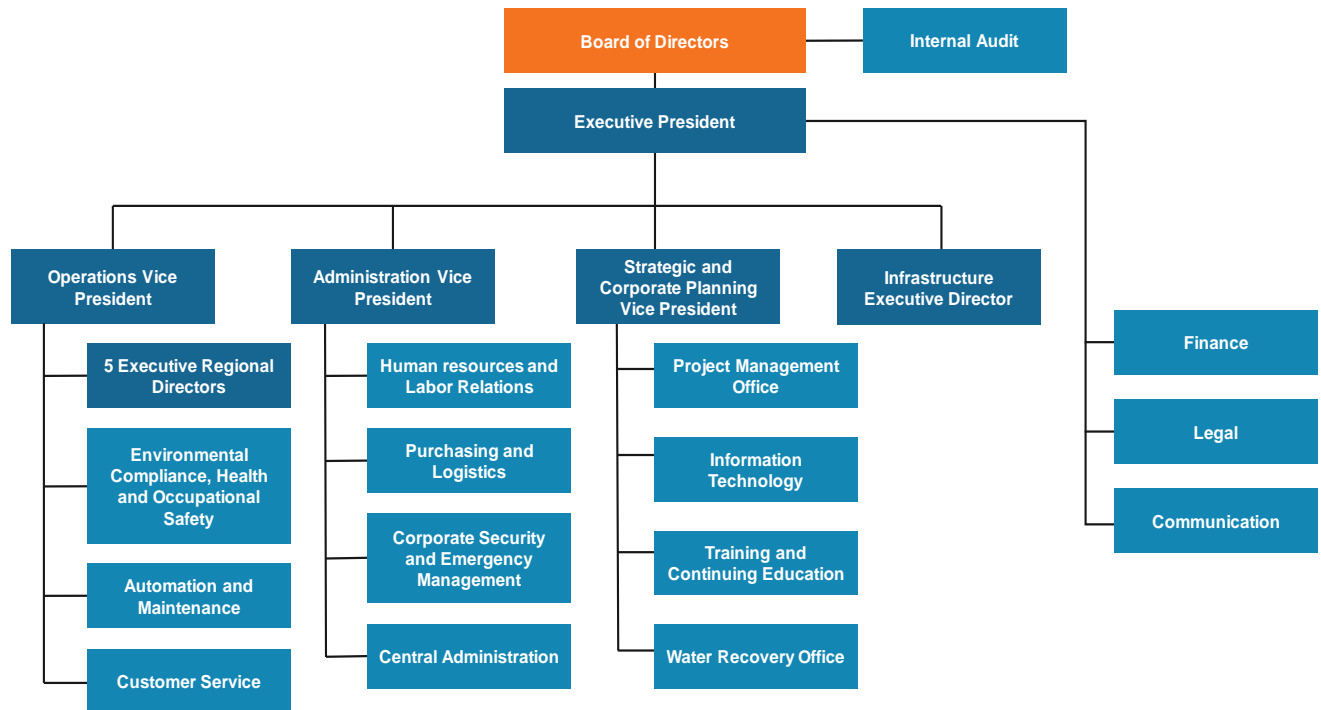


Figure 3-2. PRASA Legislated and Executive Management Structure as of June 30, 2017

3.2 Updates and Changes in PRASA's Organization and Management

3.2.1 Governing Board

As presented in Table 3-1 and as restructured following Act No. 68 of 2016 (Act 68-2016), the 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 PRFAFAA representative as per Act 2-2017.
- One private citizen representing the Authority's customers, and

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- Two ex-officio members, the Executive Director of the Association of Mayors and the Executive Director of the Federation of Mayors.

Currently, the PRASA's Governing Board has two costumer's representatives since they were selected prior to the enacting of Act 68 and their current term expires in June 2020, thus there will be nine members in PRASA's Governing Board when the vacant positions are appointed. However, after their term ends, the PRASA's Governing Board will have only one Consumer Representative as stated by Act 68-2016 bringing down the number of PRASA's Governing Board members to eight.

Table 3-1. PRASA's Governing Board Members as of July 31, 2017

Name	Board Position	Position Description	Term Ends
Reinaldo Paniagua Latimer ⁷	Interim President	Executive Director of the Federation of Mayors	Ex Officio
Gerardo Lorán Butrón, Esq.	Director	PRFAFAA Representative	Indefinite (PRFAFAA designee)
Vacant	Director	Independent Director/Finance	
Vacant	Director	Independent Director/ Engineering	
Gretchen Hau, Esq.	Director	Executive Director of the Association of Mayors	Ex Officio
Vacant	Director	Independent Director	
Vacant	Director	Independent Director/Legal	
Héctor Sánchez Cardona, P.E.	Director	Consumer Representative	June 19, 2020
Félix Aponte Ortiz, PhD.	Director	Consumer Representative	June 19, 2020

As of the date of this Report, there are four vacant position on PRASA's Governing Board awaiting appointment: a legal Independent Director, a finance Independent Director, an engineering Independent Director and a professional (Independent Director) with expertise in any fields related functions delegated to PRASA. As per Act 68-2016, the designation of a substitute shall be made within six months after the vacancy occurs. Except for the consumer representative, the PRFAFAA 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 (10) candidates to be prepared by a recognized executive search firm, according to objective criteria that takes into account the professional and educational backgrounds of the candidates. The customer representative will be elected through a public selection process under jurisdiction of and directed by the Puerto Rico Department of Consumer Affairs and shall serve for a three-year term. Finally, the Governor designated or elected board members shall serve for 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 for five-year terms, following the same

⁷ Mr. Paniagua Latimer was appointed the interim president of PRASA's Governing Board.

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candidate identification mechanism. None of the members appointed by the Governor may hold such office for more than three terms.

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

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

3.2.2 Executive Management Team

Since the enactment of Act 92-2004, PRASA has gone through several management changes at many levels of its organization including the executive level. A summary of PRASA's key Executive Management Team as of the date of this Report, including previous positions held and years of experience, is presented in Table 3-2. After the commencement of the newly elected government on January 2017, a new Executive Management team was appointed. Key changes include: The Executive President, Strategic and Corporate Planning Vice President, Operations Vice President, Administration Vice President, Executive Director for the North Region, and the Director for Infrastructure.

Table 3-2. PRASAs Executive Management

Name	Current Role	Term Ends	Prior Role	Experience Total/PRASA
Eng. Elí Díaz Atienza	Executive President	February 2022	Private Sector	12 years / 0 years
Eng. Doriel Pagán	Operations Vice President	Indefinite	Executive Director North Region	26 years / 24 years
Eng. Ryan Arrieta	Strategic and Corporate Planning Vice-President	Indefinite	Private Sector	17 years / 0 years
Mr. Yoniel Arroyo	Administration Vice-President	Indefinite	Customer Service Manager West Region	13 years / 10 years
Mr. Efraín Acosta	Executive Director of Finance	N/A	Deputy Exec. Director of Finance PRIDCO	39 years / 13 years
Eng. José J. Rivera	Executive Director for Infrastructure ¹	Indefinite	Auxiliar Director for Engineering	20 years / 6 years
Eng. Roberto Martínez	Executive Director Metro Region ¹	December 2019	Deputy Exec. Director Metro Region	30 years / 24 years
Eng. José Rivera	Executive Director North Region ¹	Indefinite	Toa Alta Area Director	20 years / 18 years
Eng. Héctor Gierbolini	Executive Director South Region ¹	February 2019	Preventive Maintenance Manager South Region	22 years / 22 years

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Name	Current Role	Term Ends	Prior Role	Experience Total/PRASA
Eng. Roberto Guzmán	Executive Director East Region ¹	December 2017	Deputy Exec. Director East Region	28 years / 28 years
Eng. Joel Lugo	Executive Director West Region ¹	February 2018	Deputy Exec. Director West Region	18 years / 18 years

¹Legislated positions.

Brief biographies of the newly appointed Executive President and Vice-Presidents are included below.

Mr. Elí Díaz Atienza, PE, ESQ, Executive President. Mr. Díaz is a Licensed Professional Engineer, Notary Lawyer and a Certified Floodplain Manager. He obtained his Civil Engineering degree from the Georgia Institute of Technology in 1999 and his Juris Doctor (JD) degree from the Faculty of Law of the University of Puerto Rico in 2006. He began his professional career in 1999 in the construction industry. Prior to transitioning to the public sector, Eng. Diaz Atienza worked with several private sector companies, including Unipro Architects and Engineers, Constructora Santiago, Banco Popular de Puerto Rico and McConnell Valdés LLC. In 2009, he served as infrastructure advisor to the Governor's Office and legal director for the P3 Authority. From 2010 to 2012 he served as Executive Director of the PR Solid Waste Authority. He is currently a member of the College of Engineers and Surveyors of Puerto Rico, the Lawyers' Association of Puerto Rico and the Association of State Floodplain Managers. He has over 10 years of experience in real estate, construction and infrastructure, where he has worked in the areas of administration and supervision of construction, design, permits, estimation, QA / QC, appraisals and commercial and residential appraisals, administration and valuation of infrastructure projects, real estate, P3s, project management and supervision, permitting and cost estimation. He also has experience in energy and waste management, including waste-to-energy, landfill gas to energy, biomass, recycling and management and operation of landfills.

Doriel I. Pagán Crespo, PE, Vice-President for Operations (previously the Executive Director for the North Region). Ms. Pagán joined PRASA in 1992, and has occupied different positions within the Operations, Compliance and Quality Control Department. Prior to joining PRASA, she worked for Johnson & Johnson Company in San Germán, Puerto Rico, for 2 years. Ms. Pagán was recognized by the College of Engineers and Surveyors of Puerto Rico as "Woman of Avant-garde." She obtained her Bachelor's Degree in Chemical Engineering from the University of Puerto Rico, Mayagüez Campus in 1991.

Mr. Ryan Arrieta Hallberg, PE, Vice-President of Corporate and Strategic Planning. Mr. Arrieta received an M.B.A. from the University of North Carolina Kenan-Flagler Business School, is a licensed professional engineer, and earned a B.S. and an M.S. in civil engineering from the Georgia Institute of Technology. Prior to joining PRASA, Mr. Arrieta served as a Management Consultant with ScottMadden, Inc. based in Atlanta, Georgia. During his time with the firm, Ryan specialized in project management, process analysis and improvement, and organization design across several industries including utilities, higher-education, and consumer packaged goods. Early in his career, Mr. Arrieta worked as a field engineer and project controls manager. Additional experience includes having worked with various heavy-civil works and construction management firms within the United States.

Mr. Yoniel Arroyo, Vice-President of Administration (previously West Region Customer Service Manager). Mr. Arroyo received a Ph.D in Enterprise and Management Development and a M.B.A from the Interamerican University of San Germán, is currently a professor of the graduate program in business administration at the Metropolitan University and works with PRASA since joining in 2007. He has occupied different positions in the operations management area in the West Region pertaining to customer service, as well as, providing trainings to PRASA staff. While working at PRASA Mr. Arroyo has continue to enhance his teaching career by offering courses in business administration at several universities in the island and by participating in seminars and conferences. He obtained his Bachelor's Degree in Commerce Administration from the University of Puerto Rico, Aguadilla Campus.

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 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 FY2016 and FY2017, PRASA had a total staff of 4,798 and 4,654, respectively; which represents a reduction of 3.0% from FY2016 to FY2017. Based on the total number of employees for both FY2016 and FY2017, the ratios of service accounts (counting the water service and sanitary sewer service for the same client, as two separate accounts)⁸ to employees were 417 and 430, respectively, which represents an increase of 4% and 7%, compared to FY2015 which was 401. Current industry for combined utilities operations averages range from 363 to 645, with a median of approximately 465 customer accounts employee⁹. PRASA's customer account per employee ratio falls within the range for the industry, however in the lower end, which can be attributed to PRASA's System and the utility's size and complexity, given the large number of facilities and wide geographic distribution of these across the island.

⁸ By the end of FY2016 and FY2017 PRASA had a total 1,236,756 and 1,236,728 active accounts, respectively.

⁹Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, AWWA (2016).

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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 as a means to reduce staff levels. PRASA reported a 6.7% net reduction of staff from FY2015 to FY2017. This net reduction includes an increase of 511 UIA-AAA employees, 184 management employees, two appointed employees; and a reduction of 1,018 temporary classified employees and 14 HIEPAAA employees.

Table 3-3. Staff Levels

End of FY	Appointed Employees	Management Employees	HIEPAAA Employees	UIA-AAA	Temporary Employees	Total Employees
2013	159	1,001	158	2,747	823	4,888
2014	170	1,004	153	2,565	1,198	5,090
2015	161	1,011	155	2,635	1,027	4,989
2016	159	1,188	149	3,293	9 (UIA)	4,798
2017	163	1,195	141	3,146	9 (UIA)	4,654
5-year CAGR	0.50%	3.61%	-2.25%	2.75%	-59.47%	-0.98%

Source: PRASA Human Resources Department

In addition, it is important to note that the “Voluntary Pre-Retirement Program”, per Act 211-2015, is still an avenue for PRASA to reduce costs and increase savings. The 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 represent 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 restructure in the absence of these positions. However, OMB may authorize to re-staff the position, if certified to be critical, and in accordance with the plan submitted by the agency. As it pertains to PRASA, some of the eligible employees currently occupy positions that are managerial or supervisory, which may create organizational challenges. As of the date of this report PRASA has identified approximately 351 employees with potential to take advantage of the program, as submitted to the OMB for approval.

Furthermore, as reported in previous CERs, PRASA’s optimum staffing to operate and maintain the System, and effectively manage the utility was determined by an external specialized consultant at 4,693 employees. As shown in Table 3-3, at the end of FY2017, PRASA’s staff totaled 4,654 employees which meets the previously determined optimum staffing level. However, PRASA needs to balance the staff profile to fill technical and operator needs while maintaining the optimum staffing level. Until this balance is achieved, PRASA may need to retain the amount of employees over the determined optimum staff level. Also, it must consider the employees that classify for the Voluntary Pre-Retirement Program and are considering taking up the program to retire. The deficit in operations personnel has forced the Operations Department to incur in overtime hours to operate facilities, thus impacting payroll metrics.

Also, contributing to the operation personnel deficit is the freezing of vacant positions as required by laws that came into effect during FY2016 and FY2017.

3.2.4 Labor Relations

After the commencement of the new elected government on 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. Act 66-2014, came into effect as an emergency act to solve the fiscal situation of that time, with the view that when the fiscal situation had improved or the law term was met, certain economic agreements with labor unions would be reestablished or renegotiated. However, the fiscal situation did not improve and during FY2016 PROMESA was enacted. Consequently, the abovementioned laws, which implement stricter economic measures, were enacted and applied to mitigate fiscal austerity and to comply with the submitted Fiscal Plan. The aspects of these laws that affect PRASA are discussed in the next sections.

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

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

1. No increase in economic benefits to employees (except minimal exceptions).
2. No liquidation of vacation days
3. No liquidation of sickness days unless employee leaves public service
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 effectiveness of this act, until the end of this act.
6. Freezing of vacant positions until June 30, 2017
7. No creation or renovation of career positions
8. Appointed positions will be reduced by 20%
9. Reduction of 10% of half of the operational costs of FY2016-2017
10. No funding for travelling outside Puerto Rico unless otherwise approved by the Secretary of Government.
11. No cellular phones or technological services will be provided
12. Reduction of energy consumption by 5% each year.

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13. Reduction of potable water consumption by 5% each year.
14. Reduction by 10% of Contracted services
15. Purchase costs shall be reduced by 5% for FY2016-2017. Except for purchase orders with previous written authorization by the OMB Executive Director.

According to this act, any agreement between PRASA and both UIA-AAA and HIEPAAA unionized personnel that has expired or expires during the period of effectiveness 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, CC 144-17 and 145-17, from OMB were circulated clarifying Article 14, which state that those benefits and economic compensations to the employee as of the time of approval of Act 66-2014, shall be maintained.

Even though these measures may represent operational savings for PRASA, some of the measures affect PRASA's revenues, such as measure 13 as 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 revenue reduction 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, that lists all implemented measures and the results obtained. Since the implementation of measures stipulated under Act 66-2014, PRASA has achieved savings of approximately \$30 million (cash basis) annually. It is not foreseen that savings greater than those attained with the implementation of Act 66-2014 will be achieved with Act 3-2017 in terms of marginal benefits of employees. Stricter measures are stipulated in the later approved Act 26-2017, discussed in more 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)

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- 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
- Holidays
- Standardization of Holidays (15 holidays)
- Uniform Medical Insurance Employer Contribution (minimum of \$100 contribution)
- Only one bonus: Christmas bonus (\$600 per year)
- Overtime Compensation
- 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 cost, since they represent a potential increase in the payment of the mandatory vehicle insurance. These increases are not known yet, but are already approved by law. Lastly, Measure 5, as listed above, requires that all public corporations, agencies, and instrumentalities of the Government of Puerto Rico transfer their surplus revenue funds to the State General Fund to comply with the approved Fiscal Plan. 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	<ul style="list-style-type: none"> • 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. • 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 loss. Vacation accumulated days up to the 	<ul style="list-style-type: none"> • 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 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

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Category	Act 3-2017	Act 26-2017
	<p>date of approval of this law shall be retained by the unionized and non-unionized employee, but accumulated excess shall not be liquidated monetarily.</p> <ul style="list-style-type: none"> • Sickness days' 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. • 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. 	<p>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.</p> <ul style="list-style-type: none"> • 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. • The Christmas bonus will be of \$600 each year for all employees of the Central Government and Public Corporations.
Negotiation of Collective Agreements	<ul style="list-style-type: none"> • 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. • 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. 	<ul style="list-style-type: none"> • This law has supremacy over any collective agreement or contractual letter that interferes with the dispositions in this law.
Employment Positions	<ul style="list-style-type: none"> • All vacant positions that were generated prior or during the effectiveness of this act will remain vacant until June 30, 2017. • No new career, regular, and transitory or irregular positions will be created or renewed, unless previously approved by the OGP Director. • Appointed positions will be reduced by 20%. 	

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Category	Act 3-2017	Act 26-2017
Operational Costs	<ul style="list-style-type: none"> • Reduction of 10% of half of the operational costs of FY 2016-2017. • 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. • No public funds will be used for the payment of cellphones or technological services. • 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. • 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. 	<ul style="list-style-type: none"> • Mandatory Vehicle Insurance Fee will potentially increase, due to additional service fee and fee revision every two years. This will be reflected in the O&M Cost of PRASA's fleet. • All government instrumentalities, agencies and public corporations of the Executive Branch, except for the University of Puerto Rico, shall transfer a specific amount, as stipulated by the designated committee, from the surplus revenue at the end of each economic year to the State General Fund.
Purchase Costs	<ul style="list-style-type: none"> • All purchase costs shall be reduced by 5% for FY 2016-2017. 	
Quarterly Report	<ul style="list-style-type: none"> • 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

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building sessions. During FY2016 and FY2017, PRASA offered over 125,161 and 63,521 training hours, respectively, to its employees; this represents an average of approximately 27 hours per trained employee for FY2016 and 18 hours per trained employee for FY2017. Overall, about 97% of the total employees for FY2016 and 77% of the total employees for FY2017 participated in training activities offered by PRASA. PRASA continues to invest in personnel training to increase work ownership and productivity levels. Also, PRASA is reducing training contracts and preparing its own employees to handle those duties. The Operator Training Center (OTC) implemented in the North Region during FY2015 did not continue during FY2016 and FY2017 and was not implemented in the other regions. However, PRASA continues to support training and certification of its treatment plant operators, in compliance with requirements established by Regulatory Agencies. Table 3-5 and 3-6 present a summary of the number of operators by the type of license they hold.

Table 3-5. Operator Licensing FY2016

	In Training	Type I	Type II	Type III	Type IV	Total
Water	23	24	48	107	289	491
Wastewater	4	1	15	24	108	152
Total	27	25	63	131	397	643

Table 3-6. Operator Licensing FY2017

	In Training	Type I	Type II	Type III	Type IV	Total
Water	31	24	50	96	279	480
Wastewater	11	1	12	25	100	149
Total	42	25	62	121	379	629

3.3 Conclusions

The current organization has been able to operate, manage and maintain the System, despite some challenges. Key PRASA leadership, including its Executive President and Vice Presidents, were newly appointed following the Government change in January 2017. Although PRASA has achieved the optimum staffing level stipulated by the Executive Management Team, its staffing mix is not yet optimal. For example, PRASA continues to lack adequate personnel in the Operations Department, mostly operators for treatment facilities and meter readers, which results in overtime hours or in the case of readers, more estimated meter reads. PRASA needs to balance the employees with skill sets to fill technical and operator needs while maintaining the optimum staffing level. Also, it must consider the impact of the employee retirements that may be completed under the Pre-Retirement Program. In both FY2016 and FY2017, PRASA's customer accounts per employee ratio fell within industry range, but below the median; this can be attributed to PRASA's System and the utility's size and complexity.

PRASA's Executive Management Team continues to assess administrative and operational performance, and to implement organizational and policy changes, focusing on customer service, System performance, and budget controls. The enactment of Act 66-2014 helped PRASA achieved savings of approximately

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\$30M per year up to FY2016 by modifying some of its O&M processes through the implementation and use of metrics system to evaluate performance and productivity, and modifications to certain employee classifications. Subsequently, the enactment of Act 3-2017 and Act 26-2017 may continue to support PRASA's cost controls efforts.

4 CONDITION OF SYSTEM

4.1 Introduction

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 3.41 million residents plus approximately 5 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 service throughout the island, which has an approximate area of 3,535 square miles. Since 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. Thus, PRASA has many more treatment facilities than most utilities serving a similar number of customers, this results in more diversity in PRASA's assets in terms of size, treatment technologies, and age when compared to systems in the U.S. and Canada, which tend to have more centralized systems with larger regional facilities. These facts add complexity to the management of the System and have historically contributed to higher O&M costs compared to other utilities serving similar populations.

Based on the data obtained from the latest published PRASA Accountability Report (1st trimester FY2016) and the FY2015 Consulting Engineer Report, PRASA owns and operates eight dams, 117 water treatment plants (WTPs), 51 wastewater treatment plant (WWTPs), 269 wells, 954 water pump stations (WPSs), 1,486 water storage tanks (WST), 824 wastewater pump stations (WWPSs), and more than 20,000 miles of water and wastewater pipelines island-wide. However, as of June 30, 2017, with the completion of the Rocha WTP elimination (February 2016), the Jiménez WTP elimination (March 2017) and the Matuyas WTP elimination (June 2017), as part of the Puerto Rico Department of Health (PRDOH) Drinking Water Settlement Agreement Certification Civil Action No. KPE 2006-0858 (904), the total number of WTP operated reduced to 114.

In FY2017, Arcadis assessed the condition of PRASA's System through an inspection program of a sample of facilities that included a selection of the major elements of the System. Given the significant reduction in capital and renewal and replacement investment over the past two years, Arcadis performed asset condition assessments of the WTP and WWTP facilities not included in the FY2016 Asset Condition Assessment Report (FY2016 ACA Report), as well as a different sample of auxiliary facilities. The purpose of these inspections, completed between January 2017 and April of 2017, was to identify the overall condition of the facilities to determine if they are being operated and maintained in a manner to achieve their operating goals, and to evaluate if PRASA's CIP is aligned with identified needs. Arcadis is conducting these facility inspections approximately every two years. As part of this effort, Arcadis also evaluated the compliance performance results for all PRASA WTPs and WWTPs for the period of July 1, 2015 through December 31, 2016. The next cycle of facility inspections will resume in FY2018.

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 FY2017 and detailed in the FY2017 ACA Report.

4.2 Facility Inspections

A summary of the facilities inspected during 2017 is presented in Table 4-1. In total, 155 facility inspections were performed out of a total of 3,706 facilities that comprise the System. Inspected facilities include: WTPs and WWTPs not inspected in FY2016, and a selection of wells, water pump stations (WPSs), water storage tanks, and wastewater pump stations (WWPSs). Dams were not included in this round of inspections because they were visited on January 2016 and included in the previous asset condition assessment report prepared by Arcadis. Approximately 61% and 45% of the WTP and WWTPs respectively, were inspected. Also, a small portion (about 2% in total) of the wells, water and wastewater pump stations and water storage tanks were inspected considering the lower risk impact these assets have on the System. 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 in a later section of this report.

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

Asset Category	Total PRASA Facilities ¹	Inspections Performed	
		Quantity	Percent
Regulated Dams	8	0	0
Water Treatment Plants	114	70	61
Wastewater Treatment Plants	51	23	45
Wells	269	10	4
Water Pump Stations	954	17	2
Water Storage Tanks	1,486	20	1.4
Wastewater Pump Stations	824	15	2
Total	3,707	155	4.2

¹Data obtained from the latest published PRASA's Accountability Report (1st trimester of FY2016) and FY2015 CER Report

4.2.1 Inspections Methodology

Inspections were performed throughout PRASA's five Operational Regions: East, Metro, North, South, and West. 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 and less wells. Nevertheless, it was inspected in a manner consistent with the other Regions.

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Table 4-2. Summary of Inspections by Region

Asset Category	East	Metro	North	South	West	Total
Water Treatment Plants	17	3	22	23	5	70
Wastewater Treatment Plants	7	0	8	5	3	23
Wells	2	2	2	2	2	10
Water Pump Stations	3	3	5	3	3	17
Water Storage Tanks	4	4	4	4	4	20
Wastewater Pump Stations	3	3	3	3	3	15
Total	36	15	44	40	20	155

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 was to determine the current state of repair and operation of the asset as influenced by age, historical maintenance and operating environment.

The evaluation criteria were chosen from the following list:

- 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.

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:

<u>Rating</u>	<u>Range</u>
• 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 section.

4.2.2 Inspection Results

According to the facilities inspections performed between January 2017 and April of 2017, an overall condition rating for each asset category was determined. The condition of each of the facilities varied from good to those requiring certain capital upgrades and/or operational/process control improvements. The inspection rankings and results per facility type are summarized in the following subsections.

4.2.2.1 Water Treatment Plants

PRASA operates 114 WTPs where it treats raw water to produce potable water for its customers. The facilities range in size from several thousand gallons per day up to 100 MGD.

Seventy (70) WTPs were inspected in 2017. Each visit consisted of a site walkthrough 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 4-3 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 2008 through 2017 inspections is also provided. On average, the WTPs were rated as adequate with a score of 2.1. About 99% of the plants were classified as adequate, while the rest 1% of the plants were classified as good. No WTPs were rated as unacceptable or poor in overall rating. Even though most WTPs were classified as adequate, fifteen (21%) of the WTPs received a low-end rating that put them close to being rated poor.

Table 4-3. WTPs - Comparison of Average Inspection Results for 2008-2017

Criteria	2008	2009	2010	2012	2014	2015	2017	Change 2017 vs. 2015
Regulatory Compliance	2.2	2.3	2.1	2.5	2.3	2.0	2.5	0.5
Operations/Process Control	2.2	2.5	2.6	2.7	2.2	2.2	1.9	-0.3
Equipment Maintenance	2.1	2.3	2.3	2.3	2.4	2.1	1.8	-0.3
Staffing/Training	2.2	2.6	2.4	2.9	2.7	2.1	2.1	0.0
Overall	2.2	2.4	2.3	2.6	2.3	2.1	2.1	0.0

In general, the WTPs are in adequate condition. Although no facilities were rated as poor or unacceptable in terms of compliance, five facilities (7%) that were rated as adequate should be closely monitored, since they received a score between 1.5 and 1.7 because of reported exceedances in Total Coliforms, TTHMs, HAAs, TOC and various NPDES parameters during the period of evaluation. Operations/Process Control in the majority of WTPs inspected were adequate. However, five facilities (7%) were rated as poor and two (3%) were rated as unacceptable. Also, jar tests were not being performed regularly or at all; of the 70 WTPs visited, approximately 23 facilities (33%) were not performing jar tests. Regarding Equipment/Maintenance, all facilities were rated either as adequate or poor in this criterion. Moreover, out of the 70 facilities inspected, four (6%) were rated as poor and although rated as adequate, 43 (61%) had a rating under 2.0 in terms of equipment and maintenance practices and should be closely monitored. Pertaining to Staffing/Training, eleven (16%) facilities received a poor rating and, thirty-eight (54%) received an adequate rating in this category.

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In comparison to the 2015 inspection results, the equipment/maintenance and operations/process control criteria decreased significantly and the regulatory compliance increased. The recent decrease in the equipment/maintenance criterion can be attributed in part to projects not being executed or being postponed as the CIP investment slowed-down, and eventually was suspended, in the last couple of years due to PRASA's financial situation. This is evident, as noted in Table 3-3, in the facilities equipment/maintenance criterion, which decreased by 0.3 in their inspection results score from the 2015 inspections. The increase noted in the regulatory compliance criterion may be due to some adjustments done by PRASA and to some degree, the fact that several NPDES parameters had interim limits or were only being monitored. 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 certain facilities.

The facilities with the lowest overall score of the 70 WTPs inspected are summarized in Table 4-4. As shown below, all fifteen (21%) facilities received a score in the lower end of the adequate scoring range (below 2.0). One of these facilities, Jimenez WTP, was eliminated in March 2017 and another, Matuyas WTP, was recently eliminated (June 2017). Also, for the Quebradillas WTP, the Environmental Quality Board (EQB) had determined it does not need an STS project because it discharges to a sinkhole and not a surface water body. Lastly, PRASA should address the shortcomings identified during inspections to improve the physical condition of these facilities and achieve/maintain continuous and consistent compliance.

Table 4-4. 2017 WTP Lowest Rated Facilities and Observations

WTP	2017 Score	Observations	CIP Identified ¹
Quebradillas (North Region)	1.5	During the evaluation period, the facility compliance was rated as good. However, it had several parameters with interim limits or only monitoring. SDWA event in THM. The operations and process control of the WTP was rated as unacceptable. Challenges in iron and manganese, turbidity, color. ERP not available. Process equipment not calibrated. The two emergency generators (Intake & WTP) are out of service. General safety not adequate, no additional security and faulty illumination. Equipment debris and poor housekeeping. Facility appearance not adequate. The overall condition of the equipment/maintenance of the WTP was rated as poor. Emergency generator for intake out of service. Also, screening needs improvement. Several monitoring instruments out of service or not calibrated. Sedimentation basin effluent launders need cleaning. Mudballs present at filters. Media needs replacement. Distribution tanks need protective coating. No sludge treatment system and no emergency generator for plant. No computerized maintenance management system at plant, outstanding work order schedule was not available. There are corrective maintenance and parts/contractor procurement process challenges. No as built drawings at facility and overall appearance not adequate. Training is adequate for this facility. Need at least (1) licensed operator to cover the facility operating hours effectively.	Yes
Canalizo	1.6	During the evaluation period, the facility compliance was rated as good. However, it had several parameters with interim limits or only monitoring.	Yes

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WTP	2017 Score	Observations	CIP Identified ¹
(North Region)		<p>SDWA exceedances in HAA. The operations and process control of the WTP was rated as poor. The operators do perform the necessary sampling to adjust the process. However, no jar test is performed, stream current monitor not calibrated and ERP not updated. Access to raw water intake is unsafe and only by walking. No calibration plan for chemical feed pumps. The biggest deficiency is the lack of emergency power due to a non-operating emergency generator. No additional security available and fence/gate needs improvements. The overall condition of the equipment/maintenance of the WTP was rated as poor. Intake does not have an emergency generator. Several monitoring instruments out of service or not calibrated. Facility does not have rapid mixing or effective slow mixing, seems they may have a mixing problem. Also, unit has corrosion. Sedimentation basin tube settlers need replacing. Filtration system is old and corrosion is visible inside tanks. Backwash works with pressure, as a siphon. Distribution tank may need some patching work. No sludge treatment system available and there is no emergency generator for operating plant. No as built drawings at facility. Need at least one more licensed operator to cover the facility operating hours effectively. There are some training courses that need refreshing.</p>	
Guayanés (South Region)	1.7	<p>During the evaluation period, the facility compliance was rated as adequate. It had several parameters with interim limits or only monitoring. SDWA minor violations in turbidity and significant violations in THM and HAA. Also, significant flow exceedances in NPDES. Exceedances in NPDES flow limits may be related to cleansing of treatment basins to control HAA exceedances. The operations and process control of the WTP was rated as barely adequate. The operators perform the necessary sampling to adjust the process. No calibration plan for chemical feed pumps. Jar tests are not being performed, equipment is damaged. There is missing laboratory equipment. No additional security available, gate/fence needs improvement. The WTP general condition and appearance is poor. The overall condition of the equipment/maintenance of the WTP was rated in the lower end of adequate (below 2). The equipment aspect was rated as barely adequate. Most the piping is corroded. Calibration issues with some monitoring instruments. Treatment modules are corroded. Metering pump out of service. Tube settlers may need replacement and effluent launders need maintenance/cleaning. Corrosion on backwash pumps. Chlorine cylinder scales are heavily corroded. Distribution pump out of service. The entire sludge treatment system needs improvement. The facility emergency generator is out of service, temporarily using rental. No as-built drawings available. Training is adequate for this facility. Need at least (1) licensed operator to cover the facility operating hours effectively.</p>	No (Improvements by operations: filter media replacement and other)
Matuyas (South Region)	1.7	<p>During the evaluation period, the facility compliance was rated as adequate. SDWA, significant exceedances in TOC, THM and HAA. Also, an NPDES violation in Residual Cl. Pre-chlorination was suspended due to issues with THM. The operations and process control of the WTP was rated barely adequate (below 2.0). The operators perform the necessary sampling to adjust the process. O&M manuals and ERP not updated. Equipment manuals not available. No calibration plan for chemical feed pumps. Jar test is performed daily. WTP does not comply with CT. WTP has cameras. Access roads need improvement. General condition and appearance inadequate. Low flow affects</p>	Yes (Eliminated in Jun-2017)

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WTP	2017 Score	Observations	CIP Identified ¹
		<p>operation. The overall condition of the equipment/maintenance of the WTP was rated as borderline adequate. Several instrumentation equipment out of service. Treatment module is corroded. Slow mixers show deterioration. No proper containment for polymers. Tube settlers need replacing. Filter media needs anthracite. One distribution tank not being used due to low flow; however, it can deteriorate further. Holding tank shows wear and some deterioration. There are corrective maintenance challenges and there is no procedure to prioritize repairs. No as-built drawings available. Overall appearance not adequate. Training is adequate for this facility. Need at least one operator to cover the facility operating hours effectively. PRASA intends to close facility during 2017.</p>	
<p>Orocovis Urbana (South Region)</p>	<p>1.7</p>	<p>During the evaluation period, the facility compliance was rated as barely adequate. It had several parameters with interim limits or only monitoring. SDWA significant violations in TOC, THM and HAA. Regarding NPDES, significant flow exceedances and minor violations of copper and residual chlorine. The operations and process control of the WTP was rated as poor. The operators do perform the necessary sampling to adjust the process. However, O&M and equipment manuals incomplete. Emergency numbers were not visible. Jar tests are not being performed. Diesel tank has inadequate containment and valve. Need to improve illumination in the sedimentation area. The overall condition of the equipment/maintenance of the WTP was rated as adequate. The equipment aspect was rated just below 2. Some piping with corrosion. One of the mixers before sedimentation is out of service. No secondary containment for some of the polymers/chemicals. Old plant sedimentation based filled with suspended solids. Some filter to waste valves were out of service. Also, actuator on filter #6 backwash valve. Chlorine building needs maintenance. Two distribution pumps out of service. Holding tank and thickener need some maintenance and/or repairs. Facility needs permanent diesel tank for emergency generator. No procedures to prioritize repairs. Training is adequate for this facility. Need an STS operator and assistance (non-licensed).</p>	<p>No</p>
<p>Arecibo Urbano (North Region)</p>	<p>1.9</p>	<p>During the evaluation, period the facility compliance was rated as adequate. However, it had several parameters with interim limits or only monitoring. It had events on Residual Chlorine and BOD. Also, some HAA violations and several flow exceedances. The operations and process control of the WTP was rated as adequate (below 2). The operators perform the necessary sampling to adjust the process. No jar tests performed. O&M manuals not updated. No calibration plan for chemical feed pumps. General safety measures are not adequate e.g. main gate cannot be locked, no added security, poor illumination of surroundings. The overall condition of the equipment/maintenance of the WTP was rated as barely adequate. The equipment aspect was rated as poor. Some of the major equipment had some issue. Some structural deterioration due to age and rust. One of the sedimentation effluent launders not working properly. The intermediate turbidimeters are out. Filters air scouring system is out. Distribution tank exhaust fans and flow meters are out. Also, several pipes connections were leaking during the inspection. The distribution phase is missing one pump and another pump is out of service. No sludge treatment system. No computerized maintenance management system available. There</p>	<p>Yes</p>

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WTP	2017 Score	Observations	CIP Identified ¹
		<p>are corrective maintenance and parts/contractor procurement process challenges. No as-built drawings available. Staffing and training are adequate for this facility and its operating hours.</p>	
Ciales Urbana (North Region)	1.9	<p>During the evaluation period, the facility compliance was rated as adequate. It had several parameters with interim limits or only monitoring. SDWA violations in THM and an event in HAA. HAA exceedances are under investigation by compliance division since distribution sampling points may have water coming from other WTPs. NPDES exceedances in flow. Flow exceedances may be related to regular cleaning of treatment unit basins. The operations and process control of the WTP was rated as adequate. The operators perform the necessary sampling to adjust the process. O&M manuals and ERP not updated. No calibration plan for chemical feed pumps. Jar test is performed weekly. No control room, operation is not automated. No additional security available and gate needs repairs. The overall condition of the equipment/maintenance of the WTP was rated as adequate (below 2). The equipment aspect was rated borderline adequate. Several monitoring instruments out of service. A distribution flow meter out of service. Concrete cracks on treatment unit. Floating solids in filters. Holding tank out of service. No as-built drawings available. Need at least (1) licensed operator to cover the facility operating hours effectively. Need refreshing for confined spaces and complete operator license certification for non-licensed operator.</p>	Yes
Guajataca (West Region)	1.9	<p>During the evaluation period, the facility compliance was rated as adequate. It had several parameters with interim limits or only monitoring. SDWA violations in THM and HAA. Also, NPDES flow exceedance problems. Compliance division has implemented measures to decreased THM and HAA exceedances by washing treatment units monthly. The operations and process control of the WTP was rated as unacceptable. The operators do perform the necessary sampling to adjust the process and perform jar test at each shift rotation. However, no O&M manuals, SOPs nor equipment manuals available during the visit. ERP not updated. The main deficiency is the lack of emergency power due to a non-operating emergency generator. Abandoned membrane system, flocculator. Facility has cameras. The overall condition of the equipment/maintenance of the WTP was rated as adequate. Most of the major equipment is in good condition. However, one slow mixer is out of service, as well as a distribution flow meter. Finally, the emergency generator is out of service, hindering operations when power is out. There are corrective maintenance challenges and no as-built drawings available. Staffing and training are adequate for this facility and its operating hours.</p>	No
Jiménez (East Region)	1.9	<p>During the evaluated period, the facility compliance was rated as adequate. Also, it had several parameters with interim limits or only monitoring. The WTP presented a minor exceedance for TOC and the distribution system reported significant exceedances in HAA. Also, significant NPDES exceedances in flow and residual chlorine and an event in lead. The operations and process control of the WTP was rated as adequate. The operators perform routine sampling, following SOPs, and perform the necessary process control adjustments. O&M manuals and emergency response plan not available. The lab is shared with the operator's room, but it is too small and was crowded at the time of the visit.</p>	N/A (Eliminated Mar-2017)

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WTP	2017 Score	Observations	CIP Identified ¹
		<p>Also, chemicals not stored properly. No additional security available. If WTP shuts down due to NTU or other reason during non-staffed hours, it cannot be automatically started. On-call personnel must manually re-start. The overall condition of the equipment/maintenance of the WTP was rated in the lower end of adequate. However, the equipment aspect was rated as poor. No coagulation/flocculation. No sedimentation-clarification process. One or both processes could help deal with the sediments and turbidity and prevent membrane clogging and damaging. Membrane system permeate pump and blower have no redundancy. Also, backwash automatic control is out of service. Distribution tank use as CT, could use more time for disinfection. One holding tank sludge pump is out of service. Thickener sludge mechanism is out of service and corrosion was observed. No dewatering system available, sludge is dump in a pit to be pick-up by truck. The training is adequate for this facility. Need at least (2) licensed operators to cover the operating hours of this facility effectively. The WTP is scheduled to be eliminated from the system by the second quarter of 2017.</p>	
La Pica (North Region)	1.9	<p>During the evaluation period, the facility compliance was rated as good. However, it had several parameters with interim limits or only monitoring. Also, NPDES flow exceedance problems are the result of the need for multiple wash sections to maintain the quality of treated water and inability of the operators to control the water intake pumps from the plant. The operations and process control of the WTP was rated as adequate (below 2). The operators perform the necessary sampling to adjust the process, however, stream current monitor is out of service and no jar test are being performed. O&M manual and ERP not updated. No calibration plan for chemical feed pumps. Pipes not colored adequately. No additional security. General condition and appearance deteriorated. Operator can only start and shut down the intake. Remote operation of the intake should be a priority for the efficient operation of the WTP. The overall condition of the equipment/maintenance of the WTP was rated as poor. Most of the equipment is old and deteriorated. Intake pumps should be replaced. Influent flow meter was not working properly. No sludge treatment system. Due to the deterioration and age of most of the equipment, some could stop functioning at any time if not replaced or improved. No procedure to prioritize repairs and no as-built drawings available. Overall WTP appearance not adequate. Staffing is adequate for this facility and its operating hours. Need training refreshing on several courses.</p>	Yes
Liza (South Region)	1.9	<p>During the evaluation period, the facility compliance was rated as adequate. SDWA exceedances in TOC, THM and HAA. Also, an NPDES violation in BOD. The operations and process control of the WTP was rated as adequate. The operators perform the necessary sampling to adjust the process. ERP not updated. No calibration plan for chemical feed pumps. Jar test is performed daily. No control room. Some piping not colored correctly and no additional security available. Needs housekeeping. The overall condition of the equipment/maintenance of the WTP was rated as adequate but below 2.0. An intake pump is out of service. Chemicals application point at influent pipe is heavily corroded. Polymer without proper containment. Tube settlers are deteriorated, need replacing. Filter media needs replacing. Also, superficial wash system needs improvement. Filters automatic controls not installed due</p>	No (Improvements by Operations: Filter media (#2), filters valves, automatization backwash)

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WTP	2017 Score	Observations	CIP Identified ¹
		<p>to issues with contractor. CFE turbidimeter is not operating. Thickener needs improvements. There are corrective maintenance and parts/contractor procurement process challenges. No procedure to prioritize repairs and no as-built drawings available. Staffing and training are adequate for this facility and its operating hours.</p>	
<p>Mameyes de Utuado (Abajo) (North Region)</p>	<p>1.9</p>	<p>During the evaluation period, the facility compliance was rated as adequate. However, some parameters had interim limits or only monitoring. SDWA minor exceedances in THM and HAA. Several NPDES exceedances in flow. The operations and process control of the WTP was rated as adequate. The operators perform the necessary sampling to adjust the process. ERP not updated. No calibration plan for chemical feed pumps. No jar test performed. Some piping, valves not colored properly. No additional security. Equipment debris laying around, general condition and appearance not adequate. The overall condition of the equipment/maintenance of the WTP was rated as poor. Most of the equipment is old and deteriorated. Intake pumps should be replaced. Some metering pumps and instrumentation out of service. A valve in one of the effluent launder of the sedimentation basin is out. No sludge treatment system. Due to the deterioration and age of most of the equipment, some could stop functioning at any time if not replaced or improved. Chemical storage building is in poor condition. There are corrective maintenance and parts/contractor procurement process challenges. No as-built drawings available. Overall WTP appearance not adequate. Staffing and training are adequate for this facility and its operating hours.</p>	<p>Yes</p>
<p>Maricao (West Region)</p>	<p>1.9</p>	<p>During the evaluation period, the facility compliance was rated as adequate. It had several parameters with interim limits or only monitoring. SDWA violations in THM and HAA. Also, NPDES flow exceedance problems and an exceedance in copper. Overflows have decreased and PRASA has implemented a plan to attack HAA and THM exceedances. The operations and process control of the WTP was rated as adequate. The operators perform the necessary sampling to adjust the process. ERP not updated. No calibration plan for chemical feed pumps. Jar test equipment is damaged. No additional security available. Average flow is more than design capacity which could create operational issues, especially with solids handling. The overall condition of the equipment/maintenance of the WTP was rated in the lower end of adequate (below 2.0). The equipment aspect was rated as borderline adequate. One intake pump out of service, thus no redundancy. In addition, emergency generator damaged. Visible wearing on flocculation baffles and corrosion on rapid mixer motor. Secondary containment on polymer seems too small. Chlorine cylinder scales corroded, might need replacement. Exhaust fan needs repairing. Holding tank pump out of service, thus no redundancy. In addition, could need increase capacity, as well as dewatering system. Emergency generator is out of service, using a rusty rental. There are parts/contractor procurement process challenges and no as-built drawings available. Training is adequate for this facility. Need at least (1) licensed operator to cover the facility operating hours effectively.</p>	<p>Yes</p>
<p>Negros Corozal</p>	<p>1.9</p>	<p>During the evaluation period, the facility compliance was rated as adequate. However, it had several parameters with interim limits or only monitoring. The</p>	<p>Yes</p>

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WTP	2017 Score	Observations	CIP Identified ¹
(North Region)		<p>operations and process control of the WTP was rated as adequate. The operators perform the necessary sampling to adjust the process. No jar test performed and stream current monitor is out of service. Voltage fluctuations affect emergency generator. Chemicals not properly stored and no potable water meter. Several burglary incidents affecting general safety. Some wobbly steel planks in walkways. No additional security and faulty illumination. The overall condition of the equipment / maintenance of the WTP was rated in the lower end of adequate (below 2). The equipment aspect was rated as borderline adequate. Influent flow meter and stream current monitor are out of service. Three of the four slow mixers in the flocculation tanks are out. One of the backwash pumps is out of service, as well as one of the distribution pumps that supplies the Negros elevated tank. Elevated tank is in poor condition. No sludge treatment system, it was abandoned. There are corrective maintenance and parts/contractor procurement process challenges. There is a need for at least (1) licensed operator to cover the facility operating hours effectively. Also, need to complete license certification for non-licensed operators and training courses for confined space.</p>	
<p>Sabana Grande de Utuado (North Region)</p>	1.9	<p>During the evaluation period, the facility compliance was rated as adequate. Some parameters had interim limits or only monitoring. SDWA exceedances in TOC, THM and HAA. Several NPDES exceedances in DO. The operations and process control of the WTP was rated as adequate. The operators perform the necessary sampling to adjust the process. ERP not available during visit. No calibration plan for chemical feed pumps. Jar test performed daily. Lab chemicals not properly stored. No additional security available. Parameter monitors such as pH meters should be calibrated. Facility partially automated and can be remotely operated for the most part. The overall condition of the equipment/maintenance of the WTP was rated as adequate (below 2). The equipment aspect was rated in the lower end of adequate. Some metering pumps out of service. Some deterioration on tube settlers. Suspended solids visible on filters. No sludge treatment system. Some rust due to old age. Outstanding work order schedule and as-built drawings not available. Staffing and training are adequate for this facility and its operating hours.</p>	Yes

¹A capital improvement project for this facility has already been identified by PRASA and is included in the CIP (2017-2050+).

As mentioned, compliance results show that facilities are, in general, performing better with respect to compliance due to the implementation of several operational strategies and initiatives to reduce DBPs. This conscientious effort to improve DBPs in the System has improved compliance performance with SDWA parameters. Notwithstanding, regulatory compliance results might be misleading since several NPDES parameters include interim limits or are only being monitored and it is unknown whether the facility can meet the actual (permanent) limits when the interim/monitoring expires. In addition, several facilities lack STS or have an STS that has been out of service for an extended period. It is recommended that the STS be repaired or constructed to achieve compliance with the NPDES parameters, as required by the 2015 USEPA Consent Decree.

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) new numeric criteria. At the issuance

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process for an updated NPDES permit, PRASA is requesting interim limits for N and P until the capital project for said facility is executed and completed. The project completion term would be subject to the Prioritization System.

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 infrastructure, prevent further deterioration, protect public health, safeguard environmental quality, allow continued economic development and help bring the System into compliance with all regulatory requirements.

4.2.2.2 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 402.8 MGD and the treated wastewater for FY2016 was approximately 197 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.

Twenty-three (23) WWTPs were inspected in 2017. Each visit consisted of a site walkthrough 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 whom 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: Pre-treatment; Primary Treatment; Secondary Treatment; Tertiary Treatment; Sludge Treatment and handling; Disinfection and discharge; and Miscellaneous (NPW, Back-up Power, Septage). Table 4-5 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 2008 through 2017 is also presented. Overall, WWTP facilities were rated as adequate with a score of 2.0.

Table 4-5. WWTPs - Comparison of Average Inspection Results for 2008-2017

Criteria	2008	2009	2010	2012	2014	2015	2017	Change 2017 vs. 2015
Regulatory Compliance	1.3 ¹	1.5 ¹	1.5 ²	1.4	1.5	1.8	2.3	0.5
Operations/Process Control	2.4	2.4	2.3	2.4	2.3	2.0	1.9	-0.1
Equipment Maintenance	2.2	2.2	2.4	2.2	2.3	2.0	1.8	-0.2
Staffing/Training	1.8	2.0	1.8	2.3	3.0	2.0	2.4	0.4
Overall	1.9	2.0	2.0	2.0	2.0	1.9	2.0	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. Also, both have been closed.

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.

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WWTPs received an overall combined score of 2.3 in Regulatory Compliance. Of the 23 facilities that were inspected, one (Río Grande Estates WWTP) received a poor rating and ten (44%) received an adequate rating under the regulatory compliance criterion. Notwithstanding, four (17%) that were rated as adequate should be closely monitored, since they received a regulatory compliance score between 1.5 and 1.8 as a result of reported exceedances in fecal coliforms, total suspended solids, nitrates, phosphorous, dissolved oxygen, ammonia, BOD and flow in three consecutive months. Although general rating improved 0.5 from FY2015 inspections, there is still much to do to consistently meet with regulatory compliance. Specifically, considering that the physical condition of the facilities is deteriorating and that several NPDES parameters had interim limits or were only being monitored, which consequently did not adversely affect the compliance rating. Therefore, PRASA must plan ahead and make the necessary improvements so that when the interim limits are lifted, they have the necessary tools and conditions to meet the permanent limits. The WWTPs generally range from poor to good condition with equipment/maintenance as the category of primary concern. As mentioned, 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. Of the 23 facilities inspected, four (17%) received a poor rating and nineteen (82%) received an adequate rating in terms of equipment/maintenance. However, of the nineteen facilities rated as adequate, fourteen were rated below 2.0 and if unattended, could fall to poor or unacceptable rating in the future. Process control continues to be a challenge in some of the facilities, even though the plant operators indicated that standard operating procedures and control strategies are followed. In summary of overall rating, of the 23 facilities inspected, one (4%) received a poor rating, twenty-one (94%) received an adequate rating and one (4%) received a good rating. Furthermore, eight (8) of the twenty-one WWTPs rated as adequate in overall rating where in the lower end, close to being rated as poor. The facility rated as poor was Río Grande Estates WWTP.

In comparison with the 2015 inspections results, the regulatory compliance and staffing criteria increased, while the equipment/maintenance and operations/process control criteria scores significantly decreased. The recent decrease in the equipment/maintenance criterion can be attributed in part to projects not being executed or being postponed as the CIP investment slowed-down the last couple of years due to PRASA's financial situation and the effect of recurring observations. The increase noted in the regulatory compliance criterion may be due to some adjustments done by PRASA and to some degree, the fact that several parameters had interim limits or were only being monitored. 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 certain facilities.

The facilities with the lowest overall score of the 23 WWTPs inspected are summarized in Table 4-6. As shown below, all eight (35%) facilities received a score in the lower end of the adequate scoring range (below 2). PRASA should address the shortcomings identified during inspections to improve the physical condition of these facilities and achieve/maintain continuous and consistent compliance. These improvements may be related to new process equipment, process automation and or process control optimization.

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Table 4-6. 2017 WWTP Lowest Rated Facilities and Observations

WWTP	2017 Score	Observations	CIP Identified ¹
Río Grande Estates (East Region)	1.1	<p>During the evaluation period, the facility compliance was rated as poor. It had significant exceedances in fecal coliforms and flow in 3 consecutive months. Also, violations in total suspended solids and BOD. Furthermore, it had several parameters with interim limits or only monitoring. The operations and process control of the WWTP was rated as poor. The operators perform the necessary sampling to adjust the process. O&M Manuals not updated. The equipment manuals were not available. There is no calibration plan for chemical feed pumps. No jar test performed. Lab chemicals are not stored properly. No odor control system or control room. Operator office in same room as MCC (safety hazard). Some pipes not colored adequately. No additional security, access road needs improvement and faulty illumination. Deteriorated appearance. The facility has adequate emergency power. Facility is programmed to be closed and diverted to Fajardo or Carolina WWTP. The overall condition of the equipment/maintenance of the WWTP was rated as poor. Most of the major equipment has some type of issue. The pretreatment is limited as there is no degritter and (1) comminutor is out. Structural condition of most process with cracks, corrosion and deteriorated concrete. Mixers at stabilization tank out of service as well as mixers at both digesters. Clarifier scrapper unable to rake effectively since it is circular in a rectangular tank. There is only (1) blower for air supply for all processes that require aeration, no back-up. Belt filter press is old and corroded and sludge drying beds are deteriorated. No prioritization procedures for repairs and no as-built drawings available and overall appearance is poor. The staffing and training are adequate for this facility and its operating hours.</p>	Yes
Corozal (North Region)	1.5	<p>During the evaluation period, the facility compliance was rated as adequate. However, it had several parameters with interim limits or only monitoring. It had an exceedance on 3 consecutive months in flow and several violations on residual chlorine with the new regulation parameter. The operations and process control of the WWTP was rated as poor. 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). Equipment manuals not available/used. The ERP was not found. No calibration plan for chemical feed pumps established. There were substantial floating solids on the effluent during visit. Power failures not recorded. Since lab has been moved to operator's office, no proper storage of chemicals is conducted. There is no NPW system or odor control. Plant does not have a control room or security. Fence and illumination needs improvement. Facility has adequate emergency power. Poor housekeeping, debris laying around. General appearance inadequate. The overall condition of the equipment/maintenance of the WWTP was rated as poor. Several of the major equipment has some type of issue. One comminutor was out of service. One lift station pump was out and access to controls is infested with spiders, needs maintenance. The degritters units are out of service and there is significant corrosion. One of the blowers is out of service and another has low amps. One Clarifier out and one RAS pump out. The scum pump station was out, so recycling scum to mixed liquor. Facility lacks NPW system. Since the CIP project was not completed and no centrifuge constructed, the current dewatering does not have enough capacity to handle solids, creating an operational problem. There is no procedure to prioritize repairs and there are corrective maintenance and</p>	Yes

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WWTP	2017 Score	Observations	CIP Identified ¹
		procurement process challenges. Overall appearance not adequate. The training for the staff is adequate. However, there is a need for a licensed operator to cover the facility operating hours effectively.	
Parcelas Borinquen (East Region)	1.7	During the evaluation period, the facility compliance was rated as adequate. There were several exceedances in nitrates, fecal coliforms and total suspended solids during the evaluation period. Also, an event in BOD. Furthermore, the facility had several parameters with interim limits or only monitoring. The operations and process control of the WWTP was rated as adequate. The operators perform the necessary sampling to adjust the process. O&M manual not updated. Equipment manuals not available. No chemical feed pump calibration plan. No jar test performed. Also, no control room or additional security. Access road and exterior illumination needs improvement. Facility has adequate emergency power. Plant is operating at about half the design capacity, which can create operational issues. The overall condition of the equipment/maintenance of the WWTP was rated as borderline adequate. The equipment aspect was rated as poor. Several of the major equipment was deteriorated. Two lift Station pumps were out of service. Bar screen clogs, comminutor was taken out several years ago, never replaced. Degritter has been out for many years. Primary clarifier has corrosion and looks deteriorated. RBC are problematic and spare parts are hard to find since equipment is outdated. Sludge drying beds need improvements. Emergency generator has previously exploded with shards impacting door (damages are visible), could present hazard. There are corrective maintenance challenges, no procedures to prioritize repairs and no as-built drawings. Staffing and training are adequate for this facility and its operating hours.	No
San Sebastián (Old) (West Region)	1.7	During the evaluation period, the facility compliance was rated as barely adequate. It had two ammonia exceedances and several flow exceedances of 3 consecutive months. Plant works at overcapacity sometimes until diverting the flow to the new San Sebastian WWTP. Also, some parameters were interim limits or only monitoring. The operations and process control of the WWTP was rated as borderline adequate. The operators perform the necessary sampling to adjust the process. O&M manuals have not been updated (1988), nor ERP. Equipment manuals not available. No calibration plan for chemical pumps. Plant does not have an NPW system. Also, no control room or adequate safety. Frequent break-ins from nearby housing project. Access road needs improvement. Material from unfinished construction laying around. Facility has adequate emergency power and cameras. The overall condition of the equipment & maintenance of the WWTP was rated in the lower end of adequate. The equipment aspect was rated as borderline adequate. One of the comminutor is out. Lift station needs better ventilation and maintenance. Package plant scum handling system out of service. Aeration blowers affected with corrosion. Some floating solids observed in CI contact chamber. Chlorine building exhaust fan needs improvement. Facility lacks NPW system. Discharge area needs maintenance. Emergency generator is overheating. No computerize maintenance system (SAP), no procedures to prioritize repairs and no as-built drawings. The staffing and training are adequate for the operation of this facility and its operating hours.	No

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WWTP	2017 Score	Observations	CIP Identified ¹
Adjuntas (South Region)	1.8	<p>During the evaluation period, the facility compliance was rated in the lower end of adequate (below 2). It had several violations in fecal coliforms, total suspended solids and flow exceedances of 3 consecutive months. Also, an event in phosphorus and ammonia. Furthermore, it had several parameters with interim limits or only monitoring. It was indicated that there seems to be high infiltration in collection system. The operations and process control of the WWTP was rated in the lower end of adequate (below 2). The operators perform the necessary sampling to adjust the process. O&M manuals not updated. No calibration plan for chemical feed pumps. No coagulant added thus no jar test performed. Facility lacks NPW system and potable water meter. No control room nor additional security. Facility has adequate emergency power. Trace of suspended solids observed in CI contact chambers. Facility has old equipment debris and poor housekeeping and general appearance. The overall condition of the equipment & maintenance of the WWTP was borderline adequate. Structural condition of package plant and headworks is poor, needs improvement. Comminutor was out of service. Need to replace motor seal on one of the degritter washers. Aeration system on digester needs improvement. Some of the piping is corroded. Concrete and steel structures of the dewatering system need improvement. Chlorine building needs maintenance and/or improvement. Overall appearance not adequate. The staffing and training are adequate for the operation of this facility and its operating hours.</p>	Yes
Comerio (East Region)	1.9	<p>During the evaluation period, the facility compliance was rated as good. However, it had several parameters with interim limits or only monitoring. Several exceedances in F. Coliforms, which were mostly attributed to high inlet flows due to storm water infiltrations. The operations and process control of the WWTP was rated as poor. The operators perform the necessary sampling to adjust the process. O&M manual and ERP are not updated. No calibration plan for chemical feed pumps. Jar test only performed twice a year and by equipment supplier, there is coagulants added. Emergency generator does not have enough capacity for entire plant. Some piping not colored correctly and chemicals not properly stored. No control room and no additional security available. Illumination and fence need improvements. Most of the plant's operation is set to manual. Although they can use the automatic mode, they prefer to use the manual mode. No telemetry available. Plant operating at half the design capacity. Facility has adequate emergency power. The overall condition of the equipment/maintenance of the WWTP was rated in the lower end of adequate (below 2). The equipment aspect was rated as barely adequate. Grit removal system is deteriorated and needs improvements. Some foam, silt/sludge and suspended solids observed in primary clarifiers. Several of the units had algae, meaning that it was not cleaned in a while. Biofilters media is in bad shape, needs to be replaced. Also, maintenance to concrete structure. Biofilters aeration was removed. Sludge drying beds need filtrate media replacement and should consider another feeding point for sludge at each bed. CI contact chamber structure is deteriorated, needs improvements. Septage tank needs improvement, structure and screening. Emergency generator diesel and day tanks are corroded. There were oil barrels in one of the pump rooms with no secondary containment, from an oil spill from the generator. Staffing is adequate for this facility and its operating hours. Although, they may need support for cleaning treatment units. There are some training courses that need refreshing. The systems manager is in the process of identifying those operators that need a refresher course.</p>	No

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WWTP	2017 Score	Observations	CIP Identified ¹
Morovis (North Region)	1.9	<p>During the evaluation period, the facility compliance was rated as borderline adequate. It had significant exceedances in fecal coliforms and total suspended solids. Also, violations in phosphorous and dissolved oxygen. Furthermore, it had several parameters with interim limits or only monitoring. Based on pattern and conversation with supervisor, exceedances should have occurred due to malfunction of equipment. The operations and process control of the WWTP was rated as borderline adequate. The operators perform the necessary sampling to adjust the process. Equipment manuals not onsite. SDS not visible. ERP not updated and emergency numbers not posted. No calibration plan for chemical feed pumps. No coagulant added thus no jar test performed. Some piping not properly colored. Facility has adequate emergency power. No additional security available and illumination needs improvement. Plant operates below half of design capacity, which could create process control/operational issues. The overall condition of the equipment/maintenance of the WWTP was rated as adequate. Most major equipment is in fair shape. Plant was built/modified in 2012. However, lift station only one pump, no redundancy. Belt filter press is out of service and sludge drying beds need improvement. Chlorine building exhaust fan and scales need maintenance. Overall appearance is good. The staffing and training are adequate for the operation of this facility and its operating hours.</p>	No
Patillas (South Region)	1.9	<p>During the evaluation period, the facility compliance was rated as adequate. It had significant exceedances in fecal coliforms. Also, it had several parameters with interim limits or only monitoring. The operations and process control of the WWTP was rated as adequate. The operators perform the necessary sampling to adjust the process. O&M manuals not available. No calibration plan for chemical feed pumps. Power failures not recorded. Facility does not have an NPW system. Some piping not colored properly. No control room or additional security. Facility appearance is no adequate and needs groundskeeping. Plant operating at below half the design capacity, which can create operational issues. In addition, process control can be compromised with the failure of the only RAS pump. Facility has adequate emergency power. The overall condition of the equipment/maintenance of the WWTP was rated as borderline adequate. In general, concrete structures are deteriorated and there is heavy corrosion on steel components. Pretreatment needs improvement, specifically comminutor, which is out of service, and the degritter units. Aeration tanks have very good air distribution, achieving good DO levels. Only one RAS pump, no redundancy available, for important activated sludge process. Digester system is deteriorated and needs improvement. Dewatering, centrifuge is working well but the redundancy is the sludge drying beds, which are in bad shape and need improvement. Chlorine contact chambers structure needs improvement. Plant has cascade post aeration but no NPW system. Emergency generator is deteriorated and might need replacement. Facility overall appearance is poor. The staffing and training are adequate for the operation of this facility and its operating hours.</p>	Yes

¹ A capital improvement project for this facility has already been identified by PRASA and is included in the CIP (2017-2050+).

4.2.2.3 Wells

PRASA has reported that it owns and operates 269 water wells, most of which deliver water directly into a distribution system with little or no treatment, except chlorination. PRASA's wells vary in size from 100 to 1,200 gallons per minute (gpm). A total of ten (10) wells from the Operational Areas of San Juan, Manatí, Caguas, Ponce and San Germán were inspected. The sample of wells inspected represent 12% of the total (82) wells in the inspected Operational Areas. Each visit consisted of a site walkthrough and an interview with the designated personnel and 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 inspection results for previous years were compared to the inspection results from the 2017 inspection to analyze condition changes. Table 4-7 illustrates the comparison of the average rating for 2008 through 2017 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. Of the ten wells inspected, six received a rating of acceptable (60%), two received a rating of good (20%), and two were rated as poor (20%), for the overall rating. Overall, wells were rated as adequate with a score of 1.8. Campanillas No. 6 and No. 8, were also evaluated in the previous Asset Condition Assessment. In the previous evaluation both were rated poor, while they were now rated unacceptable. Furthermore, although not rated as poor, the Costa Caribe well was borderline adequate and, if left unattended, could deteriorated its condition and fall to poor or unacceptable rating in the future.

Table 4-7. Wells - Comparison of Average Inspection Results for 2008-2017

Criteria	2008	2009	2010	2012	2014	2015	2017	Change 2017 vs. 2015
Overall	2.0	1.9	2.1	2.2	2.2	1.9	1.8	-0.1

In general, the average results decreased when compared to the 2015 results. Although most wells were generally observed to be in adequate condition, there were several factors that resulted in some wells being rated lower. Campanillas No. 6 and No. 8 wells, from the San Juan Operational Area, and Manatí II well, from the Manatí Operational Area, were found in detrimental condition.

Also, due to the current fiscal situation, improvements had to be reduced or placed on hold thus exacerbating the deterioration of some facilities. 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:

- 80% of the wells are not remotely monitored;

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- 60% of the wells do not have adequately labeled waste pipelines;
- 40% have entry points in the well head casing;
- 40% have corroded pipelines and fittings;
- 100% of the inspected wells do not have an EGU; and
- 30% of the wells did not have a satisfactory appearance.

The observed deficiencies in terms of the Regional evaluations for both San Juan and Manatí Operational Areas for potable water systems were the following:

- Unavailability of O&M/vendor manuals
- Challenges in the parts procurement process
- Unavailability of written emergency handling procedures for the ancillary facilities
- Unavailability of as-built drawings
- Insufficient staff

The other operational areas evaluated, San Juan, Ponce, and San German had similar deficiencies, except for the Caguas Operational Area, which was rated as good.

The sample of wells average rating was adequate. However, some of the wells presented a poor to unacceptable condition in the facility specific criteria. Nevertheless, for the time being, these wells are expected to continue to serve their intended function of supplemental water supply. One of the main concern is the lack of backup power in all 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. 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. However, 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 is conducting a comprehensive study at all active groundwater wells island-wide to assess source water protection and identify potential groundwater under the direct influence (GWUDI) of surface water. The project grouped wells into five different priorities and schedules. As of the date of this Report, PRASA has completed five priority evaluations and has performed Microscopic Particulate Analysis (MPA) in selected wells from priority one and priority two groups, to further evaluate the potential of a well of being GWUDI. This effort is being performed in compliance with USEPA's Surface Water Treatment Rule (SWTR) and state regulations required by the PRDOH. The SWTR requires source protection, filtration and disinfection when surface water or GWUDI is used as a source for drinking water. Results of the GWUDI evaluations currently being conducted by PRASA should prove beneficial to identify additional needs in these facilities. This initiative continues its progress.

4.2.2.4 Water Pump Stations

PRASA has reported that it owns and operates 954 WPSs. WPSs consist of two major categories: 1) above ground pumps and 2) below ground pumps in vaults with heavy covers that cannot be readily

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removed by field inspectors (underground booster stations) – usually not inspected. PRASA's WPSs vary in pumping capability from less than 100 gpm to over 9,000 gpm. A total of 17 above ground WPSs (2% of total WPSs) were inspected in 2017. Each visit consisted of a site walkthrough and an interview with the designated personnel. The results of the assessments of those stations are described below. 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. One criterion considers operations, process control and equipment aspects which are related (limited 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 was included to evaluate the adequacy of PRASA's assigned monitoring and operations personnel.

The operations/process control/equipment criterion was assigned a weighting factor of 75%, while the maintenance/staffing criterion was assigned a weighting factor of 25%.

The average WPSs overall rating resulted in the adequate range with a rating of 2.3. No facility was rated unacceptable under the operation/process control/equipment category. However, two facilities were rated as poor under this category, these included: El Coqui (North Region, Ciales) and Cumbre 1 (North Region, Ciales), both from the Manatí Operational Area. Although not rated as poor, the Reina de Los Angeles WPS was borderline adequate and, if left unattended, its condition could deteriorate and fall to poor or unacceptable rating in the future.

The inspection results for previous years were compared to the inspection results from 2017 inspection to analyze performance changes since the previous inspections. Table 4-8 illustrates the comparison of the average rating of all facilities by each category evaluated. The overall average rating of each evaluation criteria for 2008 through 2017 is also presented.

Table 4-8. WPSs - Comparison of Average Inspection Results for 2008-2017

Criteria	2008	2009	2010	2012	2014	2015	2017	Change 2017 vs. 2015
Overall	2.2	2.2	2.3	2.4	2.2	2.2	2.3	0.1

As shown in Table 5-4, the overall rating increased by 0.1 compared to the 2015 results. However, it is important to indicate that significantly less facilities were evaluated during this period when compared to 2015 inspections, because of the emphasis given to water and wastewater treatment facilities. Although most the WPSs were generally observed to be in adequate or good condition, there were several factors that resulted in some WPSs being rated lower.

According to the inspections performed, some of the most notable deficiencies include the following:

- 47% of the facilities lack remote monitoring;
- 35% of facilities did not have crane rails or a portable hoisting truck for the removal of pumps for maintenance purposes;
- 53% of the facilities were observed to have leakage with severity ranging from minor to severe;

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- 53% did not have a flow meter;
- 59% did not have an EGU.

In terms of the regional evaluation of the Manatí Operational Area, the following deficiencies were encountered:

- Unavailability of O&M/ vendor manuals
- Challenges in the parts procurement process
- Unavailability of written emergency handling procedures for the ancillary facilities
- Unavailability of as-built drawings
- Insufficient staff

The other operational areas evaluated, San Juan, Ponce, and San German had similar deficiencies, except for the Caguas Operational Area, which was rated as good.

The WPSs are generally in adequate condition and are expected to continue to serve their intended function of delivering drinking water throughout the distribution systems. Two facilities (12% of the evaluated facilities) were rated as poor. 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 deficiency was observed to be the lack of an EGU, followed by the lack of remote monitoring of the facilities, and third the lack of flow meters. However, PRASA's Operational Regions continue efforts under the IMP to install telemetry systems in all facilities to enable monitoring from the remote operating centers (ROCs). These deficiencies, if left unattended, could compromise the continuous supply of potable water to PRASA's clients during power failure events or equipment failure.

4.2.2.5 Wastewater Pump Stations

PRASA has reported that it owns and operates 824 WWPs that varies in pumping capability from less than 100 gpm to over 10,000 gpm depending on the population density and its proximity to the WWTP. A total of 15 WWPSs (1.8% of total WWPSs) were inspected in 2017. Each visit consisted of a site walkthrough 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 result of the assessments of those stations is 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 and staffing practices of the region/operational area. One criterion considers operations, process control and equipment aspects which are related (limited 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 was included to evaluate the adequacy of PRASA's assigned monitoring and operations personnel.

The operations/process control/equipment criterion was assigned a weighting factor of 75%, while the maintenance/staffing criterion was assigned a weighting factor of 25%.

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The average WWPSs rating for 2017 resulted in the lower end of the adequate range with an overall rating of 1.8. None of the visited WWPSs were classified as unacceptable. However, four facilities were rated poor under the operations/process controls/equipment criterion. These were:

- Piscina Olímpica WWPS (Metro Region, San Juan)
- Martín Peña WWPS (Metro Region, San Juan)
- Los Corozos WWPS (Metro Region, San Juan)
- Reina de los Ángeles WWPS (East Region, Gurabo)

In addition to the facilities rated as poor, although rated as adequate, twelve (80%) of the fifteen WWPSs inspected were below a 2.0 rating in the facilities criterion and, if left unattended, could fall to poor or unacceptable rating in the future. The only WWPSs with over a 2.0 rating in the facilities criterion were: Cotto Norte WWPS (North Region, Manatí), Caguas Milenio II WWPS (East Region, Caguas) and Salamanca WWPS (West Region, San Germán).

In terms of the regional evaluations, the number of deficiencies found for the San Juan Operational Area was higher than those of the Caguas Operational Area. The deficiencies found in the San Juan Operational Area were the following:

- Challenges in the parts procurement processes
- Unavailability of as-built drawings
- Insufficient staff
- Poor training (According to person interviewed, better training is needed)
- Facilities are not visited in a daily basis and do not have an exterior alarm

The San Juan Operational Area obtained the lower score (1.3) for the regional evaluation for wastewater facilities compared to the rest of the Operational Areas. The Caguas Operational Area only had one deficiency which was that the facilities are not visited daily but have telemetry system. The rest of the operational areas have similar deficiencies with other deficiencies such as:

- Unavailability of O&M/vendor manuals
- Lack of procedure to prioritize repairs

The inspection results for previous years were compared to the inspection results from 2017 to analyze the performance. Table 4-9 presents the comparison of the average rating of all facilities by each category evaluated. The overall average rating of each evaluation criteria for 2008 through 2017 is also presented.

Table 4-9. WWPSs - Comparison of Average Inspection Results for 2008-2017

Criteria	2008	2009	2010	2012	2014	2015	2017	Change 2017 vs. 2015
Overall	1.7	2.0	2.0	2.1	2.3	2.4	1.8	-0.6

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The overall condition of WWPSs significantly decreased by -0.6 compared to the 2015 inspections. Although a smaller sample of facilities was taken, the high variance is indicative of progressive deterioration that can mostly be attributed to the lack of investment in improvement works the last few years due to the ongoing fiscal situation.

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

- 67% of the visited WWPSs had recorded overflows during the evaluation period;
- 40% of the pump stations did not have elapsed time meters;
- 33% do not have audible alarm;
- 53% of the facilities are not remotely monitored;
- 47% of the facilities did not have an adequately clean bar screen;
- 40% was not clear of floating debris;
- 33% did not have a crane rail system; and
- 53% of the facilities have its exhaust fans operating in manual mode.

Overall, the WWPSs are in adequate to poor condition. There has been a deterioration of the facilities compared to the 2015 evaluation. and most of the operational areas have challenges in procuring parts. The fact that 67% of the visited facilities have recorded overflows during this evaluation period is of concern. Even though most of the visited facilities had an EGU, overflows were still reported. Therefore, this problem can be attributed to the fact that 53% of the facilities visited are not remotely monitored, 33% of the facilities do not have an exterior alarm, and 47% of the bar screens were not adequately cleaned, which may result in clogging of the entry way to the pump station. Having remote monitoring will help PRASA prevent overflows in the System, and adding a comminutor 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.

4.2.2.6 Water Storage Tanks

PRASA has reported that it owns and operates 1,486 water storage tanks that vary in storage capacity (size) from 100 to 10,000,000 gallons. A total of 20 water storage tanks (1.4% of total tanks) were inspected in 2017. Each visit consisted of a site walkthrough and an interview with the designated personnel. The results of the assessments of those stations are described below. 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. One criterion considers operations, process control and equipment aspects which are related (limited 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 was included to evaluate the adequacy of PRASA's assigned monitoring and operations personnel.

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The operations/process control/equipment criterion was assigned a weighting factor of 75%, while the maintenance/staffing criterion was assigned a weighting factor of 25%.

The inspection results for previous years were compared to the inspection results from 2017 inspection to analyze performance changes since the previous inspections. The overall rating was in the adequate range, with an overall rating of 2.3. Table 4-10 illustrates the comparison of the average rating of all facilities by each category evaluated. The overall average rating of each evaluation criteria for 2008 through 2017 is also presented.

Table 4-10. Tanks - Comparison of Average Inspection Results for 2008-2017

Criteria	2008	2009	2010	2012	2014	2015	2017	Change 2017 vs. 2015
Overall	1.9	1.6	1.6	1.9	2.4	2.3	2.4	0.1

On average, overall ratings slightly increased from the 2015 inspections. None of the facilities were rated as poor or unacceptable. However, it is important to indicate that significantly less facilities were evaluated during this period when compared to 2015 inspections, because of the emphasis given to WTPs and WWTPs. Notwithstanding, four facilities, although rated as adequate, were below a 2.0 rating and, if left unattended, could deteriorate its condition and fall to poor or unacceptable rating in the future. These facilities are:

- Fullana Tank (North Region, Ciales),
- Masas 1 (Metro Region, Trujillo Alto),
- 4th Ext. El Monte (South Region, Ponce) and
- Redondo 4th Ext. (South Region, Ponce)

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

- 79% of the tanks visited did not have a local level indicator;
- 16% of the tanks are not tested for water quality;
- 32% of the tanks are not visited daily;
- 32% of the visited tanks do not have a high/low level alarm;
- 37% of the tanks are not remotely monitored;
- 37% of the tanks do not have adequately secured access hatches;
- 26% of the tanks have deteriorated concrete walls, with cracks ranging from minor to moderate degree and minor leakage.

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

The water storage tanks 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 local level indicator, lack of remote monitoring, and lack of adequately fitted/ locked access hatches. These deficiencies do 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 26% 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 already begun with this initiative, providing remote monitoring to those tanks that have been identified as critical in the distribution system. According to FY2016 Water Audit: 581 out of 1524 tanks have telemetry. The West Region expects to reach 100% of tank monitoring by August 2017. The other Regions continue the effort to increase tank visualization in their respective ROCs. Nevertheless, some delays in the execution and implementation of the initiative have been experienced due to the fiscal situation, as indicated by the fact that 37% of the visited tanks during this period are still not remotely monitored.

4.3 Buried Infrastructure

The following sections provide some discussion regarding indirect indicators of the condition of buried infrastructure and the steps PRASA is taking to improve them. Historically, PRASA had not kept a reliable database of its buried infrastructure. Nevertheless, since FY2005 PRASA has invested in and continues to develop and update its Geographical Information System (GIS) database to allow for a better control, record and management of its buried assets. Also, PRASA continues with its buried infrastructure R&R program, mainly managed and implemented by the Regions. Pipe R&R, which targets pipe break and leak-prone areas, are identified by PRASA's Operational Areas and prioritized per severity of the problem. Meter replacements are programmed and managed through PRASA's NRW Reduction Program.

4.3.1 Water Meters

PRASA owns over 1.4 million water meters ranging from 1/2 to 12 inches in diameter. PRASA has continued its meter replacement initiative under the Revenue Optimization Program. As reported by PRASA, 710,000 small meters (1-inch in diameter or less) have been replaced between FY2009-FY2017. Due to PRASA's current fiscal situation, however, the implementation of the initiatives included in the Revenue Optimization Program has slowed down. About 22,171 and 8,688 small meters were replaced during FY2016 and FY2017, respectively. Furthermore, between FY2009-FY2017, PRASA replaced over 5,000 large meters (greater than 1-inch in diameter). A total of 333 and 354 large meters were replaced during FY2016 and FY2017, respectively. These replacement numbers are less than what was being replaced in previous years and from PRASA's estimated projection and were particularly due to maintenance, theft or special client requests. For FY2017, PRASA had projected to replace and normalize approximately 45,000 small meters and 550 large meters.

PRASA's meter replacement program has had significant positive results in PRASA's metering accuracy as well as in its billings. PRASA plans to continue renovating this infrastructure as meters continue to age and wear out. To that effect, in FY2015, PRASA projected that over 491,000 small meters and 2,900 large meters will be replaced between FY2016 and FY2020. However, since June 30, 2015, given the fiscal situation and overall suspension of PRASA's CIP, the meter replacement initiative under the Revenue Optimization Program has slowed down. PRASA indicates that although the initiative is currently on hold, minor replacements have been performed, either due to maintenance, theft or special client requests. Nonetheless, no significant investments were made in FY2016 and FY2017.

PRASA is currently focusing its efforts in the planning and implementation of its Fiscal Plan. Under its proposed P3 Project (currently under scope and procurement development), PRASA seeks to optimize its metering system, among other key initiatives. PRASA expects to leverage private sector capabilities and capital to, above all, improve metering accuracy and replace meters.

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 72 inches in diameter. As in previous years Arcadis did not inspect the water transmission and distribution system. However, it is reasonable to assume that a portion of the water distribution system will require some structural repairs, as well as rehabilitation to reduce leakage, considering the volume of NRW reported by PRASA which amounts to 58.7% of total water production as of FY2016.

4.3.3 Non-Revenue Water

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, etc.

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System Input Volume (Dispatched Water)	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
	Water Losses	Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water
			Unbilled Unmetered Consumption	
			Commercial Losses	
		(Apparent Losses)	Unauthorized Consumption (theft)	
			Customer Metering Inaccuracies	
		(Real Losses)	Data Handling (Billing) Errors	
	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 4-11 provides a summary of key water distribution system metrics for FY2016, including current levels of water production, water losses, and NRW, as reported by PRASA. PRASA is currently working on the draft FY2017 Water Audit; hence, such values have not been included in this Report.

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

Fiscal Year	Total Water Production (MGD) ¹	Water Losses (MGD)	Non-Revenue Water (MGD)
FY 2012	547	381	399
FY 2013	617	354	363
FY 2014	598	343	351
FY 2015	557	299	307
FY 2016	508	291	298
Difference FY 2015-2016	-49	-8	-9
Cumulative Difference FY 2012-2016	-139	-90	-101

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PRASA's average NRW percentage from FY2002 through FY2011 has been about 61%, with a record high recorded in FY2011 of 64.5%. However, since FY2012, PRASA's NRW levels have been consistently declining. As shown in Table 4-11, from FY2012 to FY2016, PRASA reports to have reduced the amount (volume) of water produced (139 MGD reduction), amount of water losses (90 MGD reduction), and NRW (101 MGD reduction). In FY2016, of the total 508 MGD produced, approximately 298 MGD was NRW (58.7%). Of this amount of NRW, 291 MGD (97.6%) was due to water losses (both apparent and real) and 7 MGD (2.4%) was due to unbilled authorized consumption. Of the total amount of water losses in FY2016, approximately 44 MGD (15%) was due to apparent (commercial) losses, while approximately 247 MGD (85%) was due to real (physical) losses. PRASA attributes these reductions to the following main contributing factors: greater understanding and improvement of management practices regarding NRW and water losses, water system optimization measures, and corrections made in water production and data collection practices.

Following the industry's recommended NRW data analysis and reporting, PRASA is reporting NRW in terms of volume reduced in its annual water audits as shown in Table 4-11, and no longer as a percentage of the water production. As observed from the data shown in Table 4-11, using NRW as a percentage of water production does not necessarily represent NRW performance efforts. For example, when comparing the FY2016 results to the FY2015, the volume of water produced, volume of water losses and volume of NRW have all been reduced. However, when comparing water losses and NRW as a percentage of the volume produced, no reduction is observed. This results from the fact that the water production decreased significantly due to the 2015 drought, and is the reason why NRW reduction efforts cannot be compared in terms of a percentage of the volume produced, but rather as an individual value. In fact, the 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.

Instead, AWWA recommends using other performance indicators for measuring NRW, such as: the volume of commercial and physical losses per connections per day and the infrastructure leakage index (ILI). PRASA's actual commercial and physical losses per service connections per day for FY2015 is 44 and 160 gallons, respectively and for FY2016 is 31 and 174 gallons, respectively. 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 result of commercial losses per service connection per day and average result of physical losses per service connection per day for utilities with combined (water and wastewater) operations range from 2.87 to 14.76 gallons (median of 5.24) and from 18.08 to 104.42 gallons (median of 42.65)¹⁰, respectively. Since FY2012, PRASA began measuring the 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 assets management. Factors that affect the ILI include the pipe age and material, customer density, and system

¹⁰ Sources: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, published by the AWWA (2016).

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pressure. The ILI was introduced in 2000¹¹ and is also defined and calculated in AWWA's M36 Water Audits and Loss Controls manual. The ILI has been adopted around the world, although it is mostly used in Europe. 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 1.10 to 5.70, with a median of 2.45¹². Globally, systems in developed countries report lower values of 5; while in developing countries, values range from 10 up to about 50. In FY2012, PRASA reported an ILI of about 18. However, since then, PRASA's ILI has reduced by about 40%: reported values for FY2013, FY2014, FY2015 and 2016 were about 13, 11, 10, and 10.6, respectively. PRASA attributes these reductions to the following main contributing factors and measures:

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

PRASA 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, PRASA has established a fully dedicated NRW monitoring and management team responsible for implementing projects that will reduce the NRW, specially the System's water losses and is one of the main drivers of the new PRASA management's draft strategic plan.

As previously mentioned, PRASA has already experienced a decline in the reported NRW and water losses as compared to previous years. Some of the actions and projects to be implemented by PRASA to achieve the additional reductions in NRW and water losses as included in PRASA's Fiscal Plan are: 1) the P3 Project, intended to reduce mostly commercial losses; and 2) Physical Losses Reduction initiatives. As previously mentioned, the P3 Project is primarily focused in the replacement of meters, installation of advanced metering technology and enhance customer service activities to, above all, identify unauthorized consumption and decrease commercial losses. The Physical Losses Reduction initiative includes continuing the water leak detection program, monitoring system pressure to optimize flows, reducing the time to repair leaks, and reducing the number of events and duration of water storage tank overflows by increasing the number of tanks connected to telemetry.

Additionally, PRASA's Water Recovery office is highly focused in 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 more meters at PRASA facilities to measure a more significant percentage of the Authorized Unbilled Consumption, and reducing the unmetered production by installing

¹¹ Source: Alegre, H. Hirner, W., Bapista, J., and Parena, R. (2000). "Performance indicators for water supply services" IWA Manual of Best Practices.

¹² Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, published by the AWWA (2016).

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more flow meters at selected WTPs to adequately measure daily production. PRASA's goal is to reach a metered reading of 80% of the production supplied by FY2020. Measuring the most amount of water production increases the credibility of the results and decreases the probable over estimation of the NRW results. In addition, PRASA's Operational Regions are in the process of installing meters or a mechanism to measure the water discarded as part of the System's programmed drainages implemented as part of the measures to meet the DBPs compliance.

As included in its Fiscal Plan, PRASA's goal is to reduce the System's total water production per year down to 450 MGD by FY2020. Also, in compliance with Act 68-2016, by FY2019 PRASA must reduce its NRW volume by 5% or 15 MGD as compared to FY2016.

4.3.3.1 Leak Monitoring and Control

As shown in Table 4-12, in FY2016 PRASA indicates that a total of 62,079 leaks were reported. Table 4-12 also shows the average annual leaks occurrence per 100 miles of water piping. The total annual reported leaks have increased approximately 18% compared to FY2011, an annual average compound rate of about 3%. However, when compared to FY2015, there is a slight decrease in reported leaks of about 2%. The increasing trend observed over the past fiscal years could be due to an increase in the actual number of leak occurrences, to an increase in the number of people reporting leaks (as a result of PRASA's communication initiatives, improved attention time and increased social media presence), or a combination of the two. A factor that could be contributing to the higher number of reported leaks during FY2015, as compared to FY2016, could be the findings of the island-wide leak detection survey. However, Arcadis has not made an independent evaluation to identify the root causes of this increase. Nevertheless, 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 7.6 and 43.1)¹³. 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 renovation.

Table 4-12. Reported Leads from FY2011 to FY2016

Fiscal Year	Total Annual Reported Leaks	Annual Leaks per 100 miles using 14, 753 miles of Water Pipeline
2011	52,817	376 ¹
2012	42,868	306 ¹
2013	47,032	335 ¹
2014	54,154	386 ¹
2015	63,503	430
2016	62,079	421

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

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

¹³ Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, published by the AWWA (2016).

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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 FY2016, PRASA reports an average of approximately 1,150 leaks per week. Comparing the weekly reported leaks in each fiscal year, it can be observed that the weekly reported leaks decreased from FY2011 to FY2012. From FY2012 to FY2015, the weekly reported leaks increased approximately 5%, 15% and 17%, respectively. However, from FY2015 to FY2016, the weekly reported leaks decreased about 4%. The same trend is observed with the weekly repaired leaks. From FY2012 to FY2015 a steadily increase was being achieved in weekly repaired leaks. However, comparing FY2016 to FY2015 results, the weekly repaired leaks decreased by about 3%. As shown in Figure 4-2, PRASA, achieved an all-time high of about 1,162 leaks repaired per week, on average, during FY2015. In FY2016, this number was slightly reduced to 1,129.

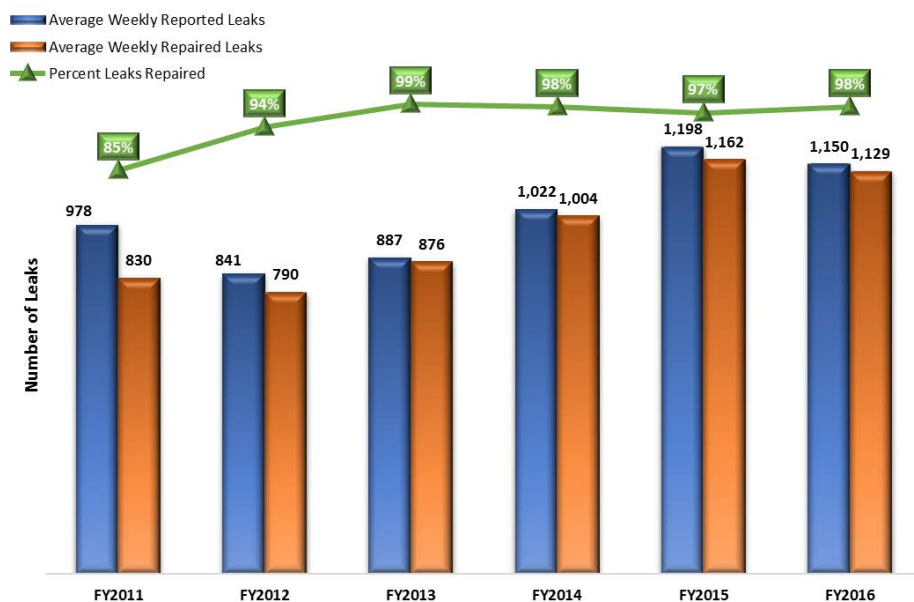


Figure 4-2. Island-Wide Weekly Average Leaks Reported and Repaired

Figure 4-3 shows the active leaks with duration greater than seven days before being repaired. As shown in the figure, despite experiencing a dramatic increase in FY2010 because of staffing and scheduling shortcomings, since FY2011 the number of leaks with duration greater than seven days was significantly reduced. In FY2015, there was a slight upturn in correlation with the increase in reported leaks as PRASA reported to have ended the fiscal year with a total of 3,049 pending leaks with duration greater than seven days and 62 weekly average pending leaks with duration greater than seven days. However, 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.

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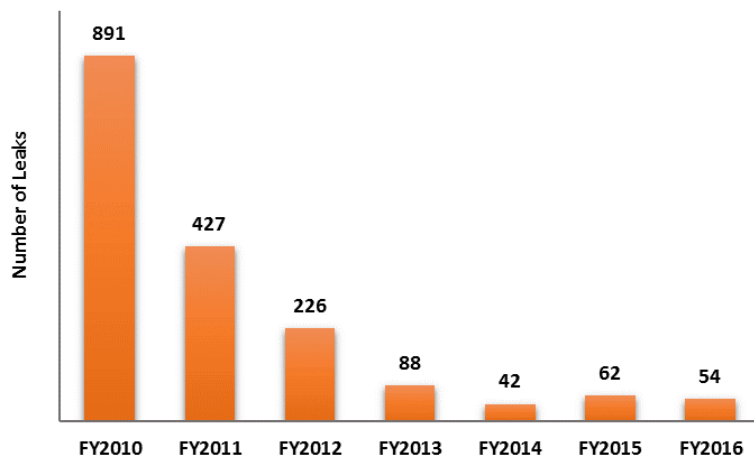


Figure 4-3. Island-Wide Weekly Average Pending Leaks with Duration >7 Days

Table 4-13 provides a summary of the average repaired leaks per working day and average backlog. Based on the weekly average pending leaks and weekly average pending leaks with duration greater than seven days, it can be observed that in FY2016 PRASA averaged a backlog of approximately 1.5 days of pending leaks and a backlog of approximately 0.2 days of pending leaks with duration greater than seven days. The average backlog days for pending leaks increased in FY2013 compared to FY2012 results, given the significant increase in the average weekly pending leaks from year to year. However, in FY2014 the average backlog days for pending leaks reduced by about 64% when compared to FY2013 results and on FY2015 continued its improvement by reducing another 17% compared to FY2014. In FY2016 the average backlog days for pending leaks continued its declining trend by reducing another 21% compared to FY2015. This resulted in a significant improvement in the average backlog days for pending leaks greater than seven days, with a reduction of about 33% compared to FY2015 results. PRASA's effectiveness in repairing pending leaks in a timely manner has continued to improve year after year since FY2011.

Table 4-13. Annual Average Backlog of Pending Leaks

Fiscal Year	Average Weekly Pending Leaks	Average Weekly Pending Leaks >7 Days	Average Repaired Leaks per Working Day ¹	Average Backlog Days for Pending Leaks	Average Backlog Days for Pending Leaks >7 Days
2011	1,031	427	166	6.2	2.6
2012	611	226	158	3.9	1.4
2013	1,147	88	179	6.4	0.5
2014	460	72	205	2.3	0.4
2015	434	62	232	1.9	0.3
2016	354	54	234	1.5	0.2

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

As of March 31, 2017, PRASA indicates that a total of 42,206 leaks were reported; equivalent to an average annual leak occurrence per 100 miles of water piping of 286. Even though this number is significantly lower than FY2016, as shown on Table 4-12, it is still extremely high when comparing to other utilities in the U.S. and it does not include the final three months of the fiscal year. For the same 2017 period, the weekly reported leaks and repaired leaks per working day averaged about 1,055 and 1,038, respectively. The average weekly pending leaks and the average repaired leaks per working day reports represents about a 35% and 12% decrease, respectively, both compared to the results obtained during the same period for FY2016. PRASA reported a backlog of 0.06 days of pending leaks with a duration greater than seven days during this period.

PRASA continues implementing the use of Mobile Data Terminals (MDT) in its repair crew vehicles. This technology allows PRASA to assign paper-less work plans to its repair crews, and facilitates the geo-referencing of leaks for PRASA to analyze leak frequency and identify root causes. Finally, it provides better repair metrics measurement, as it will record hour by hour as opposed to day by day as currently tracked by PRASA. PRASA expects to achieve faster repair response times and improve the repair lead and backlog times tracking.

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 allows. It is still PRASA's goal to reach 100% monitoring in water storage tanks. 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. Notwithstanding, the ongoing fiscal situation may adversely affect the leak repair and attention rates.

4.3.4 Wastewater Collection System

Based on the latest published PRASA Accountability Report (1st trimester of FY2016), 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.

4.3.4.1 Overflow Monitoring and Control

As shown in Table 4-14, PRASA indicates that in FY2016, 29,991 overflows were reported. 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.

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Table 4-14 also shows the average annual overflows occurrence per 100 miles of sewer. In FY2016, an average of 500 overflows per 100 miles of sewer were reported. There was an increase of total annual reported overflows of about 6% from FY2014 to FY2015 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. Again, Arcadis has not made an independent evaluation to identify the root causes of this increase. In FY2016, there was an increase of 5% when compared to FY2015 reported overflows. Conversely, 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 0.8 and 5.8 overflows¹⁴). 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 and inadequate customer use (i.e., illegal connections and discharges).

Table 4-14. Reported Overflows from FY2011 to FY2016

Fiscal Year	Reported Overflows	Annual Overflows per 100 miles using 5,994 miles of Wastewater Pipeline
2011	28,185	529 ¹
2012	26,903	505 ¹
2013	27,358	514 ¹
2014	26,937	506 ¹
2015	28,569	477
2016	29,991	500

Source: PRASA SAP (Commercial) Database

¹Wastewater pipeline total length used for previous fiscal year (FY2011-FY2014) was 5,325 miles.

PRASA's average weekly reported and repaired overflows per fiscal year are shown in Figure 4-4. For FY2016, PRASA reports an average of approximately 555 overflows per week. Comparing the weekly reported overflows per each fiscal year, it can be observed that the reported overflows decreased in FY2012. However, in FY2013 there was a slight increase over the FY2012 results due to the increase in the number of reported overflows through the fiscal year. In FY2014, the average weekly reported overflows experienced a reduction of approximately 2% compared to FY2013 results, in FY2015 an increase of 6% was observed compared to FY2014 results and in FY2016 an increase of 5% was observed compared to FY2015 results. Also, shown in Figure 4-4 is the percentage of repaired overflows with respect to the number of overflows reported in each fiscal year. PRASA's rate of repair of overflows has significantly improved since FY2011.

¹⁴ Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, published by the AWWA (2016).

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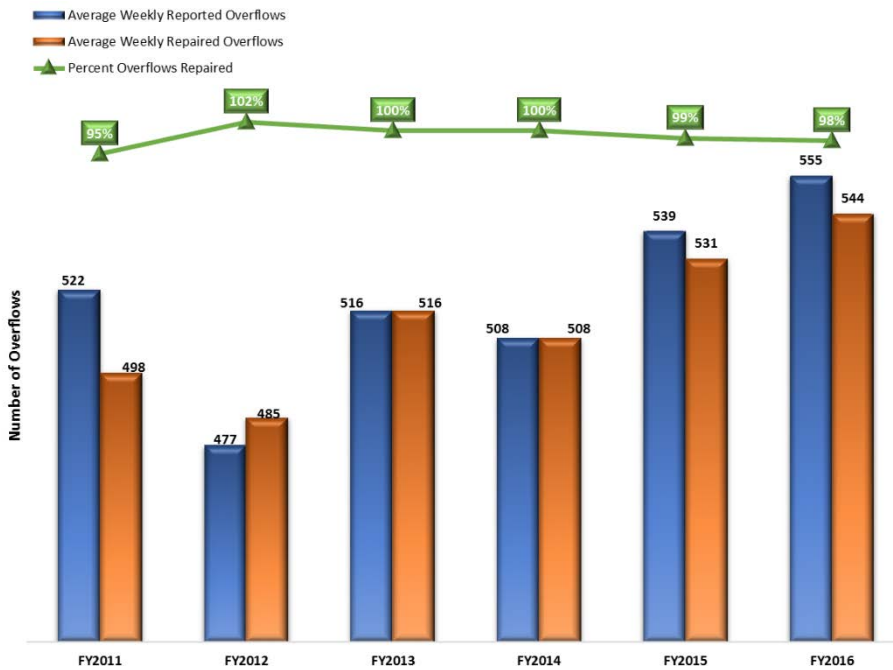


Figure 4-4. Island-Wide Weekly Average Overflows Reported and Repaired

Figure 4-5 shows the pending overflows with duration greater than seven days. As shown in the figure, the number of pending overflows with duration greater than seven days had been constantly decreasing since FY2010. In FY2016, however, there was an increase in the weekly average pending overflows with duration greater than seven days of about 30%.

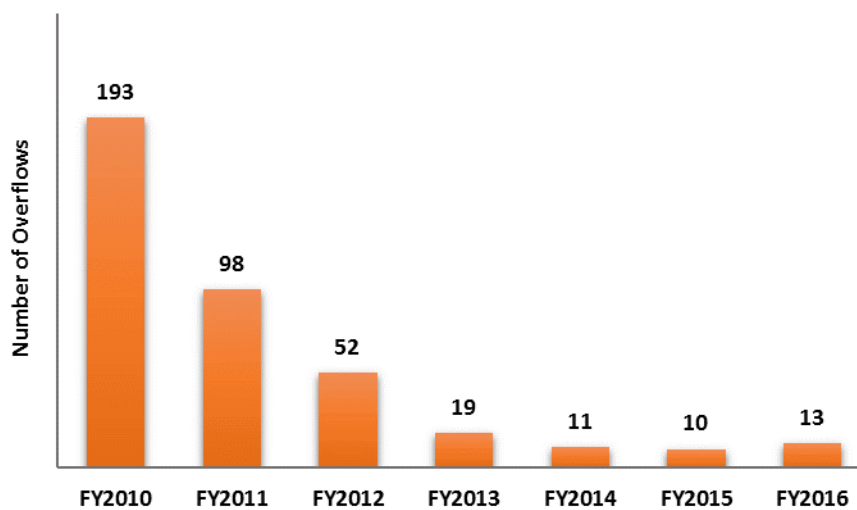


Figure 4-5. Island-Wide Weekly Average Pending Overflows with Duration >7 Days

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Table 4-15 provides a summary of the average repaired overflows per working day and average backlog. As shown, the average weekly pending overflows decreased from FY2011 to FY2012. In FY2013 the average weekly pending overflows resulted in a small increase compared to FY2012 results. However, in FY2014 PRASA reported only 169 average weekly pending overflows, which is a significant improvement compared to previous fiscal years. In FY2015 and FY2016, PRASA continued its decrease with 108 and 104 reported average weekly pending overflows, respectively. In FY2016, PRASA also improved its average backlog achieving approximately 0.9 days of pending overflows, although the backlog of pending overflows with duration greater than seven days slightly increased to 0.12. These results represent a reduction of about 10% and an increase of 33%, respectively, compared to FY2015 results. PRASA's effectiveness in repairing pending overflows in a timely manner has continued to improve year after year since FY2011, particularly those with duration greater than seven days.

Table 4-15. Annual Average Backlog of Pending Overflows

Fiscal Year	Average Weekly Pending Overflows	Average Weekly Pending Overflows	Average Repaired Overflows per Working Day ¹	Average Backlog Days for Pending Overflows	Average Backlog Days for Pending Overflows >7 Days
2011	350	98	100	3.5	1.0
2012	224	52	97	2.3	0.5
2013	295	19	105	2.8	0.2
2014	169	18	104	1.6	0.17
2015	108	10	106	1.0	0.09
2016	104	13	113	0.9	0.12

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

As of March 31, 2017, PRASA indicates that a total of 21,655 overflows were reported. For this period (third quarter of the FY), the weekly pending overflows and repaired overflows per working day averaged about 265 and 160, respectively. The average weekly pending overflows represent a reduction of about 33% and the average repaired overflows per working day represent a decrease of about 4%, both compared to the results obtained during the same period for FY2016. PRASA reported a backlog of 0.06 days of pending overflows with a duration greater than seven days.

As with leaks, PRASA expects to improve its sewer overflows response time and metrics tracking using the MDT technology currently being implemented across its operational regions. As previously mentioned, this technology allows PRASA to assign paper-less work plans to its repair crews, and facilitates the geo-referencing of sewer overflows for PRASA to analyze overflow frequency and identify root causes. Also, PRASA intends to continue the Combine Sewer Overflow (CSWO) program and commence the Fats, Oils and Grease (FOG) Program in FY2018, which will have a positive impact on overflows. However, it is important to indicate that the current fiscal situation can adversely affect the sewer overflow repair and attention rates.

4.4 Conclusions

Arcadis visited a total of 155 facilities across PRASA's five Operational Regions between January and April of 2017, to assess the condition of PRASA's System. Ninety-three (60%) of the facilities visited were treatment (WTP and WWTP) facilities. The assessment included a visual inspection of the physical condition of the equipment and the facilities, process controls; and an evaluation of the regulatory compliance performance, O&M practices, staffing and training. In general, the condition of the facilities visited varied from those still in good condition to those requiring capital upgrades. Table 4-16 presents a summary of the inspections overall rating results. The data indicates that 95% of the facilities inspected are in the adequate to good range. When compared to the 2015 inspection results, there was a noticeable decrease in number of facilities (17 facilities compared to 58) rated as good. Although, most of the treatment facilities were rated as adequate (90 of 93), there is a concern pertaining to the physical condition (the equipment/maintenance criterion) as fifty-nine (38%) of the facilities visited received a rating below 2.0. If unattended, the condition of these facilities could continue to deteriorate and fall to poor or unacceptable rating in the future.

Table 4-16. 2017 vs. 2015 Asset Condition Inspection Results Summary

Asset Category	Unacceptable		Poor		Adequate		Good		Total	
	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015
Regulated Dams	0	0	0	1	0	5	0	2	0	8
Water Treatment Plants	0	0	0	0	69	41	1	5	70	46
Wastewater Treatment Plants	0	0	1	9	21	16	1	3	23	28
Wells	0	0	2	3	6	13	2	2	10	18
Water Pump Stations	0	0	0	2	9	33	7	7	17	42
Water Storage Tanks	0	0	0	0	15	37	5	24	20	61
Wastewater Pump Stations	0	0	4	1	11	12	0	15	15	28
Total	0	0	7	16	131	157	17	58	155	231
Percent of Total	0%	0%	5%	7%	84%	68%	11%	25%	-	-

Compliance with discharge permit limits and drinking water standards varied depending on the plant age, condition and experience of operators. Based on the regulatory compliance results evaluated, despite some operational (process control) and minor compliance issues, the treatment facilities are generally producing and delivering potable water and conveying and treating wastewater adequately.

Overall, the WTPs are in adequate condition and are expected to continue to serve their intended purpose of providing potable water supply in compliance with applicable regulations. However, as previously mentioned, several WTPs received a low-end rating that put them close to being rated poor and the equipment/maintenance was the key factor. Consequently, the greatest concern is the physical

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condition of the facilities which continues to deteriorate due to the lack of capital investments and significant reduction in R&R.

Regarding the compliance criteria, the overall rating of WTPs in this evaluation category increased significantly since the previous inspection. PRASA acknowledges that it still 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 established corrective actions and control measures to improve compliance.

Furthermore, 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. The effects of these future regulations will not be known until PRASA performs data collection and studies to determine what, if any, additional capital improvements will be needed to comply with these future regulations. However, PRASA is conducting evaluations, water quality modeling, developing action plans and implementing remedial actions to minimize these non-compliance events but efforts have been hindered due to the fiscal situation. 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. Also, PRASA should consider operational improvements including new process equipment and process automation considering that operators continue to depend on manual mode for several processes instead of using the automated protocol a practice that has been found to be inefficient.

Regarding the WWTPs, evaluations generally ranged from poor to good condition with equipment/maintenance as the category of primary concern. Although there was only one facility rated as poor compared to nine in 2015, sixteen (70%) of the twenty-three facilities visited received a score below 2.0 and are in danger of continued deterioration. As with WTPs, the greatest current concern is the physical condition of the facilities which continues to deteriorate due to the reduction in capital investments. Process control also continues to be a challenge in some of the facilities, even though the plant operators indicated that standard operating procedures and control strategies are followed. Regarding the compliance criteria, the overall rating increased significantly since the previous inspection. However, as with the WTPs, much has to do with having several NPDES parameters with interim limits or only monitoring (as per consent decree and agreement requirements) and it is unknown whether the facility can meet the actual limit when the interim/monitoring limits expire. Moreover, PRASA should consider the stricter residual chlorine, fecal coliforms parameters for WWTPs with ocean outfalls and stringent phosphorus and nitrogen limits. Bringing facilities into consistent and sustained compliance with discharge parameters, addressing the shortcomings identified during inspections and additional operational improvements including new process equipment, process automation and process control optimization are some of the measures that PRASA must undertake to continue to improve and maintain the condition of its facilities

Regarding the ancillary assets, a smaller sample of facilities were inspected this year since an emphasis was given to treatment facilities. There was an equivalent or slight improvement in overall scores for water storage tanks and WPS and a slight decrease for wells. The wells decrease from 2014 to 2015 and again in this year's inspection, maintaining the trend that deterioration will continue if CIP or R&R investments are not made. Notwithstanding, most of the deficiencies noted can be addressed through PRASA's R&R program and may not require major capital improvements.

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PRASA continues to work on and improve its leak detection and monitoring practices. Currently, PRASA is remotely monitoring levels of a number of the tanks in the distribution system to avoid tank overflows and improve the water distribution balance. PRASA continues conducting periodic water audits which are used to implement the necessary controls and develop action items to address NRW.

Although the number of sanitary overflows is also high compared to the U.S., for example; PRASA has continued to improve its response time and attention/repair effectiveness to minimize the duration of these overflow events and their environmental impact. PRASA is implementing sanitary sewer evaluations and repair plans to reduce levels of infiltration and inflow (I/I) that must be treated in their WWTPs. The progress of this initiative has been affected as well by the ongoing fiscal situation.

Arcadis has provided recommendations for CIP projects and/or minor improvement needs (refer to facility inspection forms for facility-specific observations and recommendations in the FY2017 ACA Report). 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 ten-year CIP as reflected in its Fiscal Plan, includes all adjustments resulting from negotiations with the regulatory agencies as previously mentioned. Notwithstanding, it is envisioned that no capital projects will move forward until the necessary funding sources are identified and allocated.

Also, 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.

Finally, 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 are showing deterioration. As evidenced by the recent inspections, specifically in treatment facilities, improvements are needed to repair and/or modernize PRASA's Infrastructure and consequently, protect public health, safeguard environmental quality, allow continued economic development and help bring the System into compliance with all regulatory requirements. If recommendations are left unaddressed or if needed improvements continue to be postponed, facility treatment capabilities could be hindered, thus, impacting the public, and capital needs will likely increase.

5 O&M PRACTICES AND STRATEGIC PLAN

5.1 Introduction

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 FY2017 asset condition assessment effort described in detail in Section 4. Overall, Arcadis found PRASA's O&M practices to be adequate. However, process control continues to be a challenge in treatment facilities.

Most of the WTPs and WWTPs were found to be adequately operated and maintained. However, as presented in Section 4, there were several WTP and WWTP facilities that reported exceedances in compliance treatment parameters during the evaluation period and/or lacked the appropriate operational tools (i.e., O&M manuals, process controls, and laboratory equipment) at the moment inspections were conducted; yet, these were the exception and not the norm. Compliance improved with regard to SWDA parameters with the control measures implemented and a concerted effort by Compliance and Operation departments to reduce DBPs. Also, despite needing some additional general upkeep and grounds maintenance ancillary facilities, for the most part, are also being adequately operated and maintained. Nevertheless, several of these facilities were found to have at least one operational and/or maintenance shortcoming. Arcadis has observed that, throughout time, PRASA's operational efforts and practices have improved. However, there is still room for further improvement with respect to prioritization, scheduling, and execution of corrective and routine maintenance activities.

As mentioned, PRASA has adopted the mission of providing quality water and wastewater services at the lowest possible cost. The previous Executive Management Team (FY2016) followed a Strategic Plan with five key strategic initiatives: 1) Fiscal Health, 2) Operational Excellence, 3) Infrastructure and Sustainability, 4) Organizational Transformation, and 5) Technological Innovation. This Strategic Plan also included KPIs and metrics established and measured by the departments and Regions, to track and improve operational performance. Currently, PRASA's new Executive Management Team is in the process of revising and launching an updated Strategic Plan that is aligned with and supports the objectives included in the Fiscal Plan and includes KPI and metrics.

A summary of the O&M budgets, O&M highlights provided by PRASA's support departments and Regional personnel, and a detailed summary of PRASA's Strategic Plan, programs and Operational Initiatives are included in this section.

5.2 O&M Costs

Over the past five fiscal years, PRASA's O&M expenses have fluctuated from \$644M in FY2011 to \$620M (includes non-cash adjustments) in FY2016. For FY2017 PRASA's O&M expenses projection is \$648M. 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. However, the implementation of most of these programs/initiatives has been hindered by the ongoing fiscal crisis that Puerto Rico is enduring and which is affecting PRASA.

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PRASA's FY2016 O&M expenses were approximately \$620M, of which \$541M were directly related to the O&M of the System. The other \$79M were 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; customer service call centers; and water meter purchases, amongst others. PRASA estimates that during FY2016 approximately 72% of its System O&M budget (\$390M) was allocated to the water system and the remaining 28% (\$151M) to the wastewater system. Estimated costs per million gallons (MG) and per customer account for combined utilities operations are summarized in the Table 5-1 and Table 5-2 below. A comparison to benchmark values are also provided.

Table 5-1. PRASA FY2016 O&M Water System Budget Benchmarks

Performance Indicator	FY2016 PRASA	2013 Survey Benchmark Median ¹	2015 Survey Benchmark Median ²
Cost per Account ³	\$314.97	\$361.00	\$410.00
Cost per MG Processed ⁴	\$2,100.20	\$2,240.00	\$2,305.00
Cost per 100 miles of pipe ⁵	\$2,639,587.80	\$2,123,944.00	\$2,598,590.00

¹ Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2013 Annual Survey Data and Analyses Report, AWWA (2015).

² Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, AWWA (2016).

³ Based on number of water accounts at the end of FY2016 of 1,236,360.

⁴ Based on FY2016 total production and distribution of approximately 508 MGD of potable water.

⁵ Based on 14,753 miles of water pipeline.

Table 5-2. PRASA FY2016 O&M Wastewater System Budget Benchmarks

Performance Indicator	FY2016 PRASA	2013 Survey Benchmark Median ¹	2015 Survey Benchmark Median ²
Cost per Account ³	\$198.23	\$344.00	\$355.00
Cost per MG Treated ⁴	\$2,106.12	\$2,233.00	\$2,597.00
Cost per 100 miles of pipe ⁵	\$2,526,534.60	\$2,386,572.00	\$2,412,263.00

¹ Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2013 Annual Survey Data and Analyses Report, AWWA (2015).

² Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2015 Annual Survey Data and Analyses Report, AWWA (2016).

³ Based on number of wastewater accounts at the end of FY2016 of 763,979.

⁴ Based on FY2016 total treatment of approximately 197 MGD of wastewater.

⁵ Based on 5,994 miles of wastewater pipeline.

5.3 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. A summary of the information provided by PRASA is detailed in the following sub-sections.

5.3.1 Department Updates

5.3.1.1 Customer Services

During FY2014, PRASA's Customer Service Department began the initiative of reducing its 24 commercial offices and 3 satellite offices down to 11 commercial offices plus one virtual office. This initiative is aligned with the Government's initiative on regionalization and government efficiency. In FY2016 PRASA completed this initiative by currently overseeing 12 commercial offices plus one virtual office, which launched in January 2016. The original intent of the new reorganization was to facilitate and improve customer service activities and customers' experience in PRASA's commercial offices and increase the customer use of internet, web stations, virtual office, call center services, thereby reducing operational costs. However, by reducing commercial offices, customers are experiencing an increase in waiting time in some of the offices, such as the Arecibo and Mayaguez offices. This is mostly due because the older customers still prefer visiting physical offices to address service issues. Notwithstanding, by having the virtual office, PRASA has been able to mitigate the waiting time increase for some customers. Through the virtual office, customers can access their accounts online and perform activities (e.g. inquiries, payment, claims, request for services, etc.) without having to visit an office in person. In FY2017, as part of the management changes that PRASA underwent, a new director for customer services was appointed.

Web service stations have been on-line since June 2015. Web service stations are administered by municipalities and provide guidance on the procedures related to service activities within PRASA. In FY2016, about thirteen municipalities implemented web service stations however, this initiative is currently on-hold due to the recent development of the integrated services offices, an initiative from the Government's new administration (known in Spanish as the "Centro Integrado de Servicios al Ciudadano"). The most recent web service station is located in Morovis and was completed in March 2017. The integrated services offices are similar to a "one stop shop" that provide customer service for various governmental agencies within the same location. The Government plans on opening 100 integrated services offices throughout the island by 2021.

The Customer Service Department continues to focus on measuring and implementing metrics to further improve invoicing, collection and billing adjustment practices, customer service complaints, service interruptions, and customers with deficient services; and improving meter readings, collections, and customer time of attention in commercial offices. Also, PRASA's Customer Service Department continues to work on efforts to reduce NRW and improve billings and collections in low income communities.

In FY2017, PRASA's Governing Board approved the revised Commercial Regulations ("Reglamento sobre el Uso de los Servicios de Acueducto y Alcantarillado Sanitario de Puerto Rico"), after public hearings that took place on September 8th and 9th, 2016. The changes to the regulations mostly include articles that impact payments and invoicing including:

- Interest to be charged for payment plans.
- An initiative to improve meter reading accuracy to reduce the number of billing adjustments.

The meter replacement program for large users (government, commercial and industrial clients) is on-going. This will improve the monitoring and collections for this type of clients. As for future initiatives, the

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Customer Service Department is currently working on the development of 34 new initiatives for the next fiscal year. These initiatives are mostly related to collections, payments and better service practices and will need to be approved by the Strategic and Corporate Planning Vice-President, while abiding to the proposed initiatives incorporated in the Fiscal Plan.

5.3.1.2 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. Regarding purchasing practices, the SAP Portal program continues its operation with occasional tweaks and improvements. Through this program, all purchasing requests are managed online, including the public bidding processes and purchasing orders. The Storage Materials Catalog, which includes pictures of the material and SAP process explanation, was completed for all Regions during the summer of 2015 and is currently being used under the Lotus Notes platform. In the near future, PRASA plans to phase out Lotus Notes and leverage SAP for these activities. Also, PRASA is still implementing the codification of chemicals to help account for type and quantity of chemicals by WTP.

Due to the current fiscal situation, however, there is a new approval process in place related to Request for Proposal (RFP), the bidding process, and purchasing orders. A summary of the new approval process is listed below.

- Before an RFP is released, PRASA is now required to obtain pre-approval from OMB. A similar approval approach is required once the contractor is selected before the contract can be executed.
- Purchase orders (PO) of monetary value up to \$100,000 require approval from the Governor's office.
- POs of monetary value greater than \$10,000 require approval from OMB.
- Change orders of monetary value greater than \$50,000 require approval from OMB.

The department's KPI for the time it takes to process a PO request is currently about 40 days. Recently, PRASA has experienced delays on the POs request due to the additional OMB and Governor's Office approval process, thus impacting the ability to meet its KPIs. This has also increased the number of emergency POs (approval time of one day).

It is important to note that the contract for the current vendor that is responsible for the SAP Portal Program expired in September 2017. The contract went out for bidding and the same vendor was selected.

The department's future purchasing initiatives are summarized below.

- Incorporate improvements to the SAP Portal to increase employee access security and make it more user friendly.
- Redefine staff classifications and job descriptions.
- Restrict the number of personnel approved to access SAP.
- Increase internal controls of the personal protective equipment replacement program by making the staff more accountable when boots need to be replaced or new tools need to be purchased due to lost ones.

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Regarding logistics practices, PRASA is in the process of closing the distribution center in Toa Baja and start using two new distribution centers:

- Trujillo Alto – This location started as a warehouse center for the Metro Region and is currently being converted into a distribution center that will serve the Metro, East and part of the South Regions. PRASA has already started moving the Toa Baja inventory to this new location.
- Aguadilla – This location is currently being upgraded to a distribution center that will provide services to the North, West and part of the South Regions.

The new distribution centers and PRASA's warehouses island-wide are interconnected and communicate with each other mostly via the SAP Portal. This has helped PRASA achieve greater inventory controls. Moreover, as part of their effort of maintaining control of PRASA's purchased materials, staff performs daily counts using the SAP Portal platform at all their facilities. A full-blown inventory is completed once a year at all facilities to attain logistics controls between regional/plants storage including usage evaluation, to achieve a reduction of inventory.

PRASA continues the implementation of "bar codes" for equipment and materials in the distribution centers and expects the completion of this initiative to occur by December 2017. The storage yard located at the Puerto Nuevo WWTP that stores the large diameter material/equipment to facilitate and expedite repairs is still being utilized by PRASA. The same applies to the transshipment area at the same location which is utilized to store decommissioned materials/equipment.

The department's future logistic initiatives are summarized below.

- Warehouses and distribution centers staff is required to check on the availability of an item at other PRASA-owned locations island-wide before the purchasing request is started.
- Miscellaneous improvements to the categorization of equipment undergoing repair has recently being developed by the department. For example, a letter "R" is added to the pump identification number once it returns from the repair shop.

PRASA continues to evaluate further improvements to its purchasing and logistics processes to reduce costs and increase operational productivity. Additionally, purchasing and logistics continues focusing on improving its chemicals purchasing and management processes, and usage controls. This effort is being conducted in direct collaboration with the Operations and Compliance Departments; however, as with other PRASA initiatives, this effort has been delayed due to the current fiscal situation. In FY2017, as part of the management changes that PRASA underwent, a new director for the Purchasing and Logistics Department was appointed.

5.3.1.3 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 (INTEGRA, by its Spanish acronym). Project scopes, priorities, and returns on investment are the key factors being assessed in the evolution of the INTEGRA program.

On-going initiatives include:

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- The maintenance of the virtual office to allow customers to submit claims, process payments, request address change, among others.
- The integration of various social media platforms.
- Maintenance and improvements to PRASA's mobile application, which various tasks including payments, complaints and reporting of leaks and overflows) with number of users increasing on a daily basis.
- MDT at all commercial offices. Also, in all operational Regions.
- Miscellaneous hardware and software upgrades are performed when needed.
- Improvements to cyber security measures are performed when needed.
- The SIRE (known in Spanish as "Sistema Integrado de Reembolsos") application to manage employee expenses is still in place. The expense approval process can now be performed electronically.
- The IT Department continues to provide support to the Communications Department for PRASA's website.
- The implementation of the SAP Screen Persona to simplify PRASA's computer screen systems has been completed.
- Live feed cameras at the commercial offices are still operational. Customers can access the feeds online and see the wait lines on real time.
- IT continues to provide support to the Human Resources (HR) department for the SAP HR Portal. Currently, the HR Portal allows employees to complete administrative forms, monitor vacation, sick and unpaid leaves and trainings. This platform can provide additional benefits to the HR Department that are not currently being utilized by PRASA.
- Island-wide SCADA support is also on-going.
- An IT Help Desk is now available to employees 24 hours 7 days a week in case computer troubleshooting support is needed.
- On October 2016, PRASA acquired a unique identifier number from the American Registry for Internet Numbers (ARIN) that is required to increase redundancy and reliability to the website platform that hosts the virtual office.

The IT Department is still providing support to the SAP Portal application for PRASA. As previously mentioned, PRASA plans on eliminating the use of Lotus Notes and utilize SAP Portal going forward. Various benefits for implementing this change include: (1) not paying licensing fees by using free SAP applications like Fiori; 2) better storage capabilities provided by Office 365; 3) more user-friendly applications.

PRASA's IT future initiatives include the following:

- As discussed above, Lotus Notes will be phased out and the Fiori application will be deployed within PRASA's SAP Portal.

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- Assist in the implementation of the fee structure changes, including electronic bill discount, adjustment policy revision, reconnection fee and disconnection fees.
- Evaluate the storage cloud alternatives that could reduce cost to PRASA.
- Increase network speed between PRASA's headquarters in San Juan and the data Recovery Center located in Ponce.
- Upgrades to PRASA's IT back-up system since the storage capability has recently been increased.
- Cyber security initiatives are being developed to block any suspicious cyber invasions and identify anomalies on the PRASA's network.
- Online chat capabilities for customer service agents has been completed, but is currently not being utilized by PRASA.
- Upgrades to the online payment gateway.
- The SAIA mobile application to assist fire fighters to track hydrant inspections is currently being developed and will be deployed in 6 months.

In FY2017, as part of the management changes that PRASA underwent, a new director for the IT Department was appointed.

5.3.1.4 Communications

Since March 2017, the Communications Department has been focusing on introducing PRASA's newly appointed Executive President to the public at various speaking engagements and published press releases. Recently, there has been a noticeable increase in the interaction between the Government and the Communications Department since the Government now needs to approve all communication content (e.g. press releases, website and social media content, etc.).

The Communications Department, in coordination with the IT Department, continues updating and improving PRASA's website, which includes quarterly accountability reports, an investor relations section (which includes applicable and relevant PRASA data), consent decree information, press releases, virtual office, greater customer account capabilities, other pertinent information depending on seasonal events (e.g. water rationing, hurricane season, water conservation, etc.), among others. The promotion of the virtual office on PRASA's website has been increased to attract and increase the number of enrolled customers. Once a customer accesses the website, a virtual office enrollment pop-up window appears on the screen. Also, the graphic design on the website's banner is changed on a biweekly basis. Since the beginning of 2017, PRASA has been working on upgrading the documents available on the website and making them interactive. The "Reglamento 8901 Sobre el Uso de los Servicios de Agua y Alcantarillado de Puerto Rico", which includes regulations that impact customer service, was changed to an interactive format. By December 2017, PRASA will be updating the format of the website per the Government's request. All government agencies websites will follow the same template for consistency.

The Department has increased PRASA's social media presence by integrating the posts on Facebook, Twitter and Instagram. PRASA is now using social media as an educational platform by continuously sharing tidbits 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. As part of the on-going water conservation plan, PRASA started to use the “#GotaAGota #SeAgota” hashtag to raise awareness about this issue. Additionally, the communications auxiliary director in each Region is responsible for responding to questions, comments or messages posted on PRASA’s social media networking sites. The Department plans on increasing the use of the YouTube Channel since a video editing software has been purchased.

The Communications Department future initiatives include the following:

- FOG awareness program will be launched in the near future. This program will educate customers on the negative impacts that pouring FOGs down the drain have on the wastewater collection system.
- An e-newsletter will soon be distributed to PRASA’s staff to give updates on past, on-going and future events, important news and any other type of information consider relevant.
- A communication’s plan will be prepared and shared with the customers explaining the rate changes that will take effect in FY2017 and FY2018. These changes include: 1) discount for electronic bill participation, 2) fee adjustments where a hidden leak is detected will only apply to the wastewater usage and not water and, 3) a \$15 disconnection fee.

PRASA’s Communications Department has also increased PRASA’s media presence (printed, online, and radio/televised). They continue maintaining clip logbooks of key events (i.e., 2015 water drought, 2014 water drought, 2013 rate increase process); in addition to a year in review logbook as a measure to retain institutional knowledge for future PRASA Executive Management Teams.

In FY2017, as part of the management changes that PRASA underwent, a new director for the Communications Department was appointed.

5.3.1.5 Human Resources

PRASA’s HR Department is currently focusing in two main tasks: 1) achieving PRASA’s headcount goal of 4,900 employees by FY2020 (with no vacant positions) as presented in the Fiscal Plan and 2) understanding and implementing the requirements included in the series of acts (Act 66-2014, Act 211-2015, Act 3-2017 and Act 26-2017) that have been passed during the past couple of years impacting PRASA employees’ benefits and economic conditions. PRASA completed identifying the roster of employees that classify for the Voluntary Pre-Retirement Program as defined by Act 211-2015. About 351 employees qualified for this program, as submitted by PRASA to OMB for final approval. In FY2017, as part of the management changes that PRASA underwent, a new director for the Human Resources Department was appointed.

5.3.1.6 Compliance

PRASA’s Compliance Department continues to effectively monitor regulatory compliance in PRASA facilities, and continues to maintain open channels of communication with Regulatory Agencies. PRASA is currently in the process of implementing several operational strategies and initiatives in the system to reduce DBPs, which PRASA acknowledges to be the biggest compliance challenge at the time after the implementation of the Stage 2 Disinfectant By-Products Rule (D/DBPR) was implemented. Complying

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with Stage 2 D/DBPR is more challenging since the average among the monitoring locations within a system is no longer considered. Hence, reporting for the DBPs running annual average (RAA) per location has resulted in more violation instances. PRASA has continued to implement several operational strategies in the System to reduce these incidences. In FY2016 and FY2017, PRASA performed water quality modeling to identify the root cause of these non-compliance events to establish corrective actions and implement control measures. PRASA has developed an action plan to address exceedances to DBPs, which consists of, but is not limited to a combination of the following corrective measures:

- Elimination/reduction of pre-chlorination
- Increasing frequency of process tanks/systems wash
- More frequent drainage of systems
- Change in coagulants
- Hydraulic modeling to reduce retention time in tanks
- Lowering pH
- Training

PRASA indicates that the East and Metro Regions are further ahead in the implementation stage of these corrective measures and are consequently seeing a reduction in the exceedances reported. The East and Metro Region compliance personnel will assist the other operational regions in the implementation process. 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.

In May 2017, the Natural Resources Defense Council (NRDC) published an article titled "Threats on Tap: Drinking Water Violations in Puerto Rico" claiming that Puerto Rico had the worst rate of drinking water violations as compared to other US states and territories. Although the article caused a lot of concern, conflict and disturbance among the Government and the population serviced by PRASA, it was considered unreliable by several professionals of the industry. The report presented misleading data as it included both PRASA and non-PRASA systems. Also, PRASA indicates that most of the violations recorded were due to reporting and administrative issues and not because of actual water quality conditions. Factors that caused these reporting violations to take place were, for example, the opposition of some residents to grant access to sampling points, the inability to access sampling points inside closed buildings, and the failure to obtain samplings to be performed by the residential customers, such as the lead analysis, due to wrong account address. Actual water quality violations reported were due to DBPs exceedances which PRASA is addressing. The Compliance Department has identified several measures and actions to reduce violations due to reporting and administrative processes. Such measures include: setting metrics for meeting a weekly sampling schedule, relocating sampling points that have accessibility issues, include water meter numbers and optimize metering routes.

The Compliance Department, in collaboration with PRASA's Infrastructure Department, completed negotiations with USEPA regarding the consent decree, but is still in ongoing negotiations with PRDOH regarding PRASA's agreement. PRASA expects that such negotiations with PRDOH will be dealt with via individual motions.

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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. The draft Corrosion Prevention Program was submitted to the USEPA for review on June 1st, 2017. Additional information regarding PRASA's IMP is included further ahead within this Section. As indicated by the Compliance Department, PRASA began with 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.

Also, as part of the Department initiatives, they are currently working with the implementation of the Process Control Program at treatment facilities. The program was completed for WWTPs, and is expected to be completed by December 2017 for WTPs (including STS), pending training completion at several facilities. The Compliance Department also reported that they began with the implementation of a FOG Awareness Program focused on educating, monitoring, and inspecting applicable commercial customers. The draft program was submitted to USEPA in September 2016 and resubmitted as a final document in February 2017. PRASA expected to launch the program by the third quarter of 2017 but it launched on July-2017. Regarding the Pre-Treatment Program (applicable for industrial clients), PRASA indicated that the projected pre-treatment regulatory revision draft, to address the changes in the discharge limits for phosphorus and nitrogen effluent parameters, was completed and submitted. However, this process has been delayed and is currently still pending further action. Another initiative the Compliance Department has been running since 2012 is the identification of potential GWUDI wells. Emergency Response Plans and Risk Management Plans (RMP) for most facilities were completed in FY2017.

Furthermore, the department continues as the responsible party for PRASA's Health and Safety Program, which includes talks, meetings, task risk assessment to improve O&M practices and employee safety. Over the last few years, an external consultant has been working on the development of the Health and Safety Program, which is expected to be completed by June 2017. The implementation of the program is projected for July 2018. Also, in collaboration with the Purchasing and Logistics Department, the departments are preparing a qualification document for the providers of chemicals products which was expected to be completed by November 2015. However, this process was delayed as the RFQ was challenged by a provider several times and it is, as of the date of this report, in Appeals Court. The RFP process is expected to start in December 2017. 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.

5.3.1.7 Legal

The Legal Department deals with: 1) claims, which include courts and extra-judicial; and 2) litigations, which include damages, contract noncompliance (class action lawsuits, service & contractors 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 eleven lawyers. Also, for damages and pre-judgements litigation related to insurance coverage they use external counsel from four law firms with pre-negotiated fixed rates and for other litigation they receive assistance

from nine pre-approved external firms in an as needed basis (although PRASA is currently in transition to narrow down to six external law firms).

The department reports that there has been a decrease in litigation cases. As for labor related issues, none are addressed in the Legal Department; they are all managed by the HR Department. The department is also involved in the negotiations with the Regulatory Agencies to modify certain requirements of the consent decrees, and agreements to re-align compliance priorities and in turn, help alleviate PRASA's financial burden. Harmonizing Act 66-2014, Act 3 2017 and Act 26 2017 has been challenging and continues to be an ongoing process of understanding. Lastly, due to the recent delays in approval, PRASA is in the process to seek dispensation from Act 3 2017 regarding the approval of OMB for POs above \$10,000.

5.3.1.8 Infrastructure

PRASA's Infrastructure Department continues to manage PRASA's CIP. However, as previously mentioned, PRASA's CIP is currently suspended until funding is identified. Furthermore, PRASA has submitted a revised and updated 5-year CIP for approval by the Board. The Infrastructure Department is also responsible for the management of PRASA's Comprehensive Energy Management Program and oversaw the Plant Automation Program.

5.3.2 Regional Updates: Challenges and Initiatives

Meetings with all five regional directors were conducted during the month of June 2017. The purpose of these meetings was to assess the progress of the region based on the established KPIs, the issues and challenges being faced, the programs and initiatives developed in each operational region during FY2016 and FY2017, future initiatives and overall operational activities.

It is important to note that all Regions presented issues and challenges which hinder them from complying with several of their established KPI goals. Some of the most common issues and/or challenges among all regions are listed below:

- Scarcity of personnel for specific functions, mainly due to the hiring freeze required by Act 3-2017, and to the population emigration to the US. This directly impacts the following KPIs:
 - Overtime
 - Budget Compliance
 - Preventive vs. Corrective Maintenance Ratio
 - Customer Service Complaints, as the lack of personnel for the meter reading crews increases the estimation of water consumption.
- Service Interruptions, mainly due to voltage fluctuation and deficiencies of the PREPA system, but also due to the lack of emergency power generators at some facilities, and to ruptures of deteriorated infrastructure or defective equipment
- Long waiting time on commercial offices (Arecibo, Mayaguez)
- No availability of fleet vehicles, mainly due to deterioration of vehicles and repair time

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- Delay in obtaining approvals of POs
- Aging infrastructure
- Sanitary Sewer Overflows (SSO)
- Increase of 30 to 40% on non-planned absences due to sickness, which may be attributed in part to the stipulations set forth on Act 26-2017
- Compliance challenges
- Operation on a tight budget

There were other issues specific to each Region. For example, in the West Region there are problems with the use of MDTs, specifically when used with flushing trucks. Another issue with the MDTs is the fact that some field work is performed by private contractors which do not have MDTs. Whereas in the South Region there are problems with the control of DBPs, the absence of a ROC, issues with the Salinas well water supply due to extraction restrictions on the aquifer, and compliance issues with the new nutrient removal and residual chlorine limits.

To tackle these challenges, the Regions developed several initiatives and programs, achieving noteworthy results. Also, they have executed several projects, with operational funds, to improve the overall condition of the water and wastewater systems. Some of the most common initiatives among the different Regions are: energy reduction measures, DBPs control measures, reduction of SSOs and combined sewer overflows, NRW reduction, among others. However, although initiatives are similar, each Region has its own approach. Table 5-3 summarizes some of the initiatives and projects being implemented.

Table 5-3. Initiatives and Projects by Region

Region	Initiatives/Projects	Description
West	Water Compliance Actions to meet DBPs	This initiative consists in the reduction of chlorine application at discharge, elimination/reduction of pre-Cl, increase polymer application (TOC) at exit, tank clean-up program (yearly). Also, as part of this measure the System's drain Program was established as well as sampling points.
	Overtime Itinerary and Control Initiative	This initiative involves the approval of the extra hours schedule by the Area Directors, also the approval by supervisors with anticipation (via WhatsApp, text, email). The goal is to reduce these overtime hours to 8% of the total worked hours. Overtime hours are only approved when PRASA's daily operations are at risk of not being met, or when there is an emergency. Check in and check out of brigades is monitored.
	Identification of water theft and following up on inactive accounts initiative	The goal of billing adjustments is 2% or less of the total invoice amount per month. A new KPI is being considered: % meter readings (Goal: 94%) to contribute to the increase in collections.

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Region	Initiatives/Projects	Description
	Pilot Program Joint Venture with Mech Tech	This program will enhance fleet maintenance and reduce O&M cost related to fleet maintenance. After discontinuing efforts to contract with a national fleet management company, PRASA is now pursuing this initiative which consists in the recruitment of two experts in fleets from Mech Tech to help PRASA in the assurance of the quality of both corrective and preventive maintenance of the fleet. O&M cost is expected to be reduced by challenging quotes/ invoices from private auto mechanics shops, and verifying quality of works. These experts will provide their opinion when buying vehicles for PRASA.
	Regulator Valve Preventive Maintenance Program	This program will reduce potable water pipelines ruptures. Regulator valves are inspected and given preventive/corrective maintenance every six months (one brigade per operational area).
	Water Loss Prevention Initiative	This initiative consisted in the replacement of the pressure control switch ("Coquitro") for an electronic model. Also, control panel replacement took place in all pump stations. The new panels have remote capabilities (web access to ROC). Also, Pumps are set to shutdown with pressure in automatic mode, which reduces pressure buildup in pipeline and therefore ruptures. (monitoring pressures and voltages from ROC).
	Sanitary Overflow Prevention Initiative	PRASA has organized CSWO identification brigades to reduce interconnections of the storm sewer to the sanitary sewer (SS) system, decreasing significantly influent flows to PRASA's WWTPs. Smoke and tint tests are used. PRASA coordinates with the different municipalities for the elimination of the interconnection of the StS to the SS identified. In the case of residences, a letter is sent to owners who have the roof drains connected to the SS.
	Water Storage Tank Overflow Prevention Initiative	Identification of WST that frequently overflow via the ROC and analysis of which facilities relevant to the overflowing WST can be closed or shutdown at certain periods of time, including wells, pump stations and WTPs.
	Energy Consumption Reduction Initiative	This initiative consists of: 1) the measurement of WST and WPS to compare capacity, it is performed every 3 months. This can allow for energy consumption reduction at WPS by reducing horsepower, if possible (combined effort of operations, maintenance & infrastructure departments); 2) putting wells on standby by expanding certain service areas; 3) elimination of WPS and WWPS, by using existing water transfer (gravity) infrastructure; and 4) the reduction of operation shifts at WTPs.
	Service Orders Registry Initiative	Consists of the performance review by tabulating and monitoring service order duration from opening to closing. Using MDTs.
	Non-Revenue Water Reduction Initiative	This initiative consists of the installation of potable water meters at WWTPs, installation of flow metering system to measure facilities drain flow, water level oscillation at tanks, optimization of water production at

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Region	Initiatives/Projects	Description
		WTPs by seasonal trends, and visualization of PRASA facilities (target is 100% of WST and 70-75% of WPS by August 2017).
	Asphalt Cost Reduction	Consist of the coordination with Municipalities to establish Memorandums of Agreement (MOAs) so that Municipalities address asphaltting needs after a repair. There is already a MOA with San Sebastian and there are plans to establish a MOA with Aguada for next fiscal year.
	Standby Personnel Guidebook	Guidebook for standby personnel to avoid issues regarding lack of knowledge of the processes and systems. Each operational area has one.
	Flushing Trucks Availability Initiative	Development of Rotational Itinerary between operational areas, to ensure availability of flushing trucks during holidays.
	Projects	<ul style="list-style-type: none"> Rincón Service Area Flexibility and Redundancy Project - allows shutting down wells within the Rincon Service Area, which have problems of saline intrusion. Lajas Service area expansion - allows to place the Duey well system and Quiñones well in "standby". Improvements at the Guajataca WTP Guajataca WTP Service Area Expansion - eliminates two WPSs that serve the Calabazas sector. Reduces energy consumption. Elimination of Sagrado Corazón WPS and Tank with 8-inch diameter pipeline. Reduces energy consumption (Añasco).
Metro	Water Compliance Actions to meet DBPs	This initiative consists in the reduction of chlorine application at discharge, elimination/reduction of pre-Cl, increase polymer application (TOC) at exit, tank clean-up program (yearly), use divers for tanks that cannot be taken out of service. Also, as part of this measure the System's drain Program was established as well as sampling points.
	Overtime Itinerary and Control Initiatives	This initiative consists of the monitoring of personnel in crews and the monitoring efficiency of employees. Reducing leaks/overflows also reduces need for overtime.
	SOMP – Sewer Operation Maintenance Program	The implementation of the program has assisted in limiting overflows. PRASA indicates that Metro Region has approximately 3,260 km of sanitary pipping.
	Energy Consumption Reduction Initiative	This initiative includes: performing pumps adjustments, reducing time in operation, using smart system in several systems, which reduces consumption. This region requested a revision of Energy Reduction KPI.
	Service Orders Registry Initiative	Consists of the performance review by tabulating and monitoring service order duration from opening to closing. Using MDTs.
	Operational Optimization	This initiative includes pressure reduction, delimitation of supply areas, providing redundancy and flexibility to systems, installation of regulator valves and delimitation of system boundaries.

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Region	Initiatives/Projects	Description
	Non-Revenue Water Reduction Initiative	This measure consists on the installation of potable water meters at WWTPs, installation of flow metering system to measure facilities drain flow, water level oscillation at tanks, among others.
	Drought Prevention	This initiative consists of maintaining high levels at reservoirs and activating measures effectively and promptly. Also, seven "stand-by" wells remain from original nine activated during 2015 drought; they are verified and drained constantly. The Miguel Such well was eliminated and the other well is non-potable.
	Non-potable water revenue	Currently selling potable water as non-potable - Sergio Cuevas. Also, the Municipality of San Juan uses one well, for which they provide maintenance and pay for its power consumption.
	Identification of stolen water and following up on inactive accounts.	This initiative includes: optimizing meter reading routes, identifying accounts that are not in record, and identifying units that have the incorrect system. A new KPI is being considered: % meter readings (Goal: 94%).
	Projects	<ul style="list-style-type: none"> • Operations performed works at Enrique Ortega WTP • Continue pipeline renewal and replacement ("REN"), as budget allows • Transition from chlorine gas to liquid chlorine in WTPs • Puerto Nuevo Incinerator emission testing to comply with regulations. • Puerto Nuevo WWTP sludge drying bed rehabilitation • Puerto Nuevo WWTP Septage receiving station improvements
East	Water Compliance Actions to meet DBPs	This initiative consists in the reduction of chlorine application at discharge, elimination/reduction of pre-Cl, increase polymer application (TOC) at exit, tank clean-up program (yearly). Also, as part of this measure the System's drain Program was established as well as sampling points.
	Fleet O&M Cost Reduction Initiative	This initiative consists in double checking on 10/100 forms, which includes quotes, by the Regional director. However, this initiative slightly delays the process, but has resulted in O&M costs reduction.
	Non-Revenue Water Recovery Initiative	This initiative includes: installation of water meters on WWTPs; maximization of service areas; reduction of water that enters the system (Production), reduction from 107 MGD to 83 MGD; thirteen (13) WTPs operating in (8-4-8-4) format; pressure control to prevent pipe breaks; pipe renovation; reparation of hidden ruptures, such as the Humacao rupture which represented a water loss of approximately 3MGD; and WSTs optimization.
	Energy Consumption Reduction Initiatives	Same concept as other regions. Key projects: necessary adjustments to maintain Candela PS in shutdown mode, this PS transfers water from the La Plata River to Cidra Lake; the reduction of the production of Caguas Norte WTP; the elimination of the Villa Nueva WPS; and the shut-down of WTPs when excess water is being produced.
	Pipe Ruptures Validation Initiative	Validates pipe ruptures reported by clients, to avoid errors of identification and unnecessary mobilization. The supervisor validates the reported pipe rupture before sending a brigade.

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Region	Initiatives/Projects	Description
	Service Orders Registry Initiative	PRASA is promoting that orders are closed on the affected site and not at the office at the end of the day. This is achieved throughout the use of MDTs. Currently, approximately 90% of work orders are being closed on-site.
	Preventive Maintenance to Regulator Valves and Valves	Regulator valves and automatic valves will be included in the IMP.
	Sanitary Overflow Prevention Initiative	Once interconnections are identified, coordination with the corresponding municipalities is performed for its elimination. Las Piedras I/I – (smoke & ink).
	Pressure Monitoring initiative	Identification of zones with high probability of leaks.
	Projects	<ul style="list-style-type: none"> • Jiménez WTP elimination, reduces production, O&M costs. • Production reduction of Ceiba Sur, KTP90, Guayabota, and Luquillo WTPs • Balancing of Rio Grande System (Yunque and Fajardo WTPs) <ul style="list-style-type: none"> ○ Providing photovoltaic cells on both sites, reduces energy costs • WSTs elimination at Vieques System.
	Water Compliance Actions to meet DBPs	This initiative includes the following measures: WSTs level oscillation, telemetry installation at Jayuya WTP, frequent WST wash program, periodic System drains, level control at WSTs, water quality testing, elimination of several WSTs, reduction of service areas, and elimination/reduction of pre-chlorine injection.
	Pipe Rupture and Water Loss Mitigation	Aggressive plan to replace pipelines. This is an ongoing plan and has decreased potable water loss but it's limited to the available budget.
	Sanitary Overflow Prevention Initiative	Identification of illegal interconnections, CSWOs, and collapsed pipe segments, piping replacement plan, sectorization, and detailed investigation for the occurrence of overflows.
North	Energy Consumption Reduction Initiative	<p>Same concept as other regions. Key initiatives include: the reduction in operation duration of Cotto Sur WPS; reduction in operation duration of Pugnado 1 and Pugnado 2 wells; reducing one shift on the Morovis Urbano and Almirante Sur WTPs is being considered; the programming to shutdown based on pressure of several WPSs at the Morovis Urbano System; the operation of four (3) WTPs as an 8-4-8-4 facility (Río Arriba, Esperanza, Sabana Grande).</p> <p>The following projects are considered for the future:</p> <ul style="list-style-type: none"> • Elimination of La Trocha WPS • Reduce shifts of several WTP without affecting population • Eliminate EB – winche -contorno • Elimination of Lomas I • Elimination of Sabana Hoyos 1 well • Elimination of 2 Millones wells

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Region	Initiatives/Projects	Description
	Service Orders Registry Initiative	Consists of the performance review by tabulating and monitoring service order duration from opening to closing. Using MDTs.
	Non-Revenue Water Recovery Initiative	<p>This initiative includes: the installation of meters at System's drains, optimization of system drainage time (reduce), sectorization, finish installing water meters at WWTPs, and the installation of water meters at WPS.</p> <ul style="list-style-type: none"> • Increase visualization of facilities / remote monitoring <ul style="list-style-type: none"> ○ Currently about 37% of facilities are visualized ○ The goal is to achieve 70% visualization of tanks ○ Manatí facilities are not visualized at all ○ WW facilities are not visualized
	Optimization of Operations Projects	<p>Reduction of water production from 120 MGD to 94 MGD.</p> <ul style="list-style-type: none"> • Elimination of Five WPS • Optimization of Quebrada WTP & improvements to raw water intake. • Reduction of Chemical Use
	Water Compliance Actions to meet DBPs	This initiative includes the elimination/reduction of the pre-chlorine injection; change of polymer – (TOC removal); measuring at WTP exit; quality vs draining time analysis of draining activities (some Systems need an increase of draining time from 20 minutes to one hour); the increase in polymer dosing for removal; and the decrease of water retention time at the 4th Extension El Monte tank.
	Pipeline Ruptures and SSOs Control	This initiative includes the validation of leak/overflow claims; installation of a 6-inch diameter potable water pipeline parallel to an existing pipeline at Salinas to provide more capacity and avoid ruptures due to high pressures; the isolation of Coqui System which is supplied by three wells: El Coqui, San Felipe, and la Plena; identification and repair of hidden ruptures near the Salinas weight station. This repair recovered 40-90 gpm of wasted potable water; pressure regulation project to limit pipe breaks.
South	Energy Consumption Reduction Initiatives	<p>Same concept as other regions. This initiative includes:</p> <ul style="list-style-type: none"> • Two persons will be used to measure energy consumption at PRASA's facilities • Reduction of pumps at the Rexmanor PS. This represents a monthly saving of \$27.5k and a reduction of 57% of the energy consumption at this PS. • Alternation of wells for potable water supplies instead of constant operation of all available wells. • Reduction of work shifts at the Guilarte WTP in Adjuntas and Yauco WTP. • WTPs and WPSs elimination <ul style="list-style-type: none"> ○ Matuyas WTP was eliminated (Jun-2017) • Installation of timers at PSs and wells. • Putting wells in standby mode; consumption reduction (33%) during

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Region	Initiatives/Projects	Description
		<ul style="list-style-type: none"> • Service Areas Expansion <ul style="list-style-type: none"> ○ (Toa Vaca) – now using 4 wells instead of 6 • Carite gravity pipeline: renovation of an existing gravity pipeline that was property of AEE to be used as the raw water pipeline from Carite 3.
	Service Orders Registry Initiative	Consists of the performance review by tabulating and monitoring service order duration from opening to closing. Using MDTs.
	Optimization of Operations	Optimizing use of operators by reorganization of personnel to be able to reduce vacancies from six operators that were missing to three operators. However, there are still vacancies.
	Non-Revenue Water Recovery	Measurement of System's drain flow and installation of water meters inside PRASA's facilities.
	Aeration of the Toa Vaca Lake	It has been confirmed that the aeration of the Toa Vaca Lake (operating since 2012) will decrease the use of chemicals in the treatment and sludge generation. This project saves PRASA \$1.4 M in fees to the Department of Natural and Environmental Resources. (Cerrillos Lake). Thanks to the availability of this Lake, during the drought season, Ponce did not have water rationing. Before the Toa Vaca Lake availability, 75% of the service area received water from wells, exploiting the Southern Aquifer. The Southern Aquifer condition has greatly improved after the use of the Toa Vaca Lake.
	Projects	<ul style="list-style-type: none"> • Guayama WTP – filters improvement among other improvements • Replacement of filter media, valves, etc. at Lizas WTP – (this WTP will supply area previously served by Matuyas WTP) • Permanent floating water intake at Patillas Dam

5.4 Strategic Plan

As reported in the previous CER, PRASA's then Executive Management Team developed and implemented a Strategic Plan in FY2013, which covered the five fiscal years from 2014 through 2018. The Strategic Plan contained clear objectives and well-defined programs and initiatives, and included a series of KPIs and metrics to be measured by each of PRASA's operational Regions.

PRASA's new Executive Management Team is currently in the process of revising and launching an updated Strategic Plan that is aligned with and supports the objectives included in the Fiscal Plan and in the Government of Puerto Rico's "Plan para Puerto Rico". KPIs and metrics are also under revision.

5.4.1 Key Performance Indicators

Tables 5-4 and 5-5 present a summary of PRASA's KPI goals and results. The results are stated for FY2015 as of June 2015 (Table 5-4), and for FY2016 as of June 2016 and for FY2017 as of June 2017 (Table 5-5). In FY2016, PRASA achieved a compliance score of 61% of its KPIs on an island-wide basis. In FY2017, PRASA's scored was reduced to 48%, mostly because of PRASA's current fiscal situation. Based on the FY2016 results, the following are some of the KPIs for which PRASA did not meet its defined goals: overtime, billings vs. collections, unplanned work effectiveness, reported leaks and

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overflows, and repair time for leaks and overflows, among others. Although some of the KPIs were improved in FY2017, such as billings vs. collections, reported leaks and repair time for leaks and overflow, the others remained below PRASA's goal. In addition, other KPIs for which PRASA did not meet its goals for FY2017 are: billing adjustments, complaints in customer service (per 1000 active accounts), customers with service interruptions, customer service attention time, average water production, and employee training. These are key areas that PRASA should continue to work on in FY2018. PRASA's new Executive Management Team is in the process of reviewing the KPIs to make modifications as necessary, add new performance indicators, and establish aggressive metrics in some of the KPIs.

Table 5-4. FY2015 PRASA Operations Key Performance Indicators

Key Performance Indicators	FY2015 Goals	Results as of June 2015
Employees per Connection	3.03 or less Employees/ 1,000 connections	2.85
Overtime	Reduce to 8%	11%
Budget Compliance (excludes electricity costs)	Below 100%	92%
Collections vs. Billings	Increase to 93.75% or Above	91.79%
Compliance - Water System	Increase to 98% or Above	99.4%
Compliance - Wastewater System	Increase to 97% or Above	97.2%
Billing Adjustments	Increase to 97.5% or Above	96.8%
Complaints in Customer Service (per 1000 active accounts)	Reduce to 16.68	19.9
Monthly Average of Customers with Service Interruptions (as a Percentage of Total Customers) ¹	Reduce to 6.5%	5.3%
Customer Attention Time (Commercial Office)	Maintain below 25 min.	26.39 min
Vehicle Availability	Increase to 90% or Above	87%
Average Processing Time of Purchase Orders	Less than 15 days	14 days
Preventive vs. Corrective Maintenance Ratio	Increase to 80%: 20%	78:22
Average Time for Equipment Repairs	Less than 20 days	30 days
Reported Overflows	Reduce to 2,512 monthly	2,378
Reported Leaks	Reduce to 4,509 monthly	5,225
Repair time for leaks	Reduce to 60.0 hrs.	62.03 hrs.

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Key Performance Indicators	FY2015 Goals	Results as of June 2015
Repair time for overflows	(New KPI for FY2016)	(New KPI for FY2016)
Average Water Production (MGD) ²	Reduce to 565 MGD	557 MGD
Energy Consumption (Annual)	Reduce to 710.28MKwH	684.42 MKwH
Project Progress (CIP)	Greater or equal to 0.9	1.0
Cost Performance (CIP)	Greater or equal to 0.9	1.0
Training (cumulative hours per employee)	More than 24 hrs. per year	26.88
Unplanned Work Effectiveness (Absenteeism)	Reduce to 1.5 days	2.82 days
Planned Work Effectiveness	Reduce to 10%	5%
Percent of NRW ³	Reduce to 56.9%	57.8%

¹ The Monthly Average of Customers with Service Interruptions (as a Percentage of Total Customers) does not include the months of May and June 2015 to exclude the service interruptions due to the 2015 drought event rationing plan. Also, this indicator was not evaluated for the first three months of FY2016 due to the rationing plan in effect during these months.

² The Average Water Production (MGD) KPI was not used by PRASA for the evaluation of the overall KPI score because of the 2015 drought event rationing plan and constant modification of the metric goal during the evaluated period.

³ The Percent of NRW KPI is only measured annually and island-wide.

Table 5-5. FY2016 & FY2017 PRASA Operations Key Performance Indicators

Strategic Plan Initiative	Key Performance Indicator	FY2016 Goals	Results as of June 2016	FY2017 Goals	Results as of June 2017
Fiscal Health	Employees per Connection	3.35 or less Employees per 1,000 connections	3.30	3.34 or less Employees per 1,000 connections	3.25
	Overtime	Reduce to 8% or Below	11%	Reduce to 7% or Below	9%
	Budget Compliance (Excludes Electricity Costs)	Below 100%	92%	Below 100%	86%
	Collection vs. Billings	Increase to 96% or Above	88.2%	Increase to 94% or Above	94.8%
Operational Efficiency	Compliance - Water System	Increase to 99% or Above	99.2%	Increase to 99% or Above	99.5%
	Compliance - Wastewater System	Increase to 97% or Above	98.3%	Increase to 97% or Above	97.9%

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Strategic Plan Initiative	Key Performance Indicator	FY2016 Goals	Results as of June 2016	FY2017 Goals	Results as of June 2017
	Billing Adjustments	Reduce to 2.5% or Below	2.2%	Reduce to 2% or Below	3.0%
	Complaints in Customer Service (per 1000 Actives Accounts)	Reduce to 16.7 or Below	16.1	Reduce to 16.7 or Below	17.5
	Monthly Average of Customers with Service Interruptions (as a Percentage of Total Customers)	Reduce to 5% or Below	3.1%	Reduce to 5% or Below	6.8%
	Customer Service Attention Time (Commercial Office)	Maintain below 30 min.	24.11 min	Maintain below 30 min.	33.13 min
	Vehicle Availability	Increase to 92% or Above	84%	Increase to 92% or Above	80%
	Average Processing Time of Purchase Orders ¹	Less than 25 days	40 days	Less than 40 days	42.58 days
	Preventive vs. Corrective Maintenance Ratio	Increase to 80%	78%	Increase to 80%	79%
	Average Time for Equipment Repairs	Less than 25 days	23 days	Less than 25 days	24.13 days
	Reported Leaks	Reduce to 3,296 monthly	3,682	Reduce to 4,598 monthly	3,935
	Reported Overflows	Reduce to 2,220 monthly	2,511	Reduce to 2,298 monthly	2,383
	Repair Time for Leaks ²	Reduce to 58.0 hrs	62.7 hrs	Reduce to 53.0 hrs	51.7 hrs
	Repair Time for Overflows	Reduce to 36.0 hrs	37.3 hrs	Reduce to 32.0 hrs	31.6 hrs
	Average Water Production (MGD) ³	Reduce to 558 MGD	508 MGD	Reduce to 505 MGD	509 MGD
	Percent of NRW ^{3, 4}	Reduce to 56.9%	54.6%	Reduce to 53.2%	-
	Energy Consumption (Annual)	Reduce to 660.34 MkWh	624.41 MkWh	Reduce to 660.34 MkWh	630.91 MkWh

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Strategic Plan Initiative	Key Performance Indicator	FY2016 Goals	Results as of June 2016	FY2017 Goals	Results as of June 2017
Infrastructure and Sustainability	Project Progress (CIP) ⁵	Greater or equal to 0.9	-	Greater or equal to 0.9	-
	Cost Performance (CIP) ⁵	Greater or equal to 0.9	-	Greater or equal to 0.9	-
Organizational Transformation	Training (Cumulative Hours per Employee)	More than 25 hrs per year	25.9 hrs	More than 26 hrs per year	23 hrs
	Unplanned Work Effectiveness (Absenteeism)	Reduce to 2 days	2.2 days	Reduce to 2 days	2.5 days
	Planned Work Effectiveness	Reduce to 10%	4%	Reduce to 10%	5%

¹ The Average Processing Time of Purchase Orders goal was modified for FY2017 to include the process time needed for the Lotus Notes process that was recently incorporated. Also, now calendar days are considered instead of business days. The new KPI goal considers 15 days required for the Lotus process and 25 days for the SAP process.

² In FY2016 Reported Leaks KPI metrics was modified to include only the in-line reported leaks (O12).

³ The Average Water Production and Percent of NRW KPIs reported for FY2016 are different from the ones presented in this table. The values used here are the official ones reported in the FY2016 Water Audit which were available after the KPIs report was published.

⁴ The Percent of NRW KPI is only measured annually and island-wide. PRASA's NRW Recovery Office is currently working in the FY2017 Water Audit and as of the date of this CER the information was not available.

⁵ Due to the suspension of the CIP, the Project and Cost Performance KPIs for FY2016 and FY2017 are not being measured.

5.5 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.

5.5.1 Integrated Maintenance Program (IMP)

The 2006 and 2010 Consent Decrees 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, including WWPSs. 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. PRASA continues to finance part of the program through its CIP (costs associated with the necessary R&R prior to the integration of the facilities into the preventive maintenance program) and the rest (the actual maintenance costs) through its O&M budget.

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The 2015 USEPA Consent Decree included the requirement for PRASA to continue with the approved IMP. Minimum requirements for the IMP include 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 addition to the minimum requirements established in previous Consent Decrees, the 2015 Consent Decree has a new requirement for PRASA to develop and submit to USEPA no later than March 1, 2017 a Corrosion Control Program to add to the implementation of the IMP. An extension to this deadline was agreed upon between PRASA and USEPA, hence, PRASA submitted the draft Corrosion Control Program for review on June 1st, 2017.

The following IMP initiatives and activities are currently taking place and being monitored by the IMP staff:

- Calibration of over 9,000 instruments and equipment.
- Standardization of control panels: This initiative started on January 2017 and comprises the replacement of 800 control panels and appurtenances at water pump stations during a 5-year period. The pilot study to select the preferred control panel manufacturer/model has been completed.
- The Plant Automation Program was completed up to the level the fiscal situation allowed. PRASA could not reach targeted goals due to the PRDOH requiring staff to be present at the facilities despite having automation capabilities and lack of funding. More information in Section 5.6.

As for PRASA's fleet of vehicles, the last purchased took place in 2012-2013. The vehicles are currently equipped with a GIS-enable tracking system known in Spanish as "Sistema Integrado de Transporte" (SIT). The SIT will also assist with the future implementation of the fleet maintenance tracking system using the SAP Portal as platform to: 1) receive automatic notifications when a vehicle is due for maintenance and 2) keep a maintenance history log for each vehicle. The fleet maintenance tracking system was completed on September 2017.

PRASA continues to evaluate the need for new metrics and more aggressive goals to the existing metrics. Key achievements include:

- Integration to the IMP of 100% of water and wastewater facilities (including plants, pump stations, wells, dams, intakes, and tanks).
- Integration to the IMP of 100% of control valves in the distribution system.
- Up to 93% of generators were operable (this metric has decreased since FY2015).
- The average pumps redundancy is maintained between 92 and 96% for all water and wastewater pumps and treatment plants.
- Continue paperless certification (digital copies) of equipment calibrations.

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- Maintained average time to repair equipment between 22 and 24 days; current KPI is to maintain average time to repair equipment at or below 25 days.
- Fleet availability is one of the most difficult ongoing challenges. PRASA's goal is to achieve a 92% fleet availability. At the end of FY2017 PRASA had an average of 80%.

PRASA had implemented a short-term and a long-term plan for the IMP. On-going IMP initiatives executed during FY2016 and FY2017 include the following:

- Plants maintenance optimization:
 - The maintenance optimization plan has been completed (including the root cause analyses for equipment failure).
 - Integration of maintenance optimization plan to SAP PM (50% complete).
 - Implementation of optimization plan (50% complete).
- Predictive techniques implementation with the interim service crews. Currently, there is only one internal crew, all others are contracted.
- Live tracking IMP metrics is on-going.
- The installation of new telemetry systems for selected water infrastructure to view the system in SCADA was 30% complete by the end of FY2016. This effort will continue through FY2018.
- The standardization of the IMP process has been completed and will be updated as needed.

The long-term plan that was established to be completed beyond FY2017, includes the following projects:

- SAP PM and SCADA Programs Integration – maintenance orders being automatically created in SAP PM by SCADA.
- Asset management implementation and nomenclature standardizations.
- Special equipment establishment in reliability maintenance managed by the IMP in PRASA's central administration building.
- Continuous improvement projects including equipment standardization and critical materials incoming/receiving inspections.

5.5.2 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 continues to be a high priority goal for PRASA; it will have both a revenue enhancing impact and an expense reduction (as water production needs are reduced) impact to PRASA's finances.

In 2011, PRASA embarked on the development of a strategic NRW management and reduction plan. For this, in late 2011, PRASA retained the services of a NRW consultant. The objective of this strategic NRW management and reduction plan was to provide PRASA with the necessary information to develop a comprehensive and cost-effective, long-term NRW management program. The report was completed in

May of 2012; it identifies a series of short, mid, and long-term activities that would provide PRASA opportunities to not only reduce its current NRW volume, but also to improve its revenues and reduce expenses. Some of the initiatives being implemented under this program are described below. As part of the NRW management and reduction plan, PRASA has established the Water Recovery Office and is now conducting periodic water audits, which are used to implement the necessary controls and develop action items to address NRW and meet the established goals. However, additional efforts and greater resources shall be dedicated to PRASA's NRW Reduction Program to maximize benefits.

5.5.2.1 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 opportunity for revenue sources and optimizing collections. These initiatives have resulted in significant additional revenue for PRASA over the past five fiscal years. Approximately \$100M per year of PRASA's revenues (or about 10% of total Operating Revenues) are generated from these initiatives.

Key initiatives of the Revenue Optimization Program include:

- **Small Meters** – This operational initiative consists of replacing meters of 1-inch or less in diameter that are more than 10 years old, as these meters lose precision and account for less water than is delivered. By replacing them, PRASA increases billed consumption and improves revenues. Every year there is a cumulative revenue effect from meters previously changed as well as a reduction in revenue loss due to the slow degradation of an aging meter's accuracy. This degradation is accounted for in the calculation of the operational initiatives revenues.

PRASA has replaced over 710,000 small meters from February 2009 to June 2017. Due to PRASA's current fiscal situation, however, the implementation of this initiative has slowed down since FY2016. The average additional monthly revenue per meter assumed for FY2018, based on the results of prior replacements, was \$8.00 per month for the first year, \$7.50 for the second year, \$7.00 for the third year, \$6.00 for the fourth and fifth years, \$5.50 for the sixth year, \$5.00 for the seventh year, and \$3.00 for the eighth year. From then a yearly reduction is assumed until the twelfth year when there is no additional monthly revenue to be gained.

- **Large Meters** – This operational initiative consists of replacing meters with a diameter greater than 1-inch. This initiative generates revenues from the additional billed consumption due to better accuracy of the meters and retroactive fines assessed to customers that present abnormally higher consumption than the average previous to the replacement of the meter.

PRASA replaced over 5,000 large meters from February 2009 to June 2017. The average additional monthly revenue per meter assumed, based on the results of prior replacements, was \$301 per month for the first year, \$275 for the second year, \$250 for the third year, \$225 for the fourth year, and \$281 for the years thereafter. Finally, the average monthly consumption per meter assumed, based on the results of prior replacements during the last eight fiscal years, was an additional 4.76 cubic meters per month, as indicated by PRASA's consultant.

- **Theft and Inactive Accounts** – The intervention of theft accounts initiative focuses on converting connected and non-paying customers into paying customers. This includes: (1) Tx accounts which

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are customer accounts currently included in PRASA's database categorized as inactive with recorded consumption (also referred to as water theft in inactive accounts); and, (2) active accounts with irregularities (i.e., direct connections and meter tampering). This initiative leverages a database desktop exercise to target the potential customers that are currently benefiting from PRASA's services but are not paying for them. Over the last nine fiscal years PRASA has normalized a total of 77,389 customers. It is expected that as accounts are handled and normalized, the number of inactive accounts with consumption will reduce over time.

- **Fire Protection and Sprinkler Initiative** – In FY2009 and FY2010, PRASA visited 3,429 targeted customers, of which 604 accounts were found to be out of compliance. Of these accounts, PRASA fined 389 customers \$10,000 per account, collecting revenues of \$3.7M. From FY2011 through FY2016, PRASA normalized about 590 customers, which represented additional revenues in the amount of \$9.9M. Since FY2017, this initiative has been placed on hold and is not expected to be reactivated.
- **Disconnections and Collections Efforts** – These initiatives focus on reducing uncollected accounts and ensuring customers pay on time. In a proactive approach, collection management consists of contacting residential, commercial, industrial and government customers with past due bills; disconnection consists of shutting-off service once a customer's bill is 60 days past due. Disconnections continue to be a major factor contributing to revenues collected under these initiatives. Over the last eight fiscal years PRASA has performed over 1,445,000 disconnections and collected about \$96.2M in additional revenues from this initiative.

This initiative of the Revenue Optimization Program was modified in FY2017. Now, the initiative will only focus in the collection management of specialized accounts, which include government accounts and commercial accounts. That is, this initiative is focused on reducing uncollected government and commercial accounts and ensuring customers pay on time.

- **Class Correction** – This initiative includes revenues from rate classification/ categorization (class and meter size) corrections and from a specialized taskforce to improve collections. Over the last eight fiscal years PRASA has normalized a total of 2,975 customers, and has collected over \$18.3M from this initiative.
- **Condominiums** – This initiative consists of billing the master meter of the condominiums which were not being billed as a result of meter reading and billing problems. These meters were normalized and are being billed on a monthly basis without exceptions. Since FY2017, this initiative has been placed on hold.
- **Miscellaneous** – These initiatives include, among others:
 - Sewer accounts not billed for the service. PRASA normalized 18,089 sewer accounts as of FY2016.
 - Inactive Accounts Debt Transfer. This initiative searches for inactive accounts with pending balance that also has an active account with same social security number. Then the pending balance from the inactive account is transferred to the active account in order to initiate the collection process.

5.5.2.2 Development of a Customer Geodatabase

Since 2012, PRASA has been working in the development of its customer geodatabase. The project consists in the development of an island-wide customer geodatabase to identify and map (geospatially) PRASA's existing and potential customers including, but not limited to, developed and pre-developed parcels not included in PRASA's SAP customer database. This geodatabase shall then be linked with PRASA's SAP customer database. PRASA seeks to develop a tool for the proactive management of its customer database, that will help in the detection of theft and, ultimately, in the reduction of apparent (commercial) losses. As such, the project's objectives focus on:

- the reduction of NRW losses
- the identification of PRASA's customers (as identified and PRASA's SAP customer database) and non-registered users geospatially
- the improvement of water system planning (uses and needs) and water conservation

The first phase of the project, which involved the services of a private contractor, commenced in July of 2012 and was completed in November 2013. The contractor completed the following services:

- Integration of PRASA's current customer database with the existing databases of other Puerto Rico agencies to identify common customers and use as the starting point for the Geodatabase to be created as part of this project.
- Development of the Geodatabase using GIS software. Approximately 860,000 locations were geo-referenced by the contractor.
- Standardization of physical addresses in both the Geodatabase and PRASA's SAP customer database of about 30% of accounts.
- Linking the Geodatabase with PRASA's SAP customer database.

In FY2014, PRASA continued the development of the Geodatabase with internal resources and support from its GIS subcontractors. The second phase of the project, which included the location of customers through field investigations as well as a desktop analysis of various databases, was completed in July 2014. Approximately 89% of PRASA's customers (1.2M) were identified and georeferenced as a result of this effort.

The third phase of the project, which started in July 2014, included field visits to identify the remaining PRASA customers in the Metro Region and in the municipalities of Caguas and Gurabo that were not previously located (approximately 129,000 customers), as well as the identification of any customer receiving PRASA services without an active or with an inactive account. Field visits have been completed resulting in the following:

- Approximately 15,000 additional customers were geo-referenced.
- Standardization of the remaining physical addresses, including the creation of area, sectors, and urbanization maps. Approximately 1,000 urbanizations, condominiums, and sectors have been identified and delimited.

A total of 1.37M of PRASA's SAP customers have been identified and georeferenced. This represents approximately 97% of PRASA's customers. Although some locations still have not been geo-referenced, field investigations will no longer be performed under the current contractor. PRASA's GIS subcontractor conducted a pilot field study to evaluate the cost-effectiveness of geo-referencing the remaining locations by conducting field visits; results showed that the costs outweighed the benefits to be achieved given that the percent amount of locations geo-referenced was significantly lower than the sites visited (approximately 16% were georeferenced). In other words, most of the meter visits resulted in not being able to be paired up with a PRASA account. As such, going forward PRASA will geo-reference accounts not yet found, leveraging opportunities under its capital and R&R projects (i.e., piping replacement projects and new system construction), and now under the proposed P3 Project.

Because the Geodatabase is a tool to be used by PRASA in the identification of its existing and potential customers, at this moment PRASA is not estimating incremental revenues from this initiative. However, with this tool, PRASA will be able to implement additional initiatives and address customer database and connection anomalies that do represent significant revenue opportunities for PRASA, specifically regarding commercial losses.

5.5.2.3 Accounts and Structures Validation Initiative

In its efforts to identify illegal connections to PRASA's System, PRASA's Water Recovery Office established the Accounts and Structures Validation Initiative (INVEC, for 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.

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, PRASA was able to narrow down this number to 265,505 by eliminating structures that are 600 square-foot or more 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 currently in the process of being georeferenced. Currently, PRASA is continuing the search for schools and hospitals to keep reducing this number prior to going to the field for verification. This initiative is expected to be transferred to the private firm or firms contracted under the P3 Project.

5.5.2.4 Development and Installation of an AMR/AMI System for Large Meter Customers in the Metro Region

The purpose of the development and installation of this initiative is primarily to:

- Increase efficiency and precision in the process of meter reading and billing consumption
- Reduce NRW

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- Improve the service provided to large customers within the Metro Region

For purposes of this project, large meter customers are defined as those customers with water meters 1-1/2 inches or larger.

As previously reported, this project was originally envisioned to consist of the installation and operation of an Automatic Meter Reading and/or Advanced Metering Infrastructure (AMR/AMI) system for approximately 3,305 large meter customers in the Metro Region. However, the scope of work was later expanded by PRASA. Through this project, PRASA has partnered with a contractor (Johnson Controls, Inc.) to enter into a contract agreement for the implementation of revenue enhancement measures, which includes water meter accuracy improvements and the installation of a hybrid AMR/AMI system for large meter customers in the Metro Region. Additionally, PRASA believes that there is an opportunity to identify and impact additional customers in the Metro Region that are currently inadequately identified in PRASA's Customer Database or that have inadequately sized meters installed, particularly, non-residential customers with smaller diameter meters. Therefore, the scope also includes water meter improvements to selected 1-inch and smaller meter customers in the Metro Region. Infrastructure improvements, such as improvements to meter boxes and meter box lids, retrofit of existing meters, installation of new meters, and replacements or modifications to the meter size or type, and the integration of the customers' accounts with PRASA's SAP customer database system, as needed, also form part of the measures identified in the scope of work. The performance component was eliminated from the contract.

The project consisted of two phases: Phase 1 – Development Phase and Phase 2 – Implementation Phase. During Phase 1 the contractor conducted a thorough audit of all large meter customers in the Metro Region, as well as identified opportunities for non-residential customers with small diameter meters. The audit (Phase 1) was completed in August of 2014. Audit results presented by Johnson Controls, Inc. show that once the project is completed (i.e., all measures identified in the audit are implemented), the projected additional annual revenues are in the order of \$2.2M; although PRASA may receive additional economic benefits as a result of: 1) a decrease in operation and maintenance costs, and 2) future capital cost avoidance. Investment costs were also revised and refined in the audit: total investment costs were revised at about \$16.3M. The main difference in the project costs (compared to the original estimate prior to completion of the audit) is due to the actual findings of meter infrastructure conditions and the additional infrastructure improvements that are required to be able to install the AMR/AMI system (i.e., meter box improvements and lids replacements). PRASA included a limited measurement and verification (M&V) component to enable tracking of project progress but not as to validate warranties. Additional measurement and verification and on-going maintenance costs were revised at about \$0.84M per year.

In FY2015, it was determined that based on the audit results, and considering the additional non-measurable benefits that the project will provide PRASA, PRASA's Executive Management Team (as approved by PRASA's Governing Board) was going to proceed with Phase 2 of the project, the Implementation Phase. The implementation time (installation period) for this initiative was estimated at 18-24 months. In FY2016, PRASA already had a draft contract agreement with the contractor, but the signing of the contract and the notice to proceed was put on hold due to PRASA's fiscal situation. This initiative is expected to be eliminated and transferred to the private firm contracted under the P3 Project, as included in the Fiscal Plan.

5.5.2.5 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.

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 inspections goal was completed by June 2015 and a total of 3,800 leaks were detected.

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 PRASA's fiscal situation this initiative was placed on hold. Currently, PRASA's new management is evaluating the next steps and goals for the water leak detection program. As previously mentioned, this initiative is included in PRASA's Fiscal Plan.

PRASA's Regions are prioritizing leak repairs in accordance to their severity, giving a higher priority of repair to major leaks which represent a higher reduction in NRW.

5.5.3 Comprehensive Energy Management Program

PRASA's energy cost is the second largest cost behind Payroll and Benefits; in FY2016 it accounted for approximately 22% of its total Operating Expenses. 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). During the past five fiscal years, PRASA's energy use has reduced from 745 million kWh during FY2013 to 644 million kWh during FY2017 (consumption data based on bills as of June 2017).

Up until FY2014, PRASA's electric power costs had historically increased mainly because of price increases, and not from consumption increases. However, as a result of the preferential electric energy tariff approved by PREPA that went into effect in FY2014, PRASA's electric power costs decreased from FY2014 to FY2016, lowering the recent 10-yr CAGR from 8% to 6%. The preferential electricity energy tariff approved for PRASA under Act 50 of June 2013 (Act 50-2013), provided a special all-in-rate of \$0.22 per kWh for the first 750 million kWh of consumption (any excess to be paid at PREPA's average cost per kWh for the most recent audited fiscal year). Nonetheless, this rate was effective from FY2014 through FY2016 and as of July 1, 2016, PREPA's preferential electric energy tariff was revoked.

A key benefit of the all-in-rate was that, in addition to stabilizing PRASA's electric energy costs, it also helped PRASA to better forecast its Operational Expenses (in recent years, electric energy costs were very volatile and difficult to forecast and budget for). Refer to Section 8 for further discussion regarding PRASA's forecasted assumptions and projected savings.

PRASA continues its Comprehensive Energy Management Program to manage and reduce its energy consumption and costs. As previously reported, PRASA undertook two separate procurement processes to engage the private sector in investing in energy related projects. These are: 1) Demand Side Projects through Energy Performance Contracts (EPCs); and 2) Supply Side Projects through Power Purchase Agreements (PPAs). 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.

5.5.3.1 Demand Side Projects through Energy Performance Contracts

During FY2016 and FY2017, PRASA continued with the implementation of six EPCs, although due to PRASA's fiscal situation, some EPCs were placed on hold until further notice. The objective of this initiative, which began during FY2009, is 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 operations benefit from improvements guaranteed by the ESCOs and as such, if the energy savings are not achieved, the ESCO will pay PRASA for the non-achieved savings. The positive financial impact of this initiative for PRASA is limited by the fact that savings are guaranteed by the ESCOs until the investment is recovered and earned their agreed payments.

PRASA continues with the EPCs with Honeywell International as the ESCO for water and wastewater treatment facilities. However, in response to the financial situation PRASA is facing and its effects on due payments, PRASA has decided to put on hold three of the six EPCs that have not started the construction/implementation phases. Table 5-6 provides a status summary of this initiative as of June 2017. With the completion of the implementation phase of the first three EPCs, PRASA has saved approximately \$400K and 2.4 million kWh per year. In terms of capital costs, unlike the demand side PPAs, the capital investment is financed by PRASA with bond proceeds and approximately \$50M of PRASA's February 2012 bond issue was designated to finance facility improvements related to the EPCs initiative; thus, the debt service cost associated with this project is included in the financial projections discussed in Section 8.

Table 5-6. PRASA EPCs

Facilities	Status
Caguas WWTP	Construction/Implementation completed. PRASA expects to contract Honeywell for a period of 1 year for the measurement and verification phase and operation and maintenance.
Barceloneta WWTP & Bayamón WWTP	Construction/Implementation completed. PRASA expects to contract Honeywell for a period of 1 year for the measurement and verification phase and operation and maintenance.
Sergio Cuevas WTP (Carraízo RWPS)	Construction/Implementation on hold.
Superaqueduct RWPS	Design completed. Construction/Implementation on hold.
Puerto Nuevo WWTP	Design on hold.

5.5.3.2 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. During the second half of FY2014, PRASA issued a second RFP for additional PPAs. From this process, PRASA elected to pursue two additional PPA projects, however, the contracts had to be cancelled. Table 5-7 below provides a status summary of the PPAs as of June 2017. In addition, during FY2017, PRASA identified 14 sites for additional solar projects from which a total capacity of approximately 16 MW is expected. As of FY2017, PRASA projects to have saved approximately \$1.5M and 11 million kWh from the solar PPAs currently in operation. Additional savings are expected once the other signed PPAs and those under negotiation are in operation.

Table 5-7. PRASA PPAs

Proponent	Technology	Status
Windmar Renewable Energy (PV Properties)	Solar	Contract signed 7 MW 10 facilities (projects) have been completed and are currently in operation
Element Power Solar	Solar	3 MW; contract cancelled
SunEdison	Solar	5 MW; contract cancelled
Renewable Power Development	Gasification	Contract signed and to be extended to December 2017 Undergoing planning and permitting process for one 10MW facility (5MW committed to PRASA)
Organics Management	Gasification	Contract signed, but cancelled Contractor was facing challenges in obtaining permits, financing and waste supply contracts

5.5.3.3 Regional Operational Initiatives

PRASA's Executive Management Team has set a goal to achieve additional energy consumption reductions, as per final budget, of at least 5% kWh per year island wide, varying within regions. During FY2014, PRASA's Operational Regions started to evaluate opportunities to implement 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. However, considering the concerted effort of the Operational Regions in reduction of energy consumption for the past fiscal years, they have expressed concern on maintaining the same energy reduction target (KPI) and meeting that target without

impacting customers. Also, some of the measures to be implemented require capital investments that PRASA cannot currently fund.

5.5.3.4 Other Projects

In addition to the demand and supply side projects, PRASA evaluated the rehabilitation of the Lago Loíza (Carraízo) hydroelectric facility. The facility has been out of service since Hurricane Hugo impacted the island in 1989. PRASA will replace one of the three hydropower units, which has an estimated capacity of 1.1 MW. Energy generated from the rehabilitated facility will be used to supply power to PRASA's facility on-site. The design for this project and the bid process were completed in the first half of FY2015, but bids received were much higher than estimated. Therefore, considering the high bids and the ongoing fiscal situation, the project has been postponed until further notice and has not been included as part of PRASA's Fiscal Plan initiatives.

However, PRASA's Fiscal Plan does include the Hydroelectric Power Generation initiative, which considers for the operation of PREPA's hydroelectric generating plants. Between 2009 and 2013, the hydroelectric facilities generated an average of 129 million kilo-watt hours per year (kWh/yr), which amounts to approximately 20% of the PRASA's total consumption. With this initiative, PRASA expects to assume the operation of the hydroelectric generation units (including reservoirs and irrigation systems) and all their related equipment. Among the benefits that this initiative offers are: lower energy costs for PRASA, better control and management of water resources, cost savings, leverages existing infrastructure and reduces the amount of future water/sewer rate increases. Currently, the P3 Authority, PREPA and PRASA are evaluating the feasibility of entering into a P3 agreement with a private entity to rehabilitate and operate the hydroelectric facilities.

5.6 Treatment Plant Automation Program

PRASA embarked on a Treatment Plant Automation Program, which consists in the installation of the necessary equipment and the development of the system protocols to automatically operate and remotely monitor its WTPs. The project scope included the procurement and installation of automation control equipment (capital investment is estimated at approximately \$400,000 per facility). As previously reported, the automation program underwent significant changes during the second term of FY2013. The program continued to be managed by PRASA's Infrastructure Department during FY2015. The Automation Program delivery strategy was revised as follows:

- Cluster operational model in place – PRASA to implement the organizational change component internally.
- Implement full automation of WTPs processes in the North Region clusters (No. 5, 6, 8, 9, and 10) and in the Metro Region (Cluster No. 22).
- Automatic Shutdown (ASD) at all plants in the West, South, and East Regions.

PRASA expected to complete the full automation of WTPs in Cluster No. #5 (a total of six plants), and Cluster No. 8 (a total of eight plants), and Cluster #9 by FY2017. Delays during construction and modification to some plants have extended the construction period to complete full automation of these clusters. Moreover, the current fiscal situation has adversely impacted the development and execution of

the program. The regions will be partially automated following the 8-4-8-4 Automation plan¹⁵. At the end of the program PRASA completed full automation for three (3) WTPs, all in the North Region, Río Arriba WTP, Esperanza WTP, Sabana Grande WTP. Also, partial automation was achieved for several treatment plants, which have ASD capabilities and may be operated as 8-4-8-4. PRASA added three large Metro Region plants (Sergio Cuevas, Enrique Ortega, and Guaynabo). Though PRASA is not intending to remote operate these three plants, but to provide for remote monitoring.

Facilities modifications to accommodate the automation-capable Remote Operation Centers (ROCs) will be completed by FY2017. Repair and replacement of certain plant equipment extended the previously reported completion date of FY2016. The East Region ROC was completed in FY2012, the North Region ROC in FY2013, the West Region ROCs was completed in FY2014 and the Metro Region ROC was completed by FY2017. The South is using the West ROC.

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 ASD (needed for 8-4-8-4 operations) or full automation capabilities, the WTPs must follow the endorsement procedure prior to implementation of reduced shifts or staff. This causes a gap in the number of plants delivered and the number of plants endorsed. A total of eight endorsements were received: Rio Arriba WTP, Esperanza WTP, Sabana Grande WTP, Barrancas WTP, Barranquitas WTP, La Plata WTP, Maizales WTP and Caguas Norte WTP. Also, ASD capabilities have been completed on another nine WTPs but PRASA has decided not to pursue the endorsement at this time. These other facilities that can operate 8-4-8-4 are: Arecibo Urbano WTP, Caguas Sur WTP, Espino WTP, Jaguar WTP, Las Bocas WTP, Aibonito Urbana WTP, Cidra WTP, El Duque WTP and Guayabota WTP. After a maturity period and full automation is tested, PRASA can request endorsement for remote operation. However, PRDOH is hesitant to keep awarding endorsements because they want physical presence at the facilities during operation.

PRASA reports that during FY2016 and FY2017 no additional efforts were made under this initiative and they do not plan to further pursue additional plant automations in the near future.

5.7 Creation of PRASA Holdings, LLC

As part of PRASA's plan to collect additional revenues to supplement its revenues and diversify its revenue sources, pursuant to Act No. 228, enacted on November 1, 2011, PRASA has created a new corporate entity, as a holding company for future investments. PRASA Holdings, LLC was registered in the State of Delaware; it is authorized to do business in Puerto Rico. One of the first opportunities pursued is the exportation of consulting services focused on infrastructure management and revenue optimization for utilities in Latin America (i.e. Honduras and Colombia).

Another opportunity that was being pursued consists in the development and operation of open access fiber optic infrastructure mainly through PRASA's water and wastewater system pipes in the San Juan Metropolitan area neighborhoods of Old San Juan, Condado and Isla Verde. However, due to the ongoing fiscal situation, efforts on this pursuit were suspended and no additional efforts or business opportunities are currently being pursued by PRASA under this subsidiary.

¹⁵ 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 minimizing overtime significantly.

5.8 Conclusions

Despite certain O&M related observations made during facility inspections in 2017, PRASA's O&M practices are adequate. The planned O&M investments and key PRASA initiatives have been impacted by the ongoing fiscal situation and have either fallen behind their intended implementation schedule or have been postponed indefinitely or cancelled by PRASA. However, initiatives such as the reduction of NRW will likely be included in the P3 Project and it is expected that benefits will surpass those already achieved by PRASA under the Revenue Optimization Program. Once funding has been identified, PRASA shall prioritize efforts to reactivate other initiatives, such as the Comprehensive Energy Management Program, as soon as possible and continue searching for new opportunities that can provide increased revenues and cost savings.

6 CAPITAL IMPROVEMENT PROGRAM AND REGULATORY COMPLIANCE STATUS

6.1 Introduction

PRASA runs and manages a CIP to improve and maintain its water and wastewater infrastructure. The CIP's main objectives are to maintain, modernize and simplify the Systems to achieve operational efficiency, protect public health and safeguard environmental quality, while enabling continued economic development and meeting all regulatory requirements. The CIP is a dynamic program that evolves and undergoes revisions as needs and sources of funds are identified, and as projects transition from planning through design, construction and startup phases. The program has been funded with external financing from bond issuances and federal assistance in accordance with standard utility financing practices. Bond financing of long-term capital improvements is consistent with PRASA's mission and results in lower, more affordable water rates than would be possible if these expenses were to be paid on a current basis (operating revenues). Since FY2007, PRASA has invested approximately \$3.7 billion in its CIP, with the intention of bringing the System into compliance and catch-up with capital needs that had been lacking in prior years. PRASA's Strategic Plan and public policies endorsed by its Governing Board included a tapered transition of financing the CIP with bonds, to self-financing a significant portion with revenues.

Given the magnitude of the CIP, it is understandable that it will continue to evolve over time and the number and budgets of projects is expected to be updated regularly. As required by PRASA's Governing Board, PRASA's Infrastructure Department must annually submit for its approval an updated five-year CIP plan. However, PRASA included in its 2017 Certified Fiscal Plan a modified ten-year CIP which includes all adjustments resulting from negotiations with Regulatory Agencies and the necessary investment to reflect PRASA's infrastructure current needs to ensure adequate operation and sustainability of the System. It covers the planning period from FY2017 through FY2026. Therefore, CIP discussions presented in this FY2016 and FY2017 CER refer to the ten-year CIP as included in 2017 Certified PRASA's Fiscal Plan. The approval and execution of this ten-year CIP is contingent upon funding availability and allocation¹⁶.

This section of the report provides:

- an overview of PRASA's CIP status and program, including summary of the program by project category;
- an assessment of the adequacy of the CIP to address identified system deficiencies and current requirements stipulated in open consent decrees with Regulatory Agencies; and
- an overview of the potential effects of future regulations on PRASA's System and CIP.

¹⁶ A revised five-year CIP was presented to and approved by PRASA's Governing Board in December 2017. This revised CIP will be presented in the FY2018 CER.

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, thereby limiting its ability to access the capital markets to obtain financing to cover its immediate CIP related expenses. Since 2014 and considering the difficulties faced in securing outside financing, PRASA diligently started to reduce the expenditures of its CIP. As previously mentioned, PRASA used operating funds to cover expenses related to its CIP projects for some time. However, in FY2016, after expending all its surplus operating income and reserves to repay bond anticipation notes and cover a portion of its unfunded CIP, PRASA was forced to essentially postpone or terminate the execution of all CIP projects. Specifically, PRASA suspended the execution of \$352M in 55 projects that were under construction, in addition to ceasing its CIP development, which was expected to start 86 projects with an investment of an additional \$247M.

As of today, execution of all regulatory-driven capital projects is on hold indefinitely. Important renewal work such as replacing inefficient meters and failed/leaking pipelines are also being deferred. 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 critical situation. Given the delays in the issuance of new revenue bonds and the resulting suspension of the CIP projects, PRASA accumulated an outstanding debt of more than \$150 million owed to its CIP contractors and suppliers. As of June 2017, outstanding debt with contractors had been reduced to approximately \$60 million.

The suspension of CIP projects may have both a short and possible long-term effect on PRASA and Puerto Rico's economy. In the short-term, PRASA is in danger of non-compliance with regulatory mandates or administrative orders, increasing construction costs, and incurring liabilities associated with its non-payment to vendors. In the long-term, the cost of capital projects may also increase as vendors may price-in the risks associated with delays in payment or non-payments to contracted projects. The suspension of all CIP projects, as well as the continuation of the delays in payment to PRASA's CIP contractors will continue to cause substantial negative impacts to the local economy.

6.2 CIP Development and Management

Prior to 2004, many of the projects required to improve the System were not being delivered due to insufficient funding and internal execution resources. Recognizing the need to successfully implement an extremely aggressive and robust infrastructure program, PRASA obtained the services of five major firms or program management consultants (the PMCs) to plan, design, and manage the CIP projects in each of the five Regions.

The PMCs were organized into three main teams to handle a project's lifecycle in stages: pre-construction, construction, and post-construction. As part of the pre-construction activities, the PMCs managed key tasks that drive CIP project budgets, such as defining project scopes, negotiating consultant contracts for studies and design services, reviewing project constructability, preparing project construction cost estimates, preparing bid packages, and managing bid processes (in close coordination with PRASA's Bids Board). As part of the construction management services, the PMCs served as PRASA's representative in the CIP projects, managing project schedules, negotiating project change orders and administration of construction contracts, among other activities. Finally, as part of the post-

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construction services, the PMCs provided support for project start-up, training, and all project close-out activities.

On July 1, 2009, PRASA reduced the number of PMCs from five to two to reduce associated program overhead costs (estimated savings of about \$7M). However, PRASA's Infrastructure Department identified the need to re-engage a third PMC and re-distribute responsibilities, as performance metrics started to decline. Therefore, since February 1, 2013 there were three PMCs that provided support to PRASA in the project development process and actively participate in the planning, conceptualization, design and construction phases island-wide.

In December 2014, at the request of PRASA's Infrastructure a second modification took place reducing the three PMCs to two. The PMC responsibilities for the South Region were reassigned from CDM-Smith (current PMC) to Black and Veatch (existing PMC of the East Region); to become effective during the second half of FY2015, after a transition period. In FY2015, an additional and final PMC structure modification was approved by PRASA's Governing Board, to become effective on FY2016. The West Region was modified by assigning the main teams of a PMC to three different entities: construction management was assigned to CH Caribe (PMC of the Metro and North Regions), pre-construction services were assigned to ECR Engineering (subcontracted by the East and South Region's PMC), and the post-construction was assigned to RER Environmental Engineering (subcontracted by the previous West Region's PMC).

Because of the CIP suspension, lack of funding sources, and accrued debt, services from PMC's were terminated. Furthermore, the Infrastructure Department has informed that it is highly probable that the PMC structure will significantly vary upon reactivation of the ten-year CIP. However, PRASA has not yet determined the type of management structure it will implement to oversee its CIP implementation going forward.

6.3 CIP: Project Distribution and Costs

The CIP projects are divided into categories, groups and types. Additionally, PRASA has implemented a prioritization system to better manage the CIP, given its size and complexity.

Projects included in the CIP cover major capital improvements identified throughout all five Regions, as well as island-wide initiatives such as technological advancements, telemetry implementations, meter replacement, and R&R to the System. The CIP is developed by PRASA taking into consideration a) current and future infrastructure and operational needs identified from system planning studies, and b) regulatory commitments as stipulated in consent decrees, administrative orders, and other agreements with Regulatory Agencies. Once the need for a capital improvement project is identified, a project creation form is prepared. The form summarizes the project scope, preliminary schedule, and cost estimates, amongst other information. The project is then assigned a CIP project number and added to the CIP inventory, where it is categorized according to PRASA's classification and prioritization system. Periodically (at least once a year), the changes to the CIP are presented to PRASA's Governing Board for revision and approval.

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

- Planning, studies, and land acquisition costs

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- Design costs
- Construction costs
- Project management and inspection costs
- Contingencies
- Miscellaneous cost (includes financing costs, insurance, O&M documents and administrative costs)

Design costs typically use as a guideline 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) but due to the ongoing fiscal situation and markets, most design costs are estimated lower than the CIAPR guidelines at about 6-7% of construction costs. The construction management and inspection costs are estimated at about 5% of the net construction cost; general, administrative and insurance costs are estimated at approximately 15% of net construction cost; while contingencies are estimated to be about 10% of the net construction cost. PRASA is no longer including an annual inflation rate on construction costs over the project development period. PRASA eliminated the annual inflation rate of 3.8% previously used, considering the downturn in construction activity and lower project cost estimate results received during project bids.

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 the bid is awarded, the amount calculated for contingencies is no longer updated and it remains as part of the assigned funds of the project until it is completed and closed-out. During the construction phase of the projects, contingencies are used to cover change order costs and other costs that may occur, such as additional land acquisition, permitting, or design activities. Before the CIP suspension, PRASA reported that existing contract change order percent in construction projects was about 3%, which is much lower than typical industry values of about 15-20%. Also, as previously mentioned, PRASA tracks KPIs for project costs and schedules. Finally, when the ten-year CIP is activated the previously described cost percentages used to determine the various stages cost of project lifecycle might need to be reassessed.

6.3.1 Project Classification and Prioritization

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

- Mandatory Compliance (2015 USEPA Consent Decree projects, 2006 PRDOH Drinking Settlement Agreement projects, Civil Actions, Administrative Orders, and other mandatory projects)
- Non-Mandatory Compliance
- Non-Mandatory Renewal and Replacement
- Non-Mandatory Quality and Growth
- Non-Mandatory Other
- Non-Mandatory Structure

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Mandatory projects are those that are required by law, as stipulated in consent decrees, administrative orders, and agreements with Regulatory Agencies including those with the USEPA and PRDOH. Non-mandatory projects are those that, although not mandated by Regulatory Agencies, are necessary to maintain, upgrade, and grow the System. These include non-mandatory compliance projects, R&R, quality and growth projects, and structure projects. R&R projects are those required to improve the system's efficiency by replacing pipelines or equipment due to emergencies or unforeseen situations, expended useful life or extreme deterioration. Quality and Growth are projects directed to expanding the service areas for water or wastewater systems and improving the operational efficiency of the Systems. The structure category projects include technology improvements, meter replacement, fleet improvements and optimization and emergencies projects.

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

In addition to project classification, CIP projects are ranked according to a prioritization score. This score is 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 projects: Regulatory Compliance, Quality of Service and Reliability, Operational Efficiency and Improvements, and Population Impacted by Project. PRASA is in the process of finalizing its project prioritization system as part of the renegotiation process with USEPA and PRDOH. The implementation schedule of future projects, currently not included in PRASA's CIP, will be subject to the prioritization system and PRASA's financial capacity.

6.4 Ten-Year CIP (FY2017-FY2026)

PRASA's ten-year CIP for FY2017 through FY2026 amounts to \$2,369.7M. Annual capital expenditures by project category are presented in Figure 6-1 and Table 6-1. As shown, the ten-year CIP is mainly composed of R&R projects, which account for half of the total forecasted expenditures. PRASA's complex and extensive system requires significant investments to maintain the condition of its infrastructure. Previously, PRASA had made significant investments in water pipe renewal, investing \$496M¹⁷ between 2011 and 2015. The ten-year CIP R&R category doubled from PRASA's previous five-year CIP, with an annual average expenditure of \$115M and a total of \$1,153M for R&R projects. The ten-year CIP includes \$396.3M for Mandatory Compliance projects, which represents 17% of all categories. Historically, the majority of PRASA's CIP investment (about 60%) was for mandatory and compliance driven projects. This reduction is mainly a result of the extensive renegotiation process that PRASA and the Regulatory Agencies entered to modify certain requirements of the existing consent decrees and agreements to re-align compliance priorities and, in turn, help alleviate PRASA's financial burden. In addition, PRASA included in its ten-year CIP, the payment of the balance owed to contractors and \$100 million in deferred projects.

¹⁷ Source: RFC Professional Opinion Report, August 2016

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Table 6-1. Capital Improvement Program FY2017-FY2026 by Category (\$, Million)

Project Category	Fiscal Year Ending June 30,										Total FY2017- FY2026
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
Mandatory Compliance (Consent Decrees, Administrative Orders, Agreements)	\$17.4	\$67.6	\$64.7	\$43.5	\$31.3	\$28.0	\$44.9	\$44.8	\$30.7	\$23.4	\$396.3
Non-Mandatory Compliance	11.9	32.1	47.2	44.7	30.8	17.6	9.3	11.4	14.7	6.8	226.5
Non-Mandatory Renewal & Replacement	15.8	81.9	69.8	89.7	91.7	139.0	158.2	165.3	145.1	196.8	1,153.3
Non-Mandatory Quality & Growth	1.0	10.1	26.9	29.0	37.0	26.1	13.7	8.4	5.5	3.5	161.2
Non-Mandatory Other	0.8	4.8	6.1	6.8	12.7	3.4	1.3	2.7	2.0	2.5	43.2
Non-Mandatory Structure	15.4	47.7	45.5	43.6	40.6	41.2	41.2	39.7	39.0	35.5	389.3
Total ¹	\$62.2	\$244.3	\$260.2	\$257.2	\$244.1	\$255.3	\$268.7	\$272.3	\$236.9	\$268.4	\$2,369.7

¹Numbers may not add due to rounding.

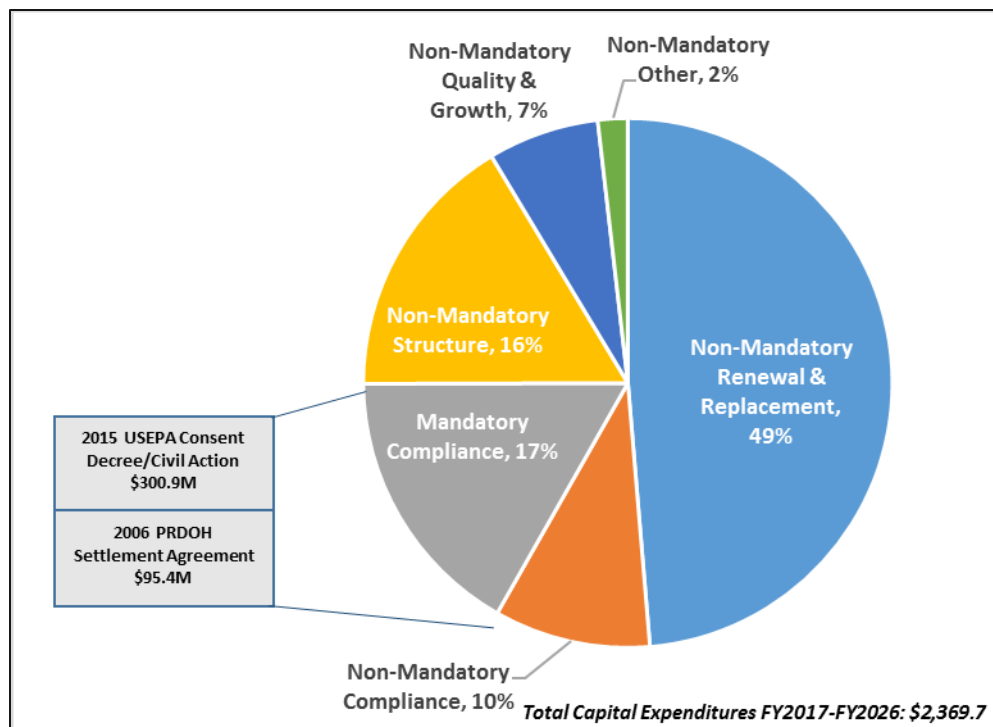


Figure 6-1. Ten-Year CIP Capital Expenditures by Category

PRASA's ten-year CIP consists of a total of 426 projects. As of April 28, 2017, 47% of the projects have not started, 37% are in the pre-construction stage (planning, design and bid), and 4% are in the construction and/or closeout stages but were interrupted by the suspension of the CIP. The remaining 12% are projects already in operation.

PRASA has identified a total of 31 critical projects that shall have priority once the CIP is reactivated. These include the 18 terminated construction projects and 13 other critical projects that are either in the planning, design or bid phases. In the preparation of the ten-year CIP, PRASA assumed that the CIP would be reactivated during FY2017, which did not occur. PRASA will, therefore, have to modify its ten-year CIP projections to account for this delay. As stated by PRASA, the execution and reactivation of the CIP will not take place until the appropriate funding is identified, the Oversight Board grants the final certification to PRASA's Fiscal Plan, and PRASA's Governing Board approves the ten-year CIP.

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 FY2017–FY2026 are estimated at approximately \$309.7M, of which approximately \$142.7M is allocated for projects classified as mandatory.

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 FY2017–FY2026 are estimated at \$419.2M, of which approximately \$242.7M is allocated for projects classified as mandatory.

6.4.3 Other Projects: Structure, Operational, Planning R&R and Technology

Total capital expenditures for all other capital projects are estimated at approximately \$1,640.8M for FY2017–FY2026. These projects address R&R, preventive maintenance, meter replacements, office and building improvements, fleet upgrades, minor repairs, and technology improvements.

Table 6-2 shows the project distribution and capital expenditures by group and type classification for FY2017 through FY2026.

6.4.4 Master Plan and Adaptation for Climate Change

In FY2015 the last two tasks of the Master Plan Update were completed; Task 3: CIP Reconciliation, and Task 4: Prioritization and Scheduling. However, the implementation and consolidation of the resulting projects with the CIP was not completed. PRASA's intention is to continuously revise the Master Plan to maintain its CIP updated with the System necessities. Additional modifications to PRASA's Master Plan may be warranted as conversations with Regulatory Agencies continue, additional regulatory requirements and needs arise, and PRASA Systems' needs change. Key recommendations from the Master Plan are included in the ten-year CIP.

As reported on previous CERs, PRASA completed a Vulnerability Study and Adaption Plan for its entire infrastructure in compliance with the February 2013 Executive Order signed by the Governor of Puerto Rico at the time. The Climate Change Vulnerability Study findings and the strategies selected in the Adaptation Plan will be further assessed and CIP projects shall then be developed. These projects will follow the same guidelines set in the prioritization system. These climate change based projects will serve as a roadmap for PRASA in the planning process and in its preparation towards the expected impacts of climate change in the near and not so distant future. Currently, PRASA's CIP does not include projects or studies for addressing identified climate change vulnerabilities or adaptation actions.

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Table 6-2. PRASA's Base CIP Projections FY 2017 - FY 2026 (\$, in Millions)¹

Category Type	Sub-Category	Fiscal Year Ending on June 30										Total*
		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2017-2026
Water System	Water Supply	\$1.9	\$5.5	\$11.5	\$12.0	\$19.2	\$10.3	\$2.4	\$1.5	\$1.5	\$3.4	\$69.3
	Water Pump Stations	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2
	WTP Capacity Increase	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WTP Improvements	4.1	14.2	24.6	17.9	7.7	2.6	3.4	8.1	10.5	3.8	96.8
	WTP New	5.5	26.0	11.7	1.5	0.0	0.0	0.0	0.0	0.0	0.0	44.7
	Water Distribution	0.2	0.9	3.1	5.5	10.1	9.4	20.1	25.8	14.3	3.6	93.0
	Other Projects (Drought)	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.6	1.8	0.3	5.8
	Subtotal	\$11.8	\$46.6	\$50.9	\$36.9	\$37.3	\$22.2	\$27.0	\$38.0	\$28.1	\$11.1	\$309.7
Wastewater System	Wastewater Pump Stations	\$0.0	\$2.5	\$8.1	\$5.4	\$1.3	\$0.7	\$0.1	\$0.0	\$0.4	\$0.5	\$19.1
	WWTP Capacity Increase	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.5	9.7	20.0	31.5
	WWTP Improvements	4.2	15.4	29.1	23.0	20.9	14.0	4.8	1.3	0.0	0.0	112.8
	WWTP New	1.3	9.1	6.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	17.16
	Wastewater Collection	10.2	22.6	33.1	41.6	38.9	27.7	31.3	20.8	9.9	2.5	238.7
	Subtotal	\$16.0	\$49.7	\$76.7	\$70.3	\$61.2	\$42.5	\$36.2	\$23.7	\$19.9	\$23.0	\$419.2
Meters	Water Meters	\$0.1	\$5.0	\$4.6	\$4.5	\$4.5	\$4.5	\$4.5	\$4.5	\$4.5	\$4.5	\$41.2
Buildings	Buildings	0.0	0.1	0.0	0.3	3.0	3.2	0.3	0.0	0.0	0.0	7.0
Fleet	Fleet	1.5	12.5	10.4	10.2	9.0	8.1	8.0	8.0	8.0	5.8	81.5
IMP	Water & Wastewater	0.1	0.3	1.0	1.9	1.2	0.3	0.0	0.0	0.0	0.0	4.9
Minor Repairs	Water & Wastewater	6.0	31.3	41.1	52.5	42.2	33.4	33.5	30.4	32.3	30.0	332.6
Renovation & Replacement	Water & Wastewater	18.0	88.6	65.0	77.7	73.9	127.5	145.5	155.5	132.7	183.7	1,068.0
Technology	Water & Wastewater	8.8	10.2	10.5	2.9	12.1	13.5	13.7	12.2	11.5	10.2	105.6
	Subtotal	\$34.5	\$148.0	\$132.5	\$150.0	\$145.8	\$190.6	\$205.5	\$210.6	\$188.9	\$234.2	\$1,640.8
Total		\$62.2	\$244.3	\$260.2	\$257.3	\$244.3	\$255.3	\$268.7	\$272.3	\$236.9	\$268.4	\$2,369.8

¹Numbers may not add due to rounding.

6.5 CIP and Current Regulatory Compliance

The primary focus of the CIP is to maintain, modernize and help bring the System into compliance with applicable federal and state environmental laws and regulations; it 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. Nonetheless, it shall be noted that the actual cost of compliance with the consent decrees and agreements and PRASA's total capital expenditures may vary substantially depending on, among other things:

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

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. These agreements included the following:

1. 2003 Consent Decree (PRASA IV), U.S. v. PRASA, Commonwealth of Puerto Rico, and "Compañía de Aguas de Puerto Rico", Inc., Civil Action No. 01-1709 (JAF) – Addresses violations to the Section 301 and 402 of the Clean Water Act (CWA) and regulations and PRASA's NPDES permits with regards to certain PRASA's WWPSs.
2. 2006 Wastewater Consent Decree, U.S. v. PRASA and Commonwealth of Puerto Rico, Civil Action No. 06-1624 (SEC) – Addresses violations to the Section 301 and 402 of the CWA and regulations promulgated there under, and PRASA's NPDES permits with regards to PRASA's WWTPs.
3. 2006 PRDOH Drinking Water Settlement Agreement, Civil Action KPE 2006-0858¹⁸ as amended – Addresses non-compliance and alleged violations with the Puerto Rico Potable Water Purity Protection Law, as amended ("Ley para Proteger la Pureza de las Aguas Potables de Puerto Rico, Ley Núm. 5 de 21 de Julio de 1977, según enmendada"), the Safe Drinking Water Act (SDWA) and applicable regulations, and the General Environmental Health Regulation ("Reglamento General de Salud Ambiental, Reglamento Núm. 6090 de 4 de febrero de 2000").

¹⁸ The Settlement Agreement was signed: March 15, 2007 and subsequently amended on June 16, 2008.

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4. 2010 USEPA STS Consent Decree, U.S. v. PRASA and Commonwealth of Puerto Rico – Addresses alleged violations to the SDWA and the CWA specifically to the National Primary Drinking Water Regulations.

In light of the challenges faced by PRASA, resulting from the continued uncertainty and strain on the Government's economy and despite PRASA being in material compliance with the capital improvement requirements of the consent decrees and agreements, PRASA requested and negotiated amendments to the above-mentioned consent decrees. 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 2006 PRDOH Settlement Agreement, as amended, PRASA restarted negotiation talks with PRDOH in January 2017. To date, PRASA and PRDOH have agreed to present joint motions to renegotiate certain terms and conditions on the Term 2 and Term 3 mandatory projects. A joint motion was submitted on March 7, 2017 regarding renegotiation for Term 2 projects.

The consent decrees and settlement agreements currently in effect with the Regulatory Agencies are:

1. 2015 USEPA Consent Decree: U.S. v. PRASA and Commonwealth of Puerto Rico, Civil Action No. 15-2283 (JAG) – Addresses violations to the Section 301 and 402 of the CWA and regulations promulgated there under, and PRASA's NPDES permits with regards to PRASA's WWTPs, WWPSs and WTP's STSs.
2. 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.

Despite the inactivation of the CIP, there has been no immediate negative impact on compliance with mandated requirements under the 2015 USEPA Consent Decree and the 2006 PRDOH Drinking Water Settlement Agreement, as amended. However, because the CIP was not going to be reactivated by January 2017 due to lack of funding, in December of 2016, PRASA requested USEPA time extensions for Base List projects (priority projects scheduled to be completed during the period of 2017 through 2021). At this time, no assurances can be given that the USEPA will grant such project deadline extensions, although PRASA remains positive and maintains open communication channels with the Regulatory Agency.

6.5.1 2015 USEPA Consent Decree Modifications

The 2015 USEPA Consent Decree includes the following modifications:

- The postponement or advancement in deadlines and completion dates of certain projects currently included in the CIP. Compliance deadlines were extended through approximately 2034.
- A revision to the scope of work negotiated for certain projects to better address certain facilities' current needs.
- The elimination of certain projects from the consent decrees and agreements given that the facility is in compliance and/or due to the declining population trends the project no longer needs to be performed or because the project has already been completed and certified. The 2006 Wastewater Consent Decree CIP Term 2 had four projects that were eliminated through the renegotiation. These projects were: Fajardo WWTP expansion, Lares WWTP expansion, Santa Isabel WWTP outfall improvements, and Barceloneta WWTP expansion. Similarly, CIP Term 3, had six projects that were eliminated. These projects were: the Comerío WWTP flow diversion, the Dorado and Vega Baja WWTPs' retrofit and flow diversion, the Unibón flow diversion, and the Las Marías and Maricao WWTPs' retrofit and capacity increase. Two projects were eliminated from the 2010 USEPA STS Consent Decree CIP Term 2 and 3 remedial measures. These projects were: Perchas WTP STS construction and Quebradillas WTP STS construction.
- The 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 Martín Peña/ENLACE projects. Also, PRASA shall develop and implement a second SSSEP for all other sanitary sewer systems by December 2016 (completed).
- The 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.

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 comprehensive and holistic 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 it was within PRASA's approved annual spending level and based on its priority score.
- Completion of scheduled mandatory projects under the Base List of projects – Includes 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 DOH

The 2006 PRDOH Drinking Water Settlement Agreement with PRDOH renegotiation status is as follows:

- In March 2017, PRASA and PRDOH presented a joint motion to amend Appendix C-3 of the 2006 PRDOH Drinking Water Settlement Agreement to modify the scopes of work or eliminate two Term 2 projects¹⁹. The requested elimination of the scope of works of these projects are no longer required given compliance records. Also, PRASA and PRDOH requested a deadline extension for the Term 2 Juncos Urbano System projects (which includes the elimination projects in Ceiba Sur WTP and the Quebrada Grande WTP) for a Term 3 deadline. To prevent future compliance exceedances in the

¹⁹ According to the 2006 Settlement Agreement, Term 2 and Term 3 projects included in the Appendix C-3 have a compliance due date of December 31, 2016 and December 31, 2021, respectively.

Juncos Urbano System, several additional measures were included in the joint motion, which include, 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 by 1 MGD at the Quebrada Grande WTP by February 2019.

- Additional discussions regarding Term 3 projects and other Agreement requirements are expected to be discussed in the near future.
- 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 Long Term 2 (LT2) 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.

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. PRASA currently estimates that the total cost (incurred, since inception and projected) of compliance with the existing consent decrees and agreements will be over \$1,700M through fiscal year 2026. In the preparation of this CER, Arcadis reviewed the following progress reports, submitted to Regulatory Agencies:

- PRASA IV Triannual Progress Report No. 37, covering the period May 1 to August 31, 2015.
- 2006 USEPA Consent Decree Triannual Progress Report No. 28 covering the period from June 1 to September 14, 2015.
- 2010 USEPA STS Consent Decree Triannual Progress Report No. 16, covering the period from May 1 to August 31, 2015.
- 2015 USEPA Consent Decree Biannual Report No. 1, covering from September 1, 2015 to February 29, 2016; Biannual Report No. 2, covering from March 1, 2016 to August 31, 2016; and Biannual Report No. 3, covering the period from September 1, 2016 to February 28, 2017.
- 2006 PRDOH Agreement Quarterly Progress Reports No. 30, No. 31, No. 32, No. 33, No. 34, No. 35, and No. 36 covering the period from July 1 to September 30, 2015; October 1, 2015 to December 31, 2015; January 1, 2016 to March 31, 2016; April 1, 2016 to June 30, 2016; July 1, 2016 to September 30, 2016; October 1, 2016 to December 31, 2016, respectively.

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

6.5.3.1 PRASA IV: 2003 Consent Decree, Civil Action No. 01-1709 (JAF)

PRASA submitted to the USEPA the Triannual Progress Report No. 37 that covers the period from May 1 to August 31, 2015. This is the last report under the previous PRASA IV: 2003 Consent Decree. As of August 2015, the following measures were implemented:

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- Remedial Actions to be performed at Group A Pump Stations: Pursuant to Section VI, paragraph 11, of the Consent Decree, PRASA was required to submit a detailed list of remedial actions to be performed at each agreed upon pump station and a proposed schedule for completion. As informed in the Triannual Report No. 12, all required projects have been completed.
- Operation and Maintenance Plan: The agreed phased approach for integrating the wastewater pump stations to the IMP was completed. The major tasks performed during the period ending August 2015 were organizational structure and SAP PM Implementation. PRASA continues to conduct compliance inspections of all facilities to ensure on going and sustainable compliance with the basic elements of the implemented program.
- Spill Response and Cleanup Plan: Pursuant to Section VIII, paragraph 17 of the Consent Decree, PRASA was required to submit to USEPA for approval a spill response and cleanup plan that specifies actions to be taken by PRASA for unanticipated bypasses for any pump station facility. The PRASA Spill Response and Cleanup Plan is being reviewed to integrate pump stations unanticipated bypass and CSWO events.
- Supplemental Environmental Project: All construction and related works were completed and the project was accepted by PRASA's Operational Area.
- Stipulated Penalties: With respect to the stipulated penalties for the said period, PRASA paid \$98,200 for the following violations: pump station overflows or unanticipated bypasses and late event notification. 95% of the penalties were related to pump station unanticipated bypass or overflow, and only 5% to late event notification. All overflows occurred in pump stations under Category A-1 (Non-Group A pump stations).

6.5.3.2 2006 Wastewater Consent Decree, Civil Action No. 06-1624 (SEC)

PRASA submitted the Triannual Compliance Report No. 28 that covers the period from June 1 to September 14, 2015. This is the last report submitted under the previous 2006 Wastewater Consent Decree. The 2006 USEPA Consent Decree specified that PRASA shall implement system-wide remedial measures at all WWTPs owned/operated by PRASA. These remedial actions are to be completed in three phases, consisting of short and mid-term remedial actions, and long-term CIP projects to be implemented over the course of 15 years.

- Short and mid-term measures – PRASA completed all short and mid-term remedial actions required, by August 2015.
- Long-term measures – All long-term capital improvement projects included in the CIP Term 1 of the 2006 EPA Consent Decree were completed. All the CIP Term 2 and CIP Term 3 ending June 1, 2016 and June 1, 2021, respectively, will be in compliance with terms and conditions of the NPDES permits for each facility. The CIP Term 2 has a total of 24 projects, of which ten projects were completed within CIP Term 1 deadline and/or CIP Term 2 deadline. These projects were: El Torito WWTP flow diversion, the Morovis WWTP new package plant, the Boquerón WWTP elimination, the Mayaguez WWTP seepage from the raw influent channel, the New Maunabo WWTP, the Playa Santa WWTP elimination, the Ponce WWTP ROV study of the sewer line from Mercedita PS to the Ponce WWTP, the Orocovis WWTP Phosphorous removal improvements, the Alturas de Orocovis WWTP

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elimination, and the Guayanilla technical cost evaluation for the consolidation to Yauco WWTP. The CIP Term 3 has a total of 19 projects, of which three projects have been completed within CIP Term 1 or CIP Term 2 deadlines: Ciales WWTP expansion, Carolina improvements, and Peñuelas technical cost evaluation for the consolidation to Yauco WWTP.

Therefore, as of June 2016, ten CIP Term 2 projects were completed, four CIP Term 2 projects were renegotiated to be eliminated, and the remaining ten CIP Term 2 projects were renegotiated for time extension. As for CIP Term 3 projects, three have been completed, two were eliminated and the remaining fourteen were renegotiated for a further deadline.

- Effluent Interim and Final NPDES Limits Exceedances – During the period from May 1, 2015 to August 31, 2015 certain effluent limits were exceeded, the most notable being fecal coliforms, arsenic, copper, enterococcus, total nitrogen and total coliforms. The parameters that were most exceeded were fecal coliforms, followed by arsenic and copper. When analyzing by region, the region with the most exceedances for this period was the South Region, followed by the North and East Regions. The detail of the exceedances can be found in Appendix 3 of the Triannual Compliance Report No. 28.

The following presents a status summary of the applicable standard and special conditions of probation:

- In accordance with special condition No. 3 of the consent decree, PRASA shall construct and complete capital improvements to replace, repair and upgrade the collection and wastewater treatment system in the Ponce de Leon Avenue area of San Juan to remedy and prevent direct discharges to the Martin Peña Channel. The Ponce de Leon Ave. sewer separation project is a combined storm water and wastewater system that discharge combined wet weather flows into the Martin Peña Channel. The existing combined flow channel is approximately 10,700 feet, located in the center of Ponce de León Ave., which runs through a mainly business and commercial area within a heavily congested arterial. As agreed by all concerning entities, the project completion schedule will be in line with the requirements of the renegotiated consent decree and this should not have a negative impact on PRASA's current compliance record.
- In accordance with special condition No. 9 of the consent decree, all PRASA plants shall have a licensed operator available at all times, 24 hours a day to ensure proper operation of the treatment facilities. PRASA maintains USEPA informed of the agency's efforts to increase the percentage of licensed operators including in each triannual report a progress report on the status of the licensing process of the water and wastewater operators. However, the ongoing fiscal situation has hindered the process of hiring additional operators Notwithstanding, to increase the percentage of licensed operators, PRASA's training department has an on-going training program for the WWTPs and WTPs operators and other operational and compliance personnel.
- In accordance with special condition No. 19 of the consent decree, PRASA shall undertake all necessary measures to reduce the amount of sanitary sewage systems overflows. On May 21, 2012, PRASA submitted to USEPA a revised version of a spill response and cleanup plan, which specifies actions to be taken by PRASA for sanitary sewage systems overflows from all facilities owned and/or operated by PRASA. The response and cleanup plan has been completed for its collection systems and wastewater lift stations.

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- Section IX of the consent decree specifies that PRASA shall develop and implement a Sanitary Sewer System Repair Plan (SSSRP) for five (5) of the seven (7) wastewater collection systems identified in the consent decree: the Aguadilla, Bayamón, Isabela, Juncos, La Parguera, San Sebastián New and Unibón Morovis WWTPs service areas. PRASA completed the required evaluations and the next steps are included as part of the renegotiation of the consent decree.
- Section XXIII of the consent decree specifies that, as a Supplemental Environmental Project (SEP), PRASA shall commit at least \$3M to provide sewer service (which shall include the connections to private residences in the community) to at least one community that historically has not been connected to PRASA's wastewater collection system. La Plata Community, located in Naranjito, Puerto Rico, was provided with sewer services on September 2014 thus meeting requirements for this section.

6.5.3.3 2010 USEPA STS Consent Decree

PRASA submitted the Triannual Progress Report No. 16, covering the period from May 1 to August 31, 2015. The report summarizes all PRASA's activities, any applicable stipulated penalties, along with all pertinent deliverables required to be submitted. In general, PRASA has mostly complied with the requirements of the consent decree. PRASA reports to have made several requests for deadline extensions for certain projects. These extensions have been approved, as applicable, by USEPA and U.S. Court. PRASA reports to have assessed, in various occasions, penalties because of violations to interim and final effluent compliance parameters. A summary of the compliance status as of August 2015 is described below.

- Remedial Measures: The remedial measures are divided in three phases, consisting of short and mid-term remedial actions, and long-term capital improvements. PRASA agreed to undertake and substantially complete short-term remedial actions by December 31, 2010 and mid-term remedial actions by June 30, 2012. Long term CIP projects were further divided in three additional subdivisions referred as CIP-Term 1, CIP-Term 2 and CIP-Term 3, with variable termination dates ranging from June 30, 2012 up to June 30, 2024.
 - The short-term remedial actions were completed as required by the consent decree.
 - A motion was presented to and subsequently approved by the U.S. Court for the District of Puerto Rico on August 29, 2012 which modified certain requirements, including deadlines, for the 417 mid-term remedial measures included in the 2010 USEPA STS Consent Decree. The mid-terms remedial measures, which were scheduled for March 2013, were completed during the months of April 2013 to October 2013, except for Guayama WTP, for which, PRASA requested an additional time until July 2014. The remedial measures for Guayama WTP already were completed.
 - As of August 2015, all long-term CIP Term-1 remedial measures have been completed except for the new STS for San Sebastian WTP, which had its scope modified in the renegotiation and included in the prioritization list for completion on 2032. Also, four CIP Term 2 remedial measures have been completed. There was a total of 57 projects under the long term remedial measures; 21% of these projects were completed and 79% was renegotiated. The other CIP-Term 2 and CIP-Term 3 remedial measures are underway.

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- Interim and NPDES Limits: The limit exceedances included in this report date from April 1, 2015 to July 31, 2015. During this period, several exceedances were registered and detail is included in Appendix 5 of such report. The most notable exceedances were copper, turbidity, residual chlorine, lead, BOD, and fecal coliforms. The three most exceeded parameters are: copper, turbidity, and residual chlorine with 28%, 15%, and 13%, respectively. The region with the most exceedances were the North Region, followed by the East Region, followed by the South Region.
- PRASA operates and maintains all WTP's STSs in accordance with the USEPA-approved IMP. This program is meeting the requirements and schedules and, as previously presented, PRASA is well underway to complete the implementation no later than March 31, 2021. PRASA implemented an interim IMP in all STSs. This program includes at a minimum, regular inspections and procedures to support prompt repair of all equipment and routine preventive maintenance for all equipment. PRASA continues conducting compliance inspections of all facilities to ensure on going and sustainable compliance with the basic elements of the implemented program. PRASA also continues implementing a Process Control System (PCS) that includes at least the Standard Operating Procedures (SOPs) for the treatment of wash water discharges at the STSs, accurate flow measurements, logs and records for all activities, processes and tests performed at the STSs, the troubleshooting guides for proper process control, and the organizational structure for implementation of PCS.
- PRASA completed the construction of the SEP of the Aeration of the Toa Vaca Lake. A first completion report was submitted on December 13, 2012 for USEPA's evaluation and approval. A second and final report that details the operation and maintenance of the project for the past five years will be submitted on December 31, 2017, for USEPA's evaluation and approval.

6.5.3.4 2015 Consent Decree, Civil Action No. 15-2283 (JAG)

As previously mentioned the previous three USEPA consent decrees from 2003, 2006, and 2010, respectively, were consolidated into the 2015 Consent Decree. Different from the previous agreements, the 2015 Consent Decree requires PRASA to submit biannual reports. PRASA has already submitted three biannual reports: Report No. 1 covering the periods of September 1, 2015 to February 29, 2016; Report No. 2 covering the periods of March 1, 2016 to August 31, 2016; and Report No. 3 covering the periods of September 1, 2016 to February 28, 2017, respectively.

- Remedial Measures: Remedial measures are divided into two categories: WTPs Sludge Treatment Systems Remedial Measures and WWTPs and Corresponding Sewer Systems Remedial Measures. These include the 2006 USEPA Consent Decree and 2010 USEPA STS Consent Decree renegotiated projects as previously discussed and as included in the 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.
 - WTPs STS Remedial Measures: 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 STS project. The construction contract for this project was terminated by convenience due to PRASA's fiscal situation. As previously discussed, PRASA and PRDOH presented a joint motion

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to amend the 2006 PRDOH Drinking Water Settlement Agreement and request a deadline extension for the Ceiba Sur WTP project and a new compliance date was agreed upon. PRASA has also requested a time extension to USEPA, but no answer has been received. (The project's compliance date is December 2020). Also, as stipulated by Paragraph 9, 10 and 11 of the 2015 Consent Decree, flow meter devices with flow totalizers and level indicators were installed at the point of discharge of most WTPs, and the remaining WTPs were scheduled to have the installation performed by June 2017. These plants were included in the IMP.

- WWTPs and Corresponding SSs Remedial Measures: As of February 29, 2017, seven out of the seventeen WWTP Base List remedial measures were completed as required by Paragraph 18 of the 2015 Consent Decree. The following are the completed measures:
 - San Jose Trunk Sewer Rehabilitation
 - Toa Alta Heights I/I Study
 - Guayanilla WWTP Flow Diversion Technical Cost Evaluation
 - Peñuelas WWTP Flow Diversion Technical Cost Evaluation
 - Islandwide SSSEP
 - Improvements to the Carolina WWTP
 - Alturas de Orocovis WWTP Flow Diversion

In December 15, 2016, PRASA sent a letter to USEPA requesting time extensions for the remaining ten remedial measures included in the Base List as permitted by the consent decree (Paragraph 37). Despite the best efforts taken to implement an infrastructure program to fulfill the commitments with the Regulatory Agencies, the status regarding PRASA's fiscal situation remained unchanged and PRASA had to request such extension. As of the date of this report, no answer had been received from USEPA.

- Sludge Treatment Systems: No STS were constructed during the period from September 2015 to February 2017.
- Sewer Systems Evaluation Plans: By December 2016, PRASA had performed SSEPs for all the WWTPs and SSs, as required by Paragraph 19 of the Consent Decree. The Island-wide SSSEP was submitted to USEPA for review on December 28, 2016.
- Puerto Nuevo WWTP Sewer System and SSOMP Program: PRASA has conducted a CSWO study on the sewer system corresponding to the Puerto Nuevo WWTP; and has submitted several reports to USEPA, including a CSWO Baseline Demonstration Study. In addition to this study, PRASA also submitted the SSOMP on June 30, 2016 for comments and approval by USEPA. As per paragraph 23 of the 2015 Consent Decree, PRASA has recognized 1,052,000 linear feet of pipeline that is connected to the Puerto Nuevo WWTP system. As part of this effort, PRASA is leveling manholes with buried manhole covers. By February 29, 2017 the following has been found and/or achieved regarding the Puerto Nuevo WWTP system:
 - Cleaning of 204,000 linear feet of sanitary sewer pipeline.

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- Defects were found on 69 PRASA sewer pipelines (i.e. Fats, oil and greases, roots, collapsed pipelines, etc). These defects need to be repaired within one year.
- 401,000 linear feet of sewer pipeline were identified as clean.

Related to the Puerto Nuevo WWTP SS initiatives and PRASA's SSOMP Program are the following measures and their corresponding status:

- On February 17, 2017, PRASA submitted to USEPA the final version of the FOG Control Program. Program focused on educating, monitoring, and inspecting applicable commercial customers launched on June 2017.
- 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, the report was submitted on March 17, 2017.
- Several areas of concern within the Puerto Nuevo WWTP system were identified on Paragraph 36 of the consent decree. Remedial measures were stipulated for each of these areas and PRASA took corresponding actions for each of the measures.
- Caño Martin Peña Projects: None of these projects were performed during the period of September 2015 to February 2017. These projects are contingent upon the completion of related prerequisite projects to be developed by parties not affiliated with PRASA. Also, depending on funding.
- Integrated Maintenance Program: PRASA complied with the IMP as stipulated in Appendix U of the consent decree.
- Operator Training Program: During the period of September 1, 2015 to February 28, 2017, PRASA hired 51 operators. Corresponding training was provided as per the operator training program submitted to USEPA on August 2, 2016.
- Process Control Systems (PCS): PCSs are being implemented at PRASA's WTP STSs and WWTPs as stipulated by Paragraph 59 of the consent decree. PCSs manuals were developed and are currently in process of being reviewed.
- Spill Response and Cleanup Plan: PRASA submitted the updated version of the plan on March 25, 2016.
- WWTP Capacity and Flow Management: According to Paragraph 70 of the consent decree, all WWTPs must have a flow meter installed and in operation at the discharge of the WWTP. As of February 29, 2017, all WWTPs meet this criteria except for Yabucoa WWTP, which is scheduled for the installation of a flow meter at the discharge point. At the moment, there is a flow metering device collecting data for reporting purposes on another location.
- Effluent Limit Exceedances: Some interim and permit limits were exceeded during the period of September 1, 2015 to February 28, 2017, the most notable being fecal coliforms, copper, arsenic, residual chlorine, and turbidity. The three most exceeded parameters were: fecal coliforms, copper, and arsenic. The region with the most exceedances during this period evaluated was the East Region, followed by the North Region, and then by the South Region.

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- Stipulated Penalties: During the period from September 1, 2015 to February 28, 2017, PRASA was subject to several penalties. Table 6-3 summarizes the penalties for such period.

Table 6-3. Stipulated Penalties

Penalties	Amount
Effluent Limits Exceedances	\$640,350
Sanitary Sewer Overflows	\$80,600
Failure to undertake required actions	\$51,000
Total	\$771,950

Note that 83% of the stipulated penalties is related to effluent interim or NPDES permit limits exceedances, 10% is related to the sanitary sewer overflows, and the remaining 7% is related to failure to act on specific requirements of the consent decree.

6.5.3.5 2006 PRDOH Drinking Water Settlement Agreement

PRASA submitted the Quarterly Settlement Agreement Reports No. 30, No. 31, No. 32, No. 33, No. 34, No. 35 and No. 36 that cover the periods from July 1 to September 30, 2015; October 1, 2015 to December 31, 2015; January 1, 2016 to March 31, 2016; April 1, 2016 to June 30, 2016; July 1, 2016 to September 30, 2016; October 1, 2016 to December 31, 2016; and January 1, 2017 to March 31, 2017, respectively. Article VII of the 2006 PRDOH Agreement states that PRASA will implement remedial actions in multiple systems or components. These remedial measures are classified as short, mid, and long term remedial measures. A summary of the status of the remedial actions as of September 2015 is described below.

- Short-term measures: A list of 540 remedial actions was identified to be completed within 12 months of PRASA and PRDOH entering into the 2006 PRDOH Agreement. All short-term measures were completed.
- Mid-term measures: A total of 115 remedial actions were identified to be completed by March 14, 2010. All mid-term remedial measures were completed.
- Long-term measures: The long-term measures are divided into three terms to be respectively completed in the scheduled time frames. Term 1 (five years or no later than December 15, 2011) includes 38 total projects which were all completed. The periods to implement the remedial measures for Term 2 and Term 3 have due dates from December 31, 2016 through December 31, 2021. The Term 2 measures have a total of 18 projects of which 14 have already been completed. Of the remaining four remedial measures, two were motion to be moved to Term 3 and two were motion to be eliminated, as describe further below. Finally, the Term 3 measures have a total of 13 projects in which seven have already been completed. These seven projects are Enrique Ortega WTP Phase-A improvements, the Tetúan system, the Guajataca WTP improvements, the Esperanza WTP improvements, elimination of Rocha WTP and La Máquina WTP, and the Guzmán Arriba WTP improvements. Of the remaining six remedial measures, four were motion for time extensions and two were motion to be eliminated, as described further below.

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In March 2017, PRASA and PRDOH presented a joint motion to amend Appendix C-3 of the 2006 PRDOH Drinking Water Settlement Agreement to eliminate the following Term 2 projects: the Duey WTP project and Hatillo-Camuy WTP dam improvements project. Also, PRASA and PRDOH requested a deadline extension for the two Term 2 Juncos Urbano System projects (which includes the elimination project in Ceiba Sur WTP and the improvements project at Quebrada Grande) for a Term 3 deadline.

Four of the Term 3 remedial measures will be renegotiated with the PRDOH for time extensions; these are: Monte del Estado WTP, La Pica WTP, Frontón WTP, and Culebras WTP. 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.

- Internal Mitigation Measures: As stipulated on Article VIII of the Settlement Agreement, PRASA must perform these mitigation measures to minimize health risks in the systems that violate turbidity, bacteriology, and DBPs, while the remedial measures stipulated on Article VII are implemented. The implementation of these mitigation measures is certified each month and such certification is submitted to PRDOH. The following interim LT2 ESWTR measures were completed by March 2017:
 - Orocovis WTP Filter Optimization
 - Treatment Improvements to the Sabana (Luquillo) WTP
 - Treatment Improvements to the Morovis Urbano WTP
 - UV installation at the Morovis Sur WTP
 - UV installation at the Vega Baja WTP
 - UV installation at the Cubuy WTP

PRASA expects to have completed construction in three additional WTPs by June 2017 (Aguas Buenas, Barranquitas and Quebrada WTPs).

- Continuous Monitoring Program: Article 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.
- Process Control Program: Article VII of the Settlement Agreement states that PRASA shall develop a program aimed to optimize treatment processes to be implemented in larger systems. It was decided on a meeting held on February 23, 2017, that this program will be called Process Control and the actions required by the program will be modified to requirements that ensure compliance with DBPs parameters' limits. Also, PRASA must implement preventive measures on those systems with frequent DBPs violations as stipulated in Article IX.
- Training Program: As stipulated in Article XI, PRASA must train all personnel for the adequate operation and management of its facilities. PRASA developed one training which covers the seven most important themes and has a duration of 2 days (15 contact hours). As of June 30, 2017, 77% of the required employees completed the training.

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- **Stipulated Penalties:** During the period from July 1, 2015 to March 31, 2017 PRASA had \$345,475 in penalties related to exceedances to the primary parameters, required submittals, contact time (CT), remedial measures, and mitigation measures. Primary standards stipulated penalties, including CT, represent approximately 96% of the total stipulated penalties. These primary standards are: bacteriology, disinfection by-products, turbidity, and CT. PRASA has developed aggressive action plans per region per potable water system to mitigate the primary standards exceedances. Among these measures the following are being implemented: tank draining every certain amount of time, elimination of tanks, and the elimination of pre-chlorine injection at the inlet of WTPs, among other initiatives.
- **Supplementary Environmental Project:** The SEP project presented to PRDOH, was divided in three projects and it impacts Non-PRASA Water Systems that due to technical, administrative or financial limitations, find it difficult to operate and maintain a public water system in compliance with state and federal laws and regulations. The project is divided as follows:
 1. Sampling and analysis of regulated chemical contaminants in potable water (was completed, but PRASA and PRDOH agreed to extend the project for an additional year). On December 23, 2014, a motion was filed proposing PRASA to perform the sample analysis of 34 Non-PRASA systems for a period of one year. PRASA contracted EQ Lab to perform such task. By December 31, 2016 this part of the project was completed.
 2. Installation of disinfection equipment, which was already completed as previously reported.
 3. PRASA service connections to schools served by Non-PRASA systems. For this last project, a Non-PRASA system called "Asociación Pro-Desarrollo Comunal Bo. Florida de Naguabo, Puerto Rico" was completed on September 25, 2015. The project consisted in providing the installation of meter boxes and their respective supply connection to the property limit of each structure to allow the connection to PRASA's potable water system. A total of 668 connections were provided.

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. This is mainly due to the fiscal situation that prevents PRASA from optimizing treatment and increasing the removal of these contaminants.

Regarding the wastewater system, PRASA has indicated that once it completes the sanitary sewer efforts in the Puerto Nuevo WWTP service area, 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, in NPDES permits for other facilities.

Regarding the water system, anticipated future regulations for potable water systems (PWSs) at the time of this report writing include:

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- 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 five years, the USEPA reviews the list of contaminants, largely based on the Contaminant Candidate List (CCL). To date, two rounds of unregulated contaminant monitoring have occurred; the results 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, among others, pesticides, DBPs, chemicals used in commerce, waterborne pathogens, pharmaceuticals and biological toxins.

Also, as previously noted, PRASA will be likely required to implement remediation measures in well facilities 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.

Finally, PRASA may identify additional CIP needs to bring the water system into compliance with the Stage 2 D/DBPR. As noted in Section 4, since the implementation of the Stage 2 D/DBPR, several PWSs that were previously in compliance are now exhibiting compliance problems due to the stricter monitoring and sampling requirements imposed by this regulation. For now, PRASA is currently implementing changes in its O&M practices to bring the PWSs into compliance. However, any additional needs identified and included in PRASA's CIP will be added into the CIP prioritization system.

6.7 Conclusions

PRASA's CIP generally addresses the needs of the System and complies with PRASA's existing commitments with Regulatory Agencies. The CIP includes projects that cover a broad array of current and future needs, as identified by PRASA and as required by consent decrees. The CIP also includes funding for minor repair projects and PRASA's R&R program. As noted in previous reports, given PRASA's high rate of leaks and overflows and continuing aging infrastructure, additional funds and an acceleration of the R&R program are required to reduce/minimize these incidences. Hence, PRASA may need to realign and re-prioritize its projected CIP breakdown of funding sources. Finally, PRASA's CIP includes funding for maintenance improvements, as well as for other necessary infrastructure projects (i.e., fleet and building renovation, 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. However, PRASA's most recent facility compliance results, and record of compliance with the milestones of the consent decrees with USEPA and the agreement with PRDOH supports PRASA's ongoing commitment to continue to maintain its System in compliance with applicable regulations and environmental matters.

The full impact of future regulations and other regulatory requirements on PRASA's System are not known at this time. As the impact of future regulations becomes more defined, CIP modifications will be

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required to adequately accommodate resulting needs. These CIP needs will be prioritized and implementation schedules will depend on PRASA's financial capacity. To the extent that PRASA's fiscal situation does not improve and that the identification of CIP financing continues unresolved, PRASA's CIP implementation will continue on hold. The delay in CIP development and implementation could negatively affect the System's renewal, replacement, and overall up-keeping. It will also affect PRASA's ability to meet regulatory obligations.

Additionally, PRASA should be considered in their CIP, actions needed to mitigate the impact caused by the recent hurricanes. This will be addressed in the FY2018 CER.

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.”

Since the insurance coverage has not change significantly in the last couple of years, Arcadis 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 made by MARSH and validated or commented by AON, PRASA's Broker of Record (BOR) in FY2016. The current BOR, 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. 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 is 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 element 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 MARSH's outstanding recommendations and AON's responses with respect to PRASA's insurance policies currently in force. Also, included is confirmation of action by Lone Star.

7.3.1 Property Insurance

The following are the findings and recommendations under the Commercial Property Program currently placed through AIG Insurance Company (AIG).

PRASA's property is insured by a policy issued by AIG Insurance Company – Puerto Rico. Renewal of policies occurred in April 2017 and extends until April 2018. Two other insurance companies are shown on the AIG policy as “subscribers.” This means they have each agreed to bear a portion of each loss, as follows:

- AIG – assumes 100% of \$10M primary; 45% of \$140M in excess of \$10M and 55% of \$150M in excess of \$150M.
- MAPFRE PRAICO Insurance Company (MAPFRE) – assumes 55% of \$140M in excess of \$10M and 20% of \$150M in excess of \$150M.
- Chubb Insurance Company (Chubb) – assumes 25% of \$150M in excess of \$150M.

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. 2017-2018 Property Coverage, Limits and Deductibles

Coverage	Limit	Deductible
Total Insurable Value	\$300 million	As stated below
Property – All Other Perils (AOP) (including Data Processing, In Transit and equipment breakdown)	\$150 million per occurrence, Combined Single Limit for Property Damage and Business Interruption, excess of applicable deductibles.	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies.
Windstorm	Included in \$150 million property coverage.	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies.

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Coverage	Limit	Deductible
Earthquake (EQ)	\$300 million Combined Single Limit for Property Damage and Business Interruption, excess of applicable deductibles.	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies.
Flood	\$300 million Combined Single Limit for Property Damage and Business Interruption, excess of applicable deductibles.	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies.
Business Interruption	Included in \$150 million property for AOP, including Windstorm, and \$300 million EQ and Flood Coverages	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies and 10 days Business Interruption.
Extra Expense	Included in \$150 million property for AOP, including Windstorm, and \$300 million EQ and Flood Coverages, subject to a \$35 million Sublimit	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies.
Contingent Business Interruption	Included in \$150 million property for AOP, including Windstorm, and \$300 million EQ and Flood Coverages, subject to a \$35 million Sublimit	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies.
Professional Services Fees	Included in \$150 million property for AOP, including Windstorm, and \$300 million EQ and Flood Coverages, subject to a \$2 million Sublimit	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies.
Newly Acquired Locations	Included in \$150 million property for AOP, including Windstorm, and \$300 million EQ and Flood Coverages	\$25 million Combined for Property Damage and Business Interruption, except for the perils of Boiler Explosion and Machinery Breakdown, where a \$25,000 applies.

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Coverage	Limit	Deductible
Boiler and Machinery	Included in \$150 million property coverage	\$25,000 each and every accident and 10 days Business Interruption.

In addition, property insurance coverage includes Addendum B, Asbestos Endorsement, included in the \$150M for AOP, and \$300M EQ and Flood coverages, subject to a \$1M sublimit. Damages must occur during policy period and be caused by one of the following perils: fire; smoke; explosion; lighting; hail; earthquake; direct impact of vehicle, aircraft or vessel; riot or civil commotion; vandalism or malicious mischief; or leakage or accidental discharge of fire protection equipment.

7.3.1.1 Recommendations & Responses

The following outstanding recommendations were 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. As required by the Bureau of Public Insurance, entity in charge of administering the Insurance Programs for the State Government Instrumentalities, the Named Insured under the program should read **Puerto Rico Aqueduct and Sewer Authority &/or Commonwealth of Puerto Rico &/or Treasury Department c/o Bureau of Public Insurance**.

AON agreed with this recommendation and submitted to the insurer (AIG) for its approval to endorse the named insured in the policy accordingly to read as recommended.

Lone Star confirms that this was included in the April 2017 policy renewal.

2. MARSH recommends the Business Description on the Policy Contract to read Water Manufacturing, Treatment, Filtering, and Distribution.

AON agreed and endorsed the business description in the policy accordingly to read as recommended.

Lone Star confirms that this was included in the April 2017 policy renewal.

3. Policy Contract should state the TIV's Limit, especially since the applicability of several Coverages and Conditions specified in the Policy Contract are subjected to this amount.

AON indicates that the TIV's limit will be included in the next renewal.

Lone Star confirms that this was included in the April 2017 policy renewal.

4. On Page 6, Item 9 Cancellation, the time frame being provided does not match the requirements presented by the Bureau of Public Insurance of the Department of Treasury. As per said Government Requirements, written cancellation notice should be given with, at least, 90 days prior notice, instead of the 45 days stated. For non-payment of premium, a 45-day prior written notice is required in order to cancel. Currently, under contract, a 10-day grace period is provided.

With respect to any "unearned premium", the computation should always be on a "pro-rata basis", irrespective of whom elects to cancel the insurance program.

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On the sixth paragraph, which relates to the period of limitation for cancellation notices being void by “any law controlling the construction thereof”, MARSH recommended to include after “law”, “or any requisite of the Bureau of Public Insurance of the Treasury Department.”

AON agreed with this recommendation and submitted to the insurer (AIG) for its approval to endorse the cancellation clause accordingly.

Lone Star confirms that this was included in the April 2017 policy renewal.

5. The deductible for Data Processing Equipment, which previously stood at \$25,000, appears to now stand at the full \$25 million deductible. MARSH recommended that a \$25,000 deductible be negotiated.

AON will verify with the carrier.

Lone Star confirms, PRASA maintains the \$25,000 deductible.

7.3.1.2 Recommendations & Responses Unrelated to Policy Contract

1. The \$25 million deductible applies whether the loss sustained by PRASA is due to a catastrophic peril as well as by any other insurable peril. FEMA would only reimburse PRASA if:
 - a. The direct damage has been caused by a Catastrophic Peril (Windstorm, Flood or Earthquake)
 - b. The affected area has been declared a Disaster Zone by the President of the United States.
 - c. Subject to Availability of Funds.

PRASA should be considering establishing a FUND to cover possible financial losses from any future catastrophic, but especially, from any non-catastrophic, peril that might affect infrastructure and operations and, therefore, impose an unexpected financial burden.

AON agreed with this recommendation and would discuss with PRASA.

Lone Star confirms that no additional coverage was included in the recent policy renewal. However, PRASA maintains a Rainy-Day Fund of around \$20 million for eventualities. In addition, extraordinary expenses may be covered by the Operating Reserve Fund, which currently has over \$40 million.

2. The current 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.

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the recommendation was adopted for the 2017-2018 renewal period.

7.3.2 Crime

PRASA maintains a crime policy issued by Chubb, providing the coverage and limits shown in Table 7-2 for loss discovered during the policy period. Renewal of policy occurred in July 2017 and extends until July 2018.

Table 7-2. 2017-2018 Crime Coverage, Limits and Deductibles

Coverage	Limit	Deductible
Employee Dishonesty – Insured Indemnity	\$1 million	\$10,000
Employee Dishonesty – Employee benefit Plan (ERISA) Indemnity	\$500,000	\$0
Forgery or Alteration	\$1 million	\$10,000
Loss Inside Premises	\$1 million	\$10,000
Computer Fraud and Fraudulent Transfer Instructions	\$1 million	\$10,000
Audit Expense	\$150,000	\$0
Loss Outside Premises (In Transit)	\$1 million	\$10,000
Securities	\$1 million	\$10,000
Claim Expense	\$150,000	\$0
Voiced Initiated Transfer	\$1 million	\$10,000
Extortion Threats to Persons	\$100,000	\$10,000
Extortion Threats to Property	\$100,000	\$10,000
Counterfeit Currency and Money Orders	\$1 million	\$10,000
Policy Aggregate	\$1 million	Not Applicable

7.3.2.1 Recommendations & Responses

The following pending recommendations were previously made by MARSH including AON comments regarding PRASA's Crime Policy. Also, included is confirmation of action by Lone Star of said recommendations:

1. The Crime policy is written to cover losses that are sustained during the policy period and discovered either during such policy period or up to one year after the policy expires. The Negotiated Discovery Period endorsement that forms part of the PRASA policy has a detrimental effect of reducing the Discovery Period to 90 days. Moreover, in a policy cancellation or non-renewal scenario, the endorsement requires PRASA to pay 75% annual premium for an Optional Extended Reporting Period of a year that would be provided in the policy contract with no additional cost.

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AON agreed with this recommendation and requested insurer for amendments to endorsement.

Lone Star confirms that it was included in the July 2017 policy renewal.

2. Knowledge or Discovery of Loss clauses should be re-negotiated to specifically identify positions triggering knowledge of incidents to minimize the risk of carrier declines for late reporting.

AON agreed with this recommendation and requested insurer for an endorsement.

Lone Star confirms that this was not included in the July 2017 renewal. It is recommended to include in the next renewal.

7.3.3 General Liability

PRASA's current commercial general liability program is issued by MAPFRE with the limits detailed in Table 7-3, below. Renewal of policy occurred in July 2017 and extends until July 2018. 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, so once this amount is paid by PRASA, the Insurance Company will pay these amounts from the first dollar and the Self-Insured Retention (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.

Table 7-3. General Liability Coverages and Limits

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

7.3.3.1 Recommendations & Responses

The following pending recommendations were previously made by MARSH including AON comments regarding PRASA's general liability program. Also, included is confirmation of action by Lone Star of said recommendations:

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1. Under the "Special Conditions" endorsement attached to the MAPFRE policy, MARSH recommended the following amendment be performed.

- a. Severity of Interest (item 8) should be revised to read Severability of Interest.

AON agreed with this recommendation and requested insurer for correction.

Lone Star confirms that this was not included in the July 2017 policy renewal. Not accepted by insurer.

2. ISO Form CG 0300 (01-96) "Deductible Liability Insurance" should specify that the Deductible included in MAPFRE's policy applies for Bodily Injury and/or Property Damage Liability Combined, since the Declarations Page is not clear as to the applicability of said deductible.

AON agreed with this recommendation and has requested clarification to the insurer.

Lone Star confirms that it was included in the July 2017 policy renewal.

3. Although Item 14 of the Special Conditions deletes any "Explosion, Collapse or Underground Property Damage Hazard" (XCU) exclusion. ISO Form CG-2142 (01-96) which excludes XCU hazards should be eliminated from the Forms and Endorsements scheduled under the policy.

AON agreed with this recommendation and has requested clarification to the insurer.

Lone Star confirms that it was eliminated in the recent policy renewal.

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

AON agreed with this recommendation and has urge PRASA to include such coverage on renewals but PRASA has declined the recommendation.

Lone Star confirms that it was not included in the recent renewal. PRASA still declines to include, as it will represent an increase on premium.

5. The applicability of the Medical Expenses coverage should be addressed within the policy. PRASA's commercial general liability program provides a \$10,000 per person limit for Medical Expenses, but the policy has a \$100,000 deductible liability retention. MARSH recommended that an endorsement in the policy be included that states that the deductible liability Retention will not apply to Medical Expenses hence coverage would be first dollar.

AON agreed with this recommendation and has requested its inclusion to the insurer.

PRASA feels that this inclusion is not necessary and additionally indicates that it has an escrow account with MAPFRE for payouts (\$0.5 M/month).

7.3.4 Automobile Liability

PRASA maintains automobile liability coverage through MAPFRE. Renewal of policy occurred in July 2017 and extends until July 2018 and includes:

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- 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.
- 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 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. This coverage is subject to a deposit premium and an annual revision at a rate of 7.5%.
- Garage liability coverage is under the Compulsory Liability Insurance policy.
- 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". 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.
- Comprehensive and collision Trailer interchange coverage is provided for non-owned trailers, 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.

7.3.4.1 Recommendations & Responses

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

1. Hired and non – owned Physical Damage coverage for vehicles less than \$40,000 should be included within the premium being charged and not subject to an annual adjustment of 7.5%. In fact, this amount should be increased to at least \$60,000. Vehicles that exceed this amount should be included for a flat charge and not subject to an annual adjustment of 7.5%.

AON agreed with this recommendation and submitted it to the insurer (MAPFRE) for review and quoting. It might result in a premium increase.

PRASA indicated that it was not included in the recent renewal. It is only done for vehicles that exceed \$40,000. Payments for physical damages are made from the fleet budget.

2. 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.

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Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the recommendation was adopted for the 2017-2018 renewal period.

3. Drive other Car coverage is included only for Liability. MARSH recommended that it be broadened to include both Physical Damage and Medical Payments coverage.

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 recent policy renewal.

7.3.5 Umbrella and Excess Liability

PRASA maintains a primary umbrella policy which provides a \$20M limit excess of the primary general, automobile and employer's liability policies. 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. Coverage is provided through MAPFRE.

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

7.3.5.1 Recommendations & Responses

The following pending recommendation was previously made by MARSH including AON comments regarding PRASA's Excess Liability program. Also, included is confirmation of action by Lone Star of said recommendation:

1. Include the Garage Liability policy issued by MAPFRE under the Commercial Umbrella's "Schedule of Underlying Insurance", in order to achieve the higher limits provided by the Excess Liability program for any Garage Liability claim that could exceed policy limits or could be excluded from coverage under said program.

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

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the recommendation was adopted for the 2017-2018 renewal period.

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 in July 2017 and extends until July 2018. 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 and July 1, 2014 for the second and last excess issued by Berkley Insurance Co. The D&O carriers and limits are shown in Table 7-4.

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Table 7-4. Directors and Officers Liability

Insurer	Limit
Chubb Insurance Company (Primary)	\$15 million
Liberty International Underwriters (First Excess Layer)	\$10 million excess of \$15 million
Berkley Insurance Company (Second Excess Layer)	\$10 million excess of \$25 million
Liberty International Underwriters (Second Excess Layer)	\$10 million excess of \$35 million
AIG Insurance Company (Second Excess Layer)	\$5 million excess of \$45 million
Total D&O Limit	\$50 million

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.

MARSH previously completed a benchmarking analysis, shown in Figure 7-1 using proprietary information to determine in absolute terms if the limit purchased by PRASA is aligned with limits carried by peers.

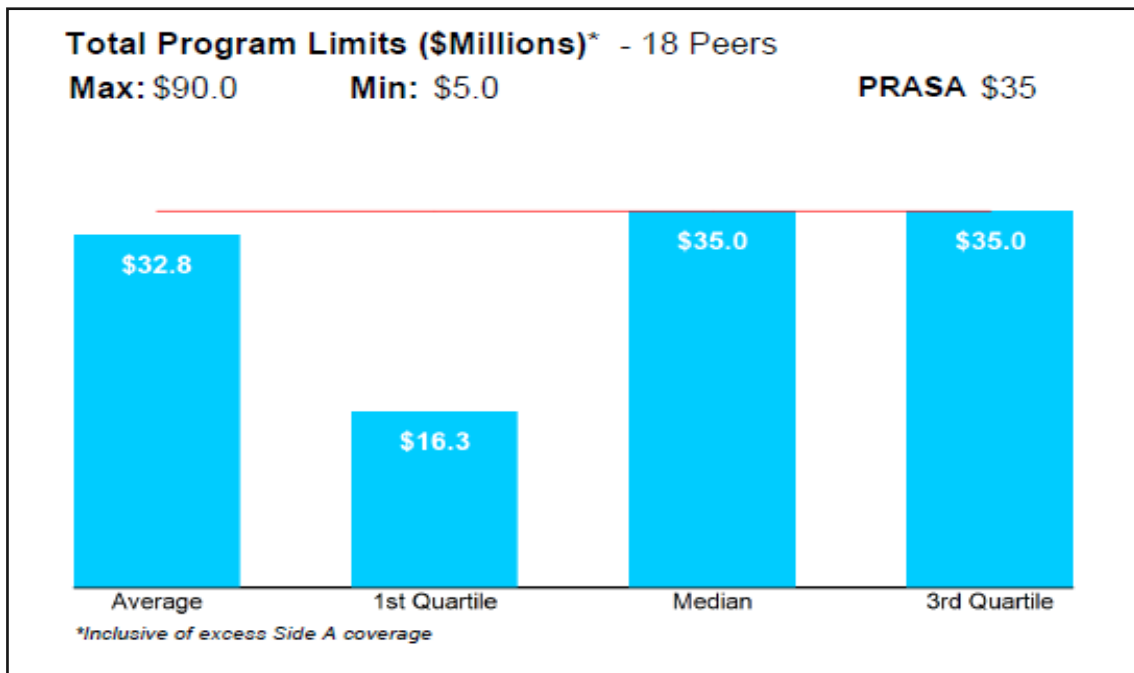


Figure 7-1. Directors and Officers Liability Benchmarking Analysis

With regard to the terms and conditions of the policy, the policy form is a fairly basic Directors & Officers Liability coverage that provides coverage for allegations of wrongful acts made against an Insured. The definition of Insured includes the corporate entity, PRASA, and its employees.

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The following pending recommendations were previously made by MARSH, including AON comments regarding PRASA's Directors and Officers insurance. Also, included is confirmation of action by Lone Star of said recommendations:

1. **Consider Re-negotiating Definition of Application Endorsement so that it is pertinent.** The Amend Definition of Application Endorsement makes reference to documents filed with the Securities & Exchange Commission. The intent of this endorsement should be to limit information used in underwriting to information received within the last year. This clarification is important because when faced with large claims insurance carriers frequently evaluate the opportunity to rescind the policy. When documentation is limited to that submitted within the past year, it is more difficult for them to rescind the policy.

AON agreed with this recommendation and requested insurer for the correct endorsement.

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report no response has been provided to confirm whether the revision was adopted for the 2017-2018 renewal period.

2. **Consider Eliminating the Private Company Endorsement.** There appears to be a conflict in wording with regard to the Securities Coverage. The policy has a Private Company Endorsement that adds coverage for the corporate entity by changing Insuring Clause C from Company Securities Liability to Company Liability eliminating the securities coverage. The Private Company endorsement has a specific Public Offering of Securities exclusion. MARSH recommended eliminating the Private Company endorsement. Chubb can include the employees as Insured's by an additional endorsement.

AON, as PRASA's BOR, won't recommend eliminating the Private Company endorsement but will instead revise its wording to harmonize the securities coverage.

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the revision was adopted for the 2017-2018 renewal period.

3. **Consider Amending Securities Claim Definition** to include administrative or regulatory proceeding against PRASA when such proceeding is also commenced and continuously maintained against an Insured Person. Currently, such proceedings are specifically excluded.

AON agreed with this recommendation and requested insurer for the amendment.

Lone Star confirms that this was included on the policy renewal.

4. **Consider Requesting Clarification to Discovery Period endorsement.** Lastly, it appears that the intent of the Discovery Period (90 Days) endorsement is to allow 90 days for PRASA to pay the premium for the extended reporting period. To achieve this, the only amendment necessary is to change the thirty-day term to 90 days in Section 4, Paragraph one. The current wording references a bond policy, which is not the case and creates the impression that the premium for a 90-day extension is 75% of the annual premium when generally Chubb charges 75% for a one-year extension term.

AON agreed with this recommendation and requested a revision of the wording to the carrier in order to clarify the intention of the endorsement.

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the recommendation was adopted for the 2017-2018 renewal period.

5. **Consider Requesting Amendments so that the Second layer is follow form and “drops down”.**
The second excess layer issued by Berkley should be follow form and as such should be amended to eliminate the Bankruptcy exclusion and a drop-down exclusion allowing the underlying limit to be eroded by either payment under the policy or payment of the underlying limit by another source should be added.

AON disagreed with this recommendation stating that a Drop-Down Endorsement had already been requested to the insurer.

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the drop-down endorsement was included for the 2017-2018 renewal period.

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. Renewal of policy occurred in July 2017 and extends until July 2018. Excess EPL coverage is through Berkley Insurance Company for \$5M each Claim but in no event exceeding \$5M in the aggregate for all Claims.

7.3.7.1 Recommendations & Responses

A benchmarking study, shown in Figure 7-2 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 \$6.8MM were carried. PRASA decided to reduce to the median based on previous years.

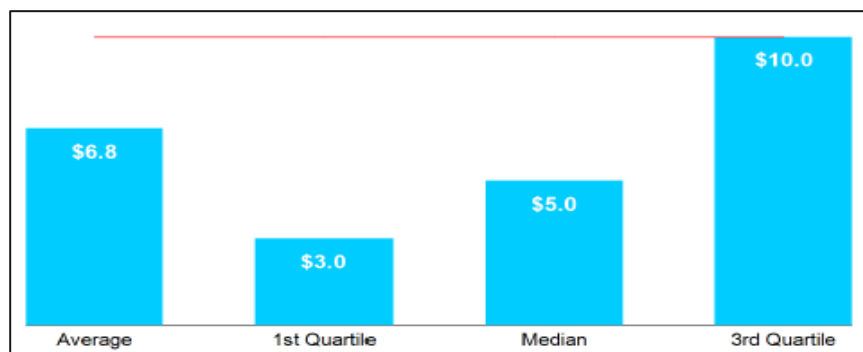


Figure 7-2. Employment Practices Liability Benchmarking Analysis

The following pending recommendation was previously made by MARSH, including AON comment regarding PRASA's Employment Practices policies. Also, included is confirmation of action by Lone Star of said recommendation:

1. The EPL Excess does not include a Drop-Down Endorsement to govern when and how such excess policy will respond on behalf of the Insured in the event of the primary policy's exhaustion.

AON states that a Drop-Down Endorsement has already been requested to the insurer.

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the drop-down endorsement was included for the 2017-2018 renewal period.

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, 2017 and extends until July 2018. A retroactive date of July 1, 2002 applies.

7.3.9 Professional Liability

PRASA maintains a miscellaneous errors & omissions liability policy through Chubb, providing a \$25M per claim limit and a \$50M annual aggregate limit, subject to a \$100,000 per claim deductible. Renewal of policy occurred in June 2017 and extends until June 2018. The policy is written on a claims-made basis and claims and defense costs are included within the limit. The policy has a September 21, 2004 retroactive date. Coverage applies to contract administration, design, engineering, consulting, inspection, and construction management, including planning, permitting, regulatory compliance services, land acquisition, assisting in construction, procurement assistance, start-up services, testing and extended commissioning under the PRASA multi-year CIP as modified by the PRASA Board of Directors from time to time.

7.3.9.1 Recommendations & Responses

The following pending recommendations were previously made by MARSH, including AON comments regarding PRASA's Errors & Omissions policy. Also, included is confirmation of action by Lone Star of said recommendations:

1. **Consider amending Section III. Definition, Item G. Client**, to mean any Third Party with whom the Insured has a formal written contract in place eliminating "for the supply of the Insured's Professional Services in return for a fee". Most claims under this policy are centered around contract disputes with contractors. The current policy definition does not accurately reflect the intent of an Owner Controlled Insurance Program of this type.

AON agreed with this recommendation and requested an amendment.

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Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the recommendation was adopted for the 2017-2018 renewal period

2. **Consider amending Section V., Item M.,** Contractual Liability exclusion to add a clarification at the end of the exclusion as follows: "however, this exclusion will not apply to Professional Services as defined in Item 5." Many of the claims filed under the policy have to do with contract administration. This exclusion might preclude coverage for these claims.

AON agreed with this recommendation and requested an amendment.

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the recommendation was adopted for the 2017-2018 renewal period.

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.

7.3.10.1 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 & 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 has advocated so the last two renewals. Has not been 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. AIG - PR and Chubb Insurance Company (50% - 50% each) are the insurers. Coverage applies to all risks of direct physical loss, except as excluded by the policy. The maximum contract value per contract is US\$50,000,000.00. The Limit of Liability in any one occurrence and in the annual aggregate for the policy term is US\$100,000,000.00. 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.

The AOP deductible is US\$20,000.00 any one occurrence. Other deductibles are 2% for flood and 2% named 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\$100,000.00 deductible in any one occurrence applies for damage to Principal's existing property, property insured while undergoing testing and commissioning; and in respect to damage to existing property.

7.4.1.1 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 February 2017 policy renewal.

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 sub limit would require additional premium. To be discussed with PRASA for the next renewal presentation.

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Lone Star confirms that this was not included on the recent policy renewal. Due to the ongoing fiscal situation PRASA is hesitant to add additional costs.

3. Requested deleting endorsement MR106- Warranty concerning sections limiting the length of certain ground works, to a maximum length of section of 1,000 feet.

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

Arcadis requested confirmation from Lone Star via PRASA. At the time of submission of this Report, no response has been provided to confirm whether the recommendation was adopted for the 2017-2018 renewal period.

4. Consider including a "Claims Preparation Expense" additional coverage sublimit to provide for the necessary and reasonable fees or expenses incurred by the insured's customary auditors, accountants, architects or engineers that may assist the insured proving a claim.

AON states that this kind of sub limit will require additional premium. To be discussed with PRASA for the next renewal presentation.

PRASA declined to include in recent policy renewal, as it is cautious to increase premium costs due to the dire fiscal situation.

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 6-5.

Table 7-5. 2017-2018 OCIP General Liability Coverages and Limits

Coverage	Limit
Each Occurrence	\$2 million
General liability – General Aggregate	\$4 million
Personal and Advertising Injury	\$2 million
Products/ Completed Operations - Aggregate	\$4 million
Employer's Liability Stop Gap	\$2 million
Fire Damage (Any One Fire)	\$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.

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. AON submitted this recommendation to the carrier to discuss it with PRASA for the next renewal presentation.

PRASA maintained the 5 years in the February 2017 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 limits of insurance are US\$ 50,000,000.00 Each Incident and US\$100,000,000.00 Policy aggregate, in excess of the primary OCIP commercial general liability limits of insurance. Each incident retained limit is the underlying insurance or US\$10,000.00 Self Insured Retention (SIR).

The Completed Operations coverage extension is for five years from the termination date of the policy or its renewal(s).

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. The policy provides a \$25M limit each loss and annual aggregate subject to a \$25,000 SIR, and covers PRASA and OCIP contractor participants.

7.4.5 Conclusions

In the opinion of Arcadis, 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.

Particularly, PRASA should address the following key recommendations:

1. Re-Conduct a PML Study considering new CAT Modellings and parameters.
2. 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 & severity of a breach.
3. Consideration to Terrorism Coverage, which is excluded under all current PRASA's Insurance Programs.
4. Consideration to include in next Crime Policy renewal - Knowledge or Discovery of Loss clauses should be re-negotiated to specifically identify positions triggering knowledge of incidents to minimize the risk of carrier declines for late reporting.
5. Consideration to broaden Drive Other Car coverage to include both Physical Damage and Medical Payments coverage.

8 SYSTEM ASSETS AND FINANCIAL ANALYSIS

8.1 Introduction

In accordance with the MAT (as amended) and the 2012 FOA, 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 FY2016, most recent data available from and provided by PRASA. FY2017 System additions and retirements were requested, but the final audited numbers are not available as of the date of this report. Also, Arcadis evaluated PRASA's financial forecast as included in PRASA's Fiscal Plan and assessed the appropriateness of rates and charges. A summary of the findings is provided in this section.

8.2 System Assets

8.2.1 Fixed Assets Changes

Table 8-1 shows that, as of June 30, 2016, PRASA had an estimated total book value of fixed (capital) assets of approximately \$6,777M. Additionally, PRASA has approximately \$409M of assets that are currently under construction or as "Work in Progress". Including land and other non-depreciable assets, as of June 30, 2016, the book value of PRASA's total fixed assets amounts to \$7,261M (net of accumulated depreciation).

Table 8-2 provides a summary of the fixed assets changes from FY2014 to FY2015 and from FY2015 to FY2016.

Table 8-1. Estimated Fixed Assets Summary through June 30, 2016 (\$, Millions)

	Original Cost	Accumulated Depreciation	Book Value
Fixed Assets	\$10,849	(\$4,072)	\$6,777
Work in Process	409	-	409
Land and other Non-Depreciable Assets	75	-	75
Total Fixed (Capital) Assets	\$11,333	(\$4,072)	\$7,261

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

	FY2014-2015	FY2015-2016
Fixed Assets (Net of Accumulated Depreciation)	(\$114,874)	\$143,724
Work in Process	146,360	(386,017)
Land and other Non-Depreciable Assets	1,104	731
Total Fixed Asset Changes	\$32,590	(\$241,562)

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PRASA's Total Assets were estimated at \$7,872M as of June 30, 2016. Total Assets include: current assets (approximately \$338M), restricted assets (approximately \$246M in restricted cash and cash equivalents), total capital assets (\$7,261M as previously mentioned), and other assets (\$27M in deferred loss resulting from debt refunding). For additional discussion regarding PRASA's assets, please refer to PRASA's Audited Financial Statements available on PRASA's website, under Investor Relations section.

8.3 PRASA's Rate Structure

Tables 8-3 through 8-5 summarize the existing rates for residential customers as implemented on July 15, 2013.

Table 8-3. 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 8-4. 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

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

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

Tables 8-6 through 8-9 summarize the existing rates for non-residential customers (includes commercial, industrial and certain government customer classes) as implemented on July 15, 2013, and amended on December 18, 2013. However, certain government customers continue to be billed using PRASA's previous non-residential rate structure under Act 66-2014.

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

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

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

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

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Table 8-8. Industrial Volumetric Rate per Cubic Meter

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

Table 8-9. ECRC for Non-Residential Customers

Commercial and Government ECRC Meter Size Equal to or Less than 2-inches ¹			
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

Additionally, in 2013 PRASA's Governing Board also included rate revisions to other services provided by PRASA including, but not limited to: new service connections, service re-connections, and sprinkler systems service. The revised rates for these services were designed to cover PRASA's cost of services. The new rates for these services were implemented on a phased approach over three fiscal years (FY2014 through FY2016).

8.3.1 Future Rate Increases

As approved by PRASA's Governing Board, future rate increases, which shall not be implemented before FY2018, 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:

- STEP 1 – Calculate the Coefficient of Deficiency (CD) for the applicable year:

$$CD = \text{Operating Expenses and Debt Service} / \text{Operating Revenues}$$

- STEP 2 – Calculate the Coefficient of Annual Base (CAB) for the Base Year:

$$CAB = \text{Operating Expenses and Debt Service (FY2007)} / \text{Operating Revenues (FY2007)}$$

- STEP 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, of the Commonwealth of Puerto Rico. The first step under Act 21-1985 requires review and ratification by PRASA's Governing Board of the proposed rate structure and approval to initiate the rate modification/increase process. The second step is the appointment of an independent Official Examiner that will conduct an independent review of the proposed changes and increases, and will lead public hearings. The third step is the development of a report by the Official Examiner that includes his findings and recommendations, to be considered by PRASA's management and Governing Board prior to final approval of the rate structure modifications and increases to be implemented. This report is published for public commentary. The fourth step and final step is the review and final approval by PRASA's Governing Board, considering the Official Examiner's recommendations.

To cover all projected operating expenses, CIP needs and debt service obligations (assuming debt restructuring or new external financing is attained), PRASA included in its Fiscal Plan a series of consistent, but moderate rate increases as required by the Oversight Board. Therefore, assuming that all

initiatives will be implemented and that a debt relief will be achieved through the current negotiations, the following annual rate increase per customer type shall be applied starting FY2018 through FY2026:

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

Customer Type	Annual Rate Increase
Residential	2.5%
Commercial	2.8%
Industrial	3.5%
Government	4.5%

As the proposed rate increase is less than 4.5% per year PRASA is expecting to implement the change through the automatic increase allowed by the existing Rate Resolution. The impact of these rate increases is further discussed in the next section.

8.4 FY2016 Results, FY2017 Projections and FY2018-FY2026 Forecast

Arcadis reviewed the financial information provided by PRASA as included in the Fiscal Plan, which is summarized in Exhibit 1 and provided at the end of this Section. This section summarizes Arcadis's review and provides an assessment of PRASA's financial condition, particularly as it relates to assessing PRASA's financial results for FY2016, projected results for FY2017, and the reasonableness of PRASA's assumptions in the preparation of the ten-year financial projections (the forecast period or the Forecast) from FY2017-FY2026, to assess the sufficiency of the revenues necessary to support the projected operations and capital costs as shown in Exhibit 1; including O&M expenses, debt service payments, and required deposits in compliance with the MAT (as amended) and the 2012 FOA. Additionally, the Forecast illustrates the anticipated DSC, for the forecast period.

The following information, provided by PRASA, was reviewed:

- MAT and FOA, as amended and restated
- Sixth Supplemental Agreement of Trust
- Audited financial statements for FY2016
- PRASA's FY2016 actual results
- PRASA's FY2017 projections (through March 31, 2017)
- PRASA's FY2018 Annual Budget
- PRASA's Fiscal Plan, including revenue and expense projections
- Debt service schedules for all currently outstanding debt service and preliminary projected debt obligations, and DSCs

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 actual operating revenues for FY2016 and projections for FY2017 to FY2026, on a cash basis, are presented in Table 8-11.

Table 8-11. PRASA Operating Revenues (\$, Millions)

Fiscal Year	Operating Revenues	Fiscal Year	Operating Revenues
FY2016 Actual	\$1,108	FY2022 Projected	\$1,244
FY2017 Projected ¹	\$1,042	FY2023 Projected	\$1,282
FY2018 Annual Budget ²	\$1,088	FY2024 Projected	\$1,319
FY2019 Projected	\$1,115	FY2025 Projected	\$1,357
FY2020 Projected	\$1,160	FY2026 Projected	\$1,394
FY2021 Projected	\$1,206		

¹ Projected based on results through March 31, 2017.

² As approved by PRASA’s Governing Board on June 27, 2017.

A discussion on PRASA’s Operating Revenue assumptions is presented below.

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1. Base Fee and Service Charges, Net of Subsidies (Exhibit 1, line 1) – PRASA's single largest source of revenue is from the monthly base charge and volume rate for services, the ECRC, and the Special Charge of \$2.00. PRASA's actual FY2016 revenues from Service Revenues net of subsidies, amounted to \$898M. The FY2016 actual results consider a reduction in consumption mainly because of the water rationing program implemented during the drought period experienced during the first two quarters of FY2016 which resulted in lower billings through most of the fiscal year. Also, it considers reduced government charges because of Act 66-2014 (estimated at approximately at \$30M), which expired on June 30, 2017.

PRASA's Base Fee and Service Charges for FY2017, net of subsidies (Service Revenues) are projected at about \$985M, which partially excludes the reduction experienced in FY2016 due to the drought and is approximately \$7.4M more than what was budgeted for FY2017. PRASA's approved Annual Budget for FY2018 includes Service Revenues, also net of subsidies, in the amount of \$1,017M, which represents a net increase of \$32.6M over FY2017 projected results. Table 8-12 provides a breakdown of PRASA's Service Revenues for FY2016 through FY2026, including proposed rate increases that will implemented starting in FY2018 in compliance with the Fiscal Plan. As shown, Service Revenues are expected to increase from the FY2017 projection of \$985M, up to \$1.2B by 2026.

PRASA's Service Revenues are presented net of subsidies. While all customers pay for service, PRASA provides a 35% subsidy to the base charge for residents over the age of 65 who are eligible under the PAN (Programa de Asistencia Nutricional by its Spanish acronym) Program or residents under the TANF (Programa de Asistencia Temporal para Familias Necesitadas by its Spanish acronym) Program; both government assistance programs. Also, since FY2010, and in compliance with Act 69 of August 2009, now Law 22-2016, PRASA provides a subsidy to all public housing residential customers limiting the monthly payments of these customers to only the water and wastewater base fee charge. Tables 8-13 and 8-14 summarize the number of residential customers that are provided a subsidy for water and wastewater bills as of June 30, 2016 and as of April 30, 2017, respectively. The number of customers benefiting from the PAN subsidy has varied from 48,873 reported by PRASA for FY2015 to 56,229 in FY2016 and 58,234 in FY2017. While the number of customers benefiting from the TANF subsidy increased from 11,676 in FY2015 to 15,912 in FY2016, but slightly reduced to 15,312 in FY2017. The number of public housing customers under a fixed tariff increased from 51,919 in FY2015 to 56,535 in FY2016 and down to 52,165 in FY2017.

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Table 8-12. PRASA Service Revenues - Excluding Operational Initiatives (\$, Thousands)

Service Revenue Category	FY2016 Actual	FY2017 Projected ³	FY2018 Annual Budget	FY2019 Projected	FY2020 Projected	FY2021 Projected	FY2022 Projected	FY2023 Projected	FY2024 Projected	FY2025 Projected	FY2026 Projected
Base Fee, Volume Charges, and ECRC ¹	\$873.6	\$955.8	\$983.5	\$981.1	\$978.6	\$976.2	\$973.8	\$971.4	\$969.0	\$966.6	\$964.2
Special Charges (\$2.00)	29.0	28.7	28.6	28.6	28.5	28.4	28.4	28.3	28.2	28.2	28.1
Rate Increases ²	0.0	0.0	5.1	44.0	70.4	96.6	124.4	153.9	184.2	215.3	247.3
Total (Net of Subsidies)	\$902.6	\$984.6	\$1,017.2	\$1,053.7	\$1,077.5	\$1,101.2	\$1,126.6	\$1,153.6	\$1,181.4	\$1,210.1	\$1,239.6

¹ Based on existing rates, includes rate adjustments, and projected reductions due to consumption reduction.

² Revenues generated from rate adjustments implemented in each year, in accordance with the Fiscal Plan; net of new electronic bill discount.

³ Based on results through March 31, 2017.

Table 8-13. Water and Wastewater Subsidized Customer Accounts FY2016

Subsidy	Number of Customers	Percent of Total Residential Customers ¹
PAN Subsidy	56,229	4.8%
TANF Subsidy	15,912	1.4%
Fixed Tariff (Public Housing)	56,535	4.8%
Total	128,676	11.0%

¹Based on a total number of residential customers of 1,174,710 as of June 30, 2016.

Table 8-14. Water and Wastewater Subsidized Customer Accounts FY2017

Subsidy	Number of Customers	Percent of Total Residential Customers ¹
PAN Subsidy	58,234	5.0%
TANF Subsidy	15,312	1.3%
Fixed Tariff (Public Housing)	52,165	4.1%
Total	125,711	10.4%

¹Based on a total number of residential customers of 1,175,615 provided by PRASA as of June 30, 2017.

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PRASA's Service Revenue projections are based on certain assumptions, including growth and consumption assumptions that could be affected by numerous factors. For example, the continued strain on the economy could cause a further decline in the consumption patterns of PRASA customers, or the timeliness or results of the revenue initiatives included in the Fiscal Plan may differ from projections. Additional discussion on PRASA's Service Revenue assumptions is provided below.

Growth and Consumption Assumptions

PRASA has experienced a compound annual reduction in number of accounts of about 0.4% per year in the last five fiscal years. Furthermore, as shown in Table 8-15, from FY2016 to FY2017 the number of customer accounts slightly decreased. Compared to FY2016, there was a minimal increase in the residential accounts. However, the number of accounts of all other customer classes reduced, with the higher percentage observed in the number of industrial accounts which reduced by about 4.4% from FY2016 to FY2017; while commercial and government accounts reduced by approximately 1.5%.

Table 8-15. PRASA Customer Accounts

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2016 ¹	1,174,710	50,994	843	10,209	1,236,756
FY 2017 ²	1,175,615	50,247	806	10,060	1,236,728
% Difference	0.1%	-1.5%	-4.4%	-1.5%	0.0%

¹ Number of accounts by customer class through June 30, 2016.

² Number of accounts by customer class through June 30, 2017.

In recent years, the average monthly billed consumption per account fluctuated from an increase of 2.6% from FY2012 to FY2013, to a reduction of 4.2% from FY2013 to FY2014, a reduction of 5.8% from FY2014 to FY2015, and an additional reduction of 8.4% from FY2015 to FY2016. In FY2017, PRASA's total average monthly billed consumption increased by approximately 4.0% compared to FY2016 which, in turn, resulted in an increase in the average billed consumption per account of approximately 3.9%, as shown in Tables 8-16 and 8-17. This increase, however, was expected as customer consumption stabilized after the 2015 drought ended. That said, FY2017 consumption results are lower than those registered prior to the drought period: in FY2014, PRASA's average monthly consumption per account was 20.6 m³ whereas in FY2017 it was 18.5 m³. Overall, since FY2012 PRASA has experienced a compound annual reduction in average monthly billed consumption per account of about 2.5% per year.

Table 8-16. Average Monthly Billed Consumption by Class FY 2016 - FY2017
(1,000 Cubic Meters)

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2016 ¹	16,170	2,510	1,218	2,078	21,977

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Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2017 ²	16,354	2,644	1,194	2,674	22,867
% Difference	1.1%	5.3%	-2.0%	28.7%	4.0%

Table 8-17. Average Monthly Consumption per Account FY2015-FY2016
(Cubic Meters)

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2016 ¹	16,170	2,510	1,218	2,078	21,977
FY 2017 ²	16,354	2,644	1,194	2,674	22,867
% Difference	1.1%	5.3%	-2.0%	28.7%	4.0%

1 Based on information through June 30, 2016.

2 Based on information through June 30, 2017.

According to the U.S. Census Bureau, there was a 1.6% decline in Puerto Rico's population between 2012 and 2016.²⁰ Additionally, the Oversight Board is projecting that Puerto Rico's population will continue to decline over the next ten years at an estimated annual rate of 0.25%. This trend in population decline is one of the reasons of 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.

To account for the possibility of further reductions in customer accounts and consumption during FY2018, the Forecast includes a reduction in Service Revenues of 0.25% in each year compared to the previous year results. Note that, given the drought adjustments made in both FY2016 and FY2017, this 0.25% reduction assumption is not apparent in the results presented in Table 8-12. However, considering the projected 0.25% reduction in population and the average monthly billed consumption per account of the past five fiscal years, this 0.25% reduction assumption could be optimistic.

The U.S. Census Bureau historical data reports a more aggressive population decrease from FY2015 to FY2016 of 1.8%, as compared to the 0.25% reduction projected by the Oversight Board (official U.S. Census Bureau data for FY2017 is not yet available). Additionally, although no longer in effect, in FY2013 the Puerto Rico's Planning Board (PRPB) projected that Puerto Rico's population was going to continue to decline over the next eight years at an estimated annual rate of 1.3% and revised those projections in FY2017 to a 1% annual rate reduction trend through FY2025. If population continues to decline at a rate greater than 0.25% per year, and average consumption per account does not increase further, revenues could decrease at a higher rate than the projected 0.25% reduction.

²⁰ The U.S. Census Bureau shows Puerto Rico population in 2012 was 3,634,487 and 3,411,307 in 2016.

Act 66-2014 Assumptions

A fiscal emergency for the Commonwealth of Puerto Rico was declared through the enactment of Act 66-2014, which required that its instrumentalities (i.e., utilities, government agencies, and public corporations such as PRASA) implement certain measures to reduce its expenses. Act 66-2014 remained in place for three years up until July 1, 2017. Act 66-2014 stipulated that executive branch agencies whose operating costs are covered in whole or in part with funds from the General Fund are not required to pay the rate increase implemented by PRASA on July 15, 2013, as amended on December 18, 2013. This represented a reduction of billings estimated at approximately \$20M in FY2014 and of about \$30M in each fiscal year thereafter. However, starting in FY2018, as forecasted in the Fiscal Plan, all government customers will be subject to the existing PRASA water and wastewater rates regardless of whether they are covered by the General Fund.

Act 68-2016 Assumptions

Although Act 68-2016 is still in effect, all efforts are now focused towards the compliance the Fiscal Plan, as certified by the Oversight Board, considering the Act 68-2016 mechanism or some other mechanism needed under the current debt restructuring effort. Although PRASA is actively seeking debt restructuring opportunities with federal agencies and bondholders, PRASA's Forecast does not consider any impact of Act 68-2016.

Rate Increases

As proposed in the Fiscal Plan, annual rate increases shall be applied each year of the Forecast, starting in FY2018, as follows:

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

PRASA expects to obtain a total of approximately \$1,141M additional revenues by FY2026 from the annual rate increases, from which \$5.1M additional revenues are projected and included in the FY2018 Annual Budget, as presented in Table 8-12. 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 Revenues 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.

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- Continued strain on the economy, the high unemployment rate in Puerto Rico²¹, and the reduction in new construction permits and economic activity index²², 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.
 - Proposed rate increases could vary depending on PRASA's revenue and expense results, and ability to achieve the expected results from the initiatives included in the Fiscal Plan.
- Transfers 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 moneys 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. In its FY2016 actual results, PRASA made a total transfer from the Rate Stabilization Account of \$90M to pay the outstanding balance of financing facilities used to pay for its CIP and related financing, legal and interest costs. This brought the Rate Stabilization Account's total balance available for use in future years down to \$1.2M. In FY2017, PRASA did not make any transfers (deposits) into the Rate Stabilization Account, and is not forecasting any deposits or withdrawals during the rest of the forecast period.
 - Revenue Optimization Program – Operational Initiatives (Exhibit 1, lines 3 & 4) – Table 8-18 presents a summary of the revenues generated in FY2016 and FY2017, and projected for the forecast period (note that actual amount forecasted is less than projected opportunity).

Table 8-18. Revenue Optimization Program Initiatives (\$, Millions)

Fiscal Plan	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026
Initiatives	Actual	Projected ¹	Annual Budget	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
Operational Initiatives - Collections	\$103.2	\$98.6	\$98.4	\$98.2	\$97.9	\$97.7	\$97.4	\$97.2	\$97.0	\$96.7	\$96.5
Billing to Collections Adjustments	8.5	4.5	4.5	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0

¹ Based on Operating Revenues collected through March 31, 2017.

Arcadis believes that PRASA has a strong commitment to its Operational Initiatives (as evidenced by historical results), and to achieving the goals outlined for each initiative. Considering the historical performance of Operational Initiatives, and the projected benefits that could be achieved (as detailed below), Arcadis finds the projections reasonable. Nonetheless, PRASA's assumptions for the incremental revenues from Operational Initiatives rely on the effective and timely implementation of these initiatives.

²¹ Based on the U.S. Bureau of Labor Statistics, as of June of 2016 the unemployment rate in Puerto Rico was 11.2%; Source: www.bls.gov/lau/

²² Source: Puerto Rico Economic Indicators; Puerto Rico Planning Board

Any changes to the implementation schedule could materially affect PRASA's projections. As such, PRASA should continuously monitor its results and make adjustments as necessary.

Revenue Optimization Program Assumptions

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. These initiatives, which together make up the Revenue Optimization Program, have resulted in significant additional revenue for PRASA over the past five fiscal years. Approximately \$100M per year of PRASA's revenues (or about 10% of total Operating Revenues) are generated from these initiatives.

Figure 8-1 presents this increasing tendency in revenue generated from PRASA's Revenue Optimization Program from FY2013 to FY2017. As shown, PRASA has consistently exceeded its budgeted amount for operational initiatives. In FY2016, PRASA collected approximately \$111.7M through its Revenue Optimization Program, which is about 17% higher than the FY2016 approved budget amount of \$97.9M. It should be noted that the significant increase from FY2013 results to FY2014 results (an increase of approximately 32%) and from there on, considers the rate increase implemented by PRASA on July of 2013. As of June 30, 2017, PRASA collected approximately \$150M through the Revenue Optimization Program, that is, 26% more than the FY2017 target of \$119M and 53% more than the FY2017 approved budget of \$97.9M.

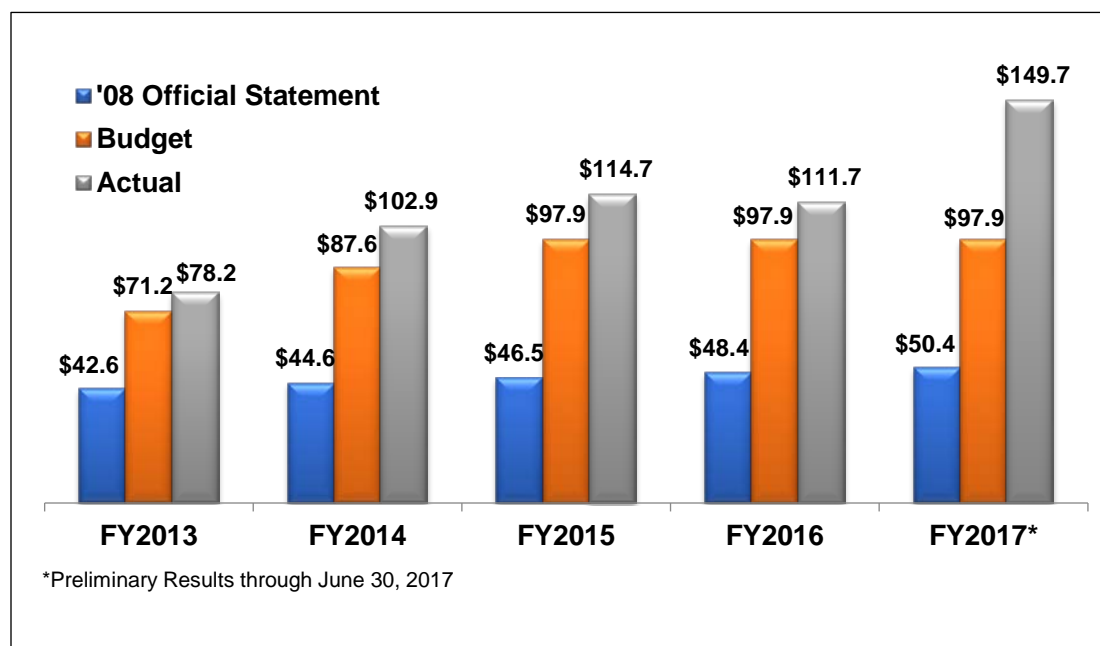


Figure 8-1. Revenue Optimization Program Results FY2013-FY2017 (\$, Millions)

In future years, as included in the Fiscal Plan, PRASA projects a decrease in the Revenue Optimization Program's revenues from \$98.4M in FY2018 to \$96.5M in FY2026 as shown in Exhibit 1, mostly because of the projected 0.25% reduction in Service Revenues applied by PRASA to its Forecast. The Revenue Optimization Program's annual target (which is higher than the amount included in PRASA's Forecast),

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however, projects an increase from \$119M in FY2019 to \$123M in FY2022, totaling revenue increases of approximately \$1,108M since FY2013, when the program was implemented.

4. Adjustment for Uncollectibles (Exhibit 1, line 5) – Prior to the rate increases implemented in 2005 and 2006, PRASA's historical percentage of Adjustment for Uncollectibles was approximately 4% of its Service Revenues. Although PRASA's rate of uncollectibles increased significantly in the years following the 2005/2006 rate increases, in FY2012 and FY2013, PRASA's rate of uncollectible accounts (including collections from prior years) stabilized below 5%.

Unlike historical results, PRASA's collections surpassed its billings during FY2016 by \$6.5M. Factors contributing to this unusual, and likely one-time, result include: (1) lower billings because of reduced customer consumption and water control measures implemented during the drought, (2) time lag between billings and collections due to PRASA's billings cycle, and (3) proactive collections efforts resulting in collection of prior year billings. In FY2017, PRASA assumed an Adjustment of Uncollectibles of Service Revenues and additional billings from Operational Initiatives of 6% to account for the possibility of a reduction in collections given the fiscal crisis affecting the Commonwealth and considering historical results prior to FY2016. As presented in the projected FY2017 results, PRASA expects to reach an Adjustment of Uncollectibles of 5%.

For its FY2018 Annual Budget and through FY2026, PRASA has assumed an Adjustment of Uncollectibles of Service Revenues and additional billings from Operational Initiatives of 4%. To maintain its rate of uncollectibles at or below this assumed level, PRASA expects that the execution of the PPP Project will be effective in promptly addressing customer complaints and service disconnections, and PRASA will continue to proactively pursue government account payments. PRASA has also assumed, for its FY2018 Annual Budget that it will collect about \$4.5M from from prior years.

Arcadis finds this amount reasonable; however, PRASA should closely monitor changes in economic indices for the Commonwealth and continuously monitor collection results given the uncertain economic and fiscal situation for Puerto Rico as a whole. Also, the assumed rate of uncollectibles 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 as a result of cost controls and budgetary actions imposed under PROMESA or by the Central Government, or 3) worsening economic situation in Puerto Rico.

5. Other Income (Exhibit 1, line 6) – 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 FY2016 and FY2017 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.

The final phase of the revised rates for new service connections and some of the other services considered under Miscellaneous Income came into effect in FY2016. These increases vary, depending on the service, as follows: 8% increase in sprinkler service connection fees, 20% increase in new service connections and water meter test fees, 33% increase in residential services

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reconnection fees, and about a 40% increase in commercial and industrial services reconnection fees. PRASA's Other Income revenues for FY2016 totaled \$10.0M, of which approximately \$6.0M was from Miscellaneous Income and \$4.0M from Special Assessments. The FY2017 projected results show that PRASA expects to collect approximately \$8.0M, of which approximately \$4.0M are from Miscellaneous Income and \$4.0M from Special Assessments. From FY2012 to FY2016, Other Income has reduced at an annual rate of approximately 6.7%. PRASA is projecting \$8M (\$4M from Miscellaneous Income and \$4M from Special Assessments) in additional revenues from Other Income during the forecast period, reducing annually at a rate of 0.25% over the ten-year period.

Arcadis believes that PRASA's assumptions for Service Revenues 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 Rico²³, and the reduction in new construction permits and economic activity index²⁴, 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.

8.4.1.1 PRASA's Fiscal Plan Revenue Enhancing Initiatives

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: PPP Project, adjustment policy revision and a new disconnection fee. Additional revenues from these initiatives are expected to be obtained starting in FY2018 and every year of the Forecast thereafter as summarized in Table 8-19.

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

Fiscal Plan	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026
Initiatives	Projected	Annual Budget	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
PPP Project	\$0.0	\$0.0	(\$7.9)	\$17.2	\$39.6	\$53.6	\$64.0	\$74.2	\$83.9	\$91.1
Adjustment Policy Revision	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Disconnection Fee	0.0	2.3	1.5	1.2	1.2	0.9	0.9	0.6	0.6	0.6
Total Additional Revenues²	\$0	\$4.3	(\$4.4)	\$20.4	\$42.8	\$56.5	\$66.9	\$76.8	\$86.5	\$93.7

¹ Numbers may not add up due to rounding.

²³ Based on the U.S. Bureau of Labor Statistics, as of June of 2016 the unemployment rate in Puerto Rico was 11.2%; Source: www.bls.gov/lau/

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

PPP Project

PRASA is in the process of developing and entering into a PPP agreement with one or more firms for the design, build, finance, maintenance and operation of a series of improvements and technologies to enhance PRASA's customer service activities and to reduce the current high volume of NRW. The Project originates from PRASA's need and goals to change the way it currently operates its customer services and metering and billing practices, to address its NRW issue, and to increase operational efficiency and operating revenues through the incorporation of advanced technologies and processes. Because of PRASA's current financial situation, its executive management team has determined that it requires private enterprise expertise and capital funds to cover the estimated technological investments.

Considering the estimated PPP Project costs and the projected increases in revenue billings and collections, and if the preferred option is implemented; the PPP Project has the estimated potential to generate net benefits for PRASA in the order of \$400M, in present value, over a 10-year PPP contract term. However, differences in the following key assumptions will cause material deviations from this estimate and could either improve the net benefits for PRASA or render the PPP Project economically unfeasible:

- Cost of capital and internal rate of return desired by Contractor(s)
- Capital investments
- Realization of PRASA's cost savings after Project implementation
- Reduction of customer service headcount

A significant component of the PPP Project's projected net benefits for PRASA is conditioned on PRASA's ability to reduce its customer service headcount. While it is expected that a number of current PRASA employees will be hired by the private partner(s), to the extent that PRASA is not able to make the necessary staff adjustments, the expected PPP Project benefits could be materially affected.

Adjustment Policy Revision and Disconnection Fee

The adjustment policy revision is expected to reduce current adjustments by 60% or \$2M per year starting on FY2018. The new \$15 disconnection fee initiative is expected to generate total benefits of approximately \$1.1M per year (on average). Based on the annual number of disconnections performed (approximately 200,000 per year), PRASA estimates that the maximum revenue amount to be achieved from this initiative would be about \$3M per year. However, once implemented, PRASA expects that the new disconnection fee will deter clients from having their services suspended, thereby reducing the projected amount of annual disconnections performed. Therefore, over the forecast period, PRASA is assuming that the additional revenues from this initiative will decrease from \$2.3M in FY2018 to \$0.6M in FY2024.

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

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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.

In past fiscal years, PRASA has required other sources of revenues to be able to meet its obligations. Because PRASA delayed implementing a rate increase until July 2013, PRASA required support from the Central Government. In FY2011, PRASA received a contribution of \$105M from the Central Government General Fund to fund an otherwise anticipated operational deficit. In FY2012, a similar contribution was approved by the Puerto Rico Legislature in the Central Government's annual budget. PRASA received \$70.3M of the \$183.9M approved from this assignment in FY2012. The difference was covered with a \$95M draw from the Budgetary Reserve Fund, which was initially funded in FY2012 with bond proceeds from PRASA's 2012 bond issuance. To meet its FY2013 obligations and to comply with the requirements of Section 7.01 of the MAT, PRASA used \$145M (remaining balance) from the Budgetary Reserve Fund. In FY2014, FY2015 and FY2016 PRASA did not include additional revenues from other sources nor deposits to the Budgetary Reserve Fund.

PRASA's FY2017 Annual Budget considered a significant reduction in the projected debt service obligation payments considering: (1) the forbearance agreements with the USDA Rural Development/Rural Utilities Services and with the USEPA SRF Loans; (2) the exclusion of the note outstanding debt service payment related to the North Coast Superaqueduct System; (3) the exclusion of the payment of an existing line of credit with the GDB not covered under the MAT; and (4) the elimination of the reimbursement to the Operating Reserve Fund for the advancement of Operating Revenues used for CIP investments in prior fiscal years. This, in turn, reduced PRASA's need for additional revenue sources in FY2017.

During FY2017, PRASA projected to receive \$151M in additional revenues from unidentified proceeds of external sources of revenue or financing. This deposit depended on PRASA's ability to obtain these funds through the proposed securitization bond transaction or a rate increase, neither one which materialized during the fiscal year. Therefore, FY2017 projected results do not include any additional revenue from other sources.

PRASA is not projecting additional revenue from other sources in the forecast period.

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*

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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 actual Operational Expenses for FY2016, projected results for FY2017, and projections for FY2018 to FY2026, on an accrual basis and net of capitalized expenses, are presented in Table 8-20.

Table 8-20. PRASA Operating Expenses (\$, Millions)

Fiscal Year	Operating Expenses	Fiscal Year	Operating Expenses
FY2016 Actual	\$619.7	FY2022 Projected	\$760.1
FY2017 Projected ¹	\$648.3	FY2023 Projected	\$788.2
FY2018 Annual Budget	\$726.1	FY2024 Projected	\$803.5
FY2019 Projected	\$733.5	FY2025 Projected	\$815.2
FY2020 Projected	\$734.5	FY2026 Projected	\$832.0
FY2021 Projected	\$744.8		

¹ Projected based on results through March 31, 2017.

PRASA's projections for Operating (Current) Expenses, on an accrual basis, 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. Following PRFAFAA's guidelines, PRASA has assumed that the inflation rate will be on average about 1.3% over the forecast period, as applied for the Government's Fiscal Plan and adopted by other agencies and public corporations. However, inflation rates in the Fiscal Plan fluctuate from 1.17% for FY2018, down to 0.97% and 0.99% for FY2019 and FY2020; increasing every year thereafter up to 1.56% for FY2025 and FY2026.

1. Payroll and Benefits (Exhibit 1, line 14) – Payroll and Benefits continues to be PRASA's largest expense category. Over the past five fiscal years, PRASA has averaged approximately \$304M annually for this expense category. Since FY2009, PRASA has implemented cost control methods to reduce its staff levels and, in turn, Payroll and Benefits costs. PRASA's FY2016 actual results for Payroll and Benefits, net of expense reduction under Act 66-2014, amounts to \$293.5M, which is \$20M under the budgeted amount. For FY2017, PRASA projected Payroll and Benefits, net of expenses reduction under Act 66-2014 amounts to \$327.8M, which is \$10M over the budgeted amount. For FY2018, PRASA is projecting Payroll and Benefits in the amount of \$353.6M, prior to expense reduction due to PRASA's Fiscal Plan expense savings initiatives and prior to capitalization.

Up until FY2017, assumptions regarding Payroll and Benefits costs per employee and overtime costs (as a percentage of total payroll and benefits costs) were increased mainly to cover the required contribution increases to the Employees Retirement System (ERS). However, for FY2018, the Payroll and Benefits costs assumptions have been increased primarily to cover for the self-funding of PRASA's pension costs in lieu of the contributions to the ERS, net of expected savings with the implementation of Act 26-2017. Also, as included in the Fiscal Plan, PRASA is projecting to maintain its headcount at 4,900 from FY2022 to FY2026, to follow V2A's workforce capacity analysis

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recommendation. Based on the historical results and the assumptions made by PRASA in its projections (discussed below), and assuming that PRASA's plan to self-fund its pensions costs will be implemented, Arcadis believes that the Payroll and Benefits projections are reasonable. However, as further discussed below, if PRASA is required to continue the ERS contributions, the forecasted Payroll and Benefits costs will not be achieved and costs would materially increase affecting PRASA's Forecast.

Headcount and Overtime Assumptions

Over the past five fiscal years PRASA has reduced its staff levels by about 1.2% each year, remaining at an average of approximately 4,880 employees since FY2013. As previously reported, PRASA ended FY2013 with 4,888 employees; however, this low staff level was mainly due to the one-time increase in personnel retirements, many of which occupied positions that PRASA would replace. During FY2014, PRASA was in the process of hiring new employees to fill certain critical operations positions that were left vacant due to numerous personnel retirements that took place in FY2013 due to legislated changes to the retirement conditions. PRASA reported a 4.13% net increase of staff from FY2013 to FY2014. Although PRASA projected that staff levels would increase to about 5,373 during FY2014, actual staff levels on June 30, 2014 were 5,090. Similarly, PRASA had projected that during FY2015 it would hire about 283 new employees to reduce overtime hours (and costs) and contract positions, and fill certain open positions, which includes positions left vacant by employees who retired during FY2013 and FY2014. However, these hirings did not materialize and, as such, the costs budgeted to cover the additional headcount were spent toward overtime costs. PRASA staff levels on June 30, 2015 were at 4,989, a 101-headcount reduction compared to FY2014.

As of June 30, 2016, and June 30, 2017, PRASA had a total headcount amount of 4,798 and 4,654 employees, respectively. The FY2018 Annual Budget assumes a total of 5,000 employees, or a net increase of 346 employees. PRASA currently has over 1,700 vacant positions and is looking to supplement certain key areas. In July 2017, PRASA requested the OMB for the approval to fill 110 of these vacancies and expects to make additional requests to fill some of the vacant positions and reach the goal set in PRASA's Fiscal Plan of 5,000 employees by FY2018. These 110 vacant positions mainly include facilities' operators and personnel for the NRW office to address the reduction in physical losses initiative set forth in PRASA's Fiscal Plan. Also, future headcount reduction is projected by PRASA as a result of the PPP Project included in PRASA's Fiscal Plan. As included in PRASA's Fiscal Plan and following the workforce capacity analysis performed in 2014 by the firm V2A, PRASA projects to maintain its headcount at 4,900 employees by FY2022. This projection assumes a reduction through natural attrition and does not include any impact resulting from potential additional retirees because of the implementation of Act 211-2015.

Based on FY2017 projected results, the current overtime level is at approximately 9.3% of total payroll costs, which already incorporates the overtime factor reduction as required by Act 26-2017 (described below). PRASA has assumed a rate of overtime of 7% (as percentage of payroll) along with other adjustments that result in an increase of the average annual cost per employee for the FY2018 Annual Budget and in every year thereafter of the forecast period.

Legislated Acts Assumptions

- *Act 26-2017* – 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 freezes and reduces some payroll benefits or compensation such as:
 - Vacation licenses are reduced from 30 days to 15 days (at an accumulation rate of 1.25 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 are reduced from 18 days to 12 days (at an accumulation rate of 1 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
 - Christmas bonuses will have a maximum of \$600
 - Extra hours will be compensated at a rate of 1.5x regular hourly rate

Act 26-2017 impact, as presented above, was incorporated in PRASA's Payroll and Benefits costs for the entire forecast period.

- *Act 3-2017* – Act 3-2017, which shall remain in place until June 30, 2021 or until certain economic and financial conditions are met, considers the following:
 - Aims to guide the Government in the management and handling of the debt and obligations
 - Establishes due process regarding the administration of human resources and the benefits that are frozen during the validity of the Act
 - Requires all executive agencies and public corporations to provide quarterly reports to the House of Representatives, the Senate of Puerto Rico and the Office of the Governor of Puerto Rico

Act 3-2017 requires, among other factors, the freezing of salaries and vacant positions; that appointed positions be reduced by 20%; and eliminates all extraordinary payments and bonuses, as measures to decrease payroll costs. Act 3-2017 also prohibits the final payment of sick and vacation balances in excess of 90 and 60 days, respectively. However, Act 3-2017 does not guarantee material additional savings in Payroll and Benefits, since the labor agreement economic clauses must be honored based on the interpretation of OMB.

- *Act 211-2015* – Under Act 211-2015 created a “Voluntary Pre-Retirement Program”. The program seeks to offer 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. Also, they can continue to contribute to their retirement plan. 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. This may reduce expenses such as payroll and “fringe benefits” costs on PRASA but requires that OMB evaluate and certify that employees eligible for the program and under consideration represent

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savings for PRASA. 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.

Most of the eligible PRASA employees occupy positions that are managerial or supervisory in nature, which may create organizational challenges. As stated, this pre-retirement program will impact headcount and consequently overtime. As of the date of this report, PRASA has submitted to OMB for approval a total of 351 employees eligible for the pre-retirement program.

- *Act 66-2014* – As a result of Act 66-2014, PRASA projected an annual reduction of \$37M in expenses. The savings include \$13M in cash items such as bonuses for years of service and removal of liquidation of vacation and sick days, a reduction of about \$10.9M in Payroll and Benefits (as a result of a decrease in collective agreements, in benefits including annual bonuses, etc.), an additional \$7.5M in savings to be reduced from the costs of the health plan provided to employees and from contracted services, and \$5.6M from universal brigades. Although PRASA did not achieve the \$37M projected reduction in FY2015 (by \$6M due primarily to a delay in the implementation of universal brigades), in FY2016, PRASA did achieve it. To reach this savings level and to account for the delay in the implementation of the universal brigades (flexibility of work shifts and functions), PRASA adjusted cash items such as Christmas bonuses. A reduction of approximately \$20M was obtained from accrued expenses and \$17M in reductions in cash payments related to vacations, sick and retirement bonuses. As of the date of this report, Act 66-2014 savings for FY2017 was not available. The economic impacts of Act 26-2017 supersede Act 66-2014, thus these benefits are no longer included in PRASA's projections.

Collective Bargaining Agreements Assumptions

Under Act 66-2014, PRASA negotiated some terms included under the CBAs with both UIA-AAA and HIEPAAA. Both UIA-AAA and HIEPAAA unionized personnel agreed with PRASA that the CBAs will continue as stipulated except for some terms which include: the saving plans, salary increases, holiday and sick day benefits, among others. PRASA has included in its Payroll and Benefits forecast the costs associated with the negotiated terms with both UIA-AAA and HIEPAAA unionized personnel, as impacted by Act 26-2017.

Pension Costs Assumptions

The Central Government's ERS has been facing 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 FY2018 Annual Budget considers the impact of fully funding the retirement (pension) benefit

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payments for PRASA's retired employees on a Pay-Go basis, estimated based on information provided by the ERS (2016 payments to PRASA's retirees of approximately \$100M). This amount was then adjusted to account for new retirees, considering a personnel rotation of 3%. 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 may be required to comply with.

Historically, as required by Act 116-2011, PRASA's contribution to the retirement system increased from 14.275% in FY2016 to 15.525% in FY2017 over FY2014 (base year), with an estimated impact of approximately \$10M when comparing FY2011 and FY2017 annual contributions. Subsequently, prior to the proposed Pay-Go condition, PRASA was required to increase the contributions to the retirement system from an annual increment of 1.25% up to FY2021. Additionally, as required by Act 3 and Act 32 of 2013, PRASA was also required to pay for benefits granted by special laws as announced by the retirement system and to cover an annual Additional Uniform Contribution to reduce the ERS actuarial deficit which started on \$4M in FY2014 and were to be \$28M for FY2018 (as per the latest invoice received by PRASA from the ERS). Also, the COLA annual bill was increased from \$6M in FY2011 to \$15M for FY2018 (if no Pay-Go were to be implemented).

PRASA has already begun to make the contributions for the pension benefit of its retired employees on a Pay-Go basis in compliance with the letter submitted by the Department of Treasury requiring such action. However, to the extent that PRASA is not able to fully fund pension benefits on a Pay-Go basis and is otherwise required to make the contributions to the ERS, Payroll and Benefits costs could increase by as much as \$47M annually materially affecting PRASA's Fiscal Plan.

2. Electric Power (Exhibit 1, line 15) – PRASA's FY2016 actual results for Electric Power amount to \$141.7M. PRASA's FY2017 projected results for electric power amount to \$140.8M. PRASA has projected an electric power expense of \$153.3M for FY2018, \$12.5M more than FY2017 projected results. The FY2018 Annual Budget is based on the average between PREPA's projected rate for FY2019 (as provided by the agency) and PRASA's projected rate based on current information for FY2017. PRASA's forecast period projections for electric power are estimated to increase from \$169M in FY2019 to \$201M in FY2026. PRASA's projected cost of electric power considers the elimination of the preferential electricity all-in-rate tariff as well as the projected and expected reductions in consumption EPCs and reductions in production from PPAs (ie. renewable energy) that have been completed YTD as part of PRASA's Comprehensive Energy Management Program. PRASA is projecting that the electric power purchased from PREPA will decrease over the forecast period at a rate of about 0.5% per year to be achieved through the currently on-going initiatives under the Comprehensive Energy Management Program.

Arcadis finds PRASA's forecast period projection for Electric Power reasonable. However, the expected savings to be achieved through the Comprehensive Energy Management Program may not be accomplished in its entirety, particularly the savings projected to be obtained from regional initiatives as they could be cancelled out by increasing energy usage of aging equipment that PRASA has had to delay replacing because of lack of funding. Also, PRASA is now more susceptible to varying prices given the elimination of the preferential all-in-rate tariff. Close monitoring of electric

energy usage must continue and PRASA shall adjust as necessary. Additional discussion on PRASA's Electric Power assumptions is provided below.

Costs and the Preferential Electric Energy Tariff Assumptions

Up until FY2014, PRASA's electric power costs had historically increased mainly because of price increases, while consumption levels remained about the same. However, because of the preferential electric energy tariff approved by the PREPA in effect from FY2014 until FY2016, PRASA's electric power costs decreased from FY2014 to FY2016, lowering the recent 10-yr CAGR from 8% to 6%. Nonetheless, as of July 1, 2016, PREPA's preferential electric energy tariff was revoked. As approved under Act 50 of June 2013 (Act 50-2013), a special all-in-rate of \$0.22 per kilowatt-hour (kWh) for the first 750 million kWh of consumption was legislated for PRASA and, subsequently approved by PREPA's Governing Board. The excess amount consumed above the 750 million kWh must be paid at PREPA's average cost per kWh for the most recent audited fiscal year. This rate was effective from FY2014 to FY2016. Starting on FY2017 and going forward, and unless PREPA was able to provide electricity at a lower cost or PREPA's debt service coverages are negatively affected, the all-in-rate would have decreased to \$0.16 per kWh for the first 750 million kWh of consumption. A key benefit of the all-in-rate is that it has also helped PRASA to better forecast its operational expenses (in recent years, electric energy costs were very volatile and difficult to forecast and budget), in addition to stabilizing PRASA's electric energy costs.

Effective in July 1, 2016, the all-in-rate was eliminated. Since then, PRASA has been paying for the energy according to the corresponding current rate based on the facilities' electric current and voltage capacity. Nonetheless, since given the sustained low oil barrel costs, the electric power rate is now less than \$0.22 per kWh. However, it should be noted that, as part of its financial and debt restructuring plan, PREPA has announced the implementation of a transitional charge of \$0.013 per kWh. PRASA assumed a rate of \$0.23 per kWh to project Electric Power expenses for FY2018, calculated as the average between PREPA projected rate for FY2019 and PRASA's projected rate based on information for FY2017. According to PRASA's Fiscal Plan, PREPA's projected rates applicable to PRASA for FY2019 to FY2026 range between \$0.26 to \$0.31 per kWh.

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. Since 2014, PRASA has 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. In its Fiscal Plan, PRASA projects that the PPA initiative (solar and gasification) increases from 11.7 M kWh in FY2017 to 38.0 M kWh in FY2020 at an aggregated rate of \$0.136 per kWh. However, additional PPAs projected to be in place during FY2017 from a request for proposal process completed in 2014 have been cancelled on hold. PRASA projects that three EPCs (Sergio Cuevas, Superaqueduct and Puerto Nuevo) will remain on hold during FY2018 and thus is not including any additional savings from EPCs (other than what is already being saved annually from the completed EPCs) in its forecast period. As of FY2016, PRASA has

reduced 2.4 M kWh with the EPCs initiative. Finally, Regional Initiatives are ongoing in FY2018, although they have also been impacted by PRASA's fiscal situation. These initiatives are projected to result in an estimated total consumption reduction of 0.5% per year.

Consumption Growth Rate Assumptions

PRASA has reduced the electric power consumption from PREPA from 743 million kWh (FY2013) down to 622 million kWh in FY2016 and back up to 644 million kWh in FY2017. FY2016 electric consumption was reduced as a result of the 2015 drought's water rationing plan. For FY2018, PRASA is projecting that its total consumption will be 640 million kWh, of which 629 million kWh will be power consumption bought from PREPA. This PREPA consumption projection considers the Regional Initiatives expected to be achieved in FY2018, and does not consider any additional contribution from EPCs. In its FY2018 Annual Budget, PRASA is projecting that electric power purchased from PREPA will decrease by about 2.3% from FY2017. Also, as previously mentioned, PRASA is projecting to have a 0.5% reduction in PREPA's electricity consumption per year for the forecast period.

3. Maintenance and Repair (Exhibit 1, line 16) – PRASA's FY2016 actual results for Maintenance and Repair expenses amounted to \$36.2M. FY2017 proposed results for Maintenance and Repair amount to \$52.3M, which is about \$8.2M higher than the budgeted amount. The additional expense is related to the projected investment in physical losses reduction initiative. The FY2018 Annual Budget is \$52.9M, which is about \$0.6M higher than FY2017 projected results. PRASA has assumed an annual year-over-year increase based on the assumed annual inflation rate (1.3% average over forecast period) for Maintenance and Repair expenses. Therefore, PRASA projects Maintenance and Repair expenses to increase from \$53.4M in FY2019 to \$58.7M in FY2026. Arcadis believes PRASA's forecast period projections for Maintenance & Repair expenses is reasonable, so long as inflation rates are not above those assumed by the Government and PRASA. Puerto Rico's inflation rate during the last quarter of FY2017 remained above the 1.3% assumed by the Government and PRASA.
4. Chemicals (Exhibit 1, line 17) – PRASA's FY2016 actual results for Chemical expenses amount to \$27.8M. FY2017 projected results for Chemical costs total about \$32.2M, in line with the FY2017 Annual Budget. 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. The three-year average for chemical cost totals approximately \$29.0M. Also, it should be noted that FY2016 actual results are close to those achieved in FY2008 (\$27.6M). From FY2012 through FY2016 Chemical expenses had decreased by approximately 6% per year. However, in FY2017 the projected results present an increase of approximately 14% in Chemical costs as compared to FY2016 results. In FY2018, PRASA is projecting approximately \$32.6M in Chemical costs, which is a slight increase over FY2017 projected results. For FY2019 through FY2026, PRASA has applied an annual increase based on the assumed inflation rate (1.3% average over forecast period) on Chemical expenses, increasing from \$32.9M in FY2019 to \$36.2M in FY2026. Arcadis believes PRASA's forecast period projections for Chemical expenses is reasonable, so long as inflation rates are not above those assumed by the Government and PRASA.

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5. Insurance (Exhibit 1, line 18) – Results for Insurance expenses in FY2016 totaled \$9.0M. Projected results for Insurance expenses in FY2017 totaled \$8.3M, which is in line with the annual budget. PRASA has budgeted \$8.4M for Insurance expenses in FY2018. This amount considers negotiated adjustments to PRASA's insurance premiums for the fiscal year, although coverages remained about the same. PRASA has applied an annual increase based on the assumed inflation rate (1.3% average over forecast period) on Insurance expenses throughout the forecast period, increasing from \$8.4M in FY2019 to \$9.3M in FY2026. Arcadis believes the forecast period projections for Insurance expenses are reasonable as coverages are adequate. However, several recommendations were made to PRASA to modify or add insurance coverages including cyber security and terrorism coverage. If PRASA adopts these recommendations, or if inflation rates differ significantly from those assumed by the Government and PRASA, and/or if insurance premiums increase, PRASA's Insurance expense could be higher than projected.

6. Other Expenses (Exhibit 1, line 19) – Other Expenses include, for example: the Superaqueduct O&M contract, professional services, materials and supplies, security, sludge treatment and disposition, rentals, and water transport. FY2016 actual results for this expense category totaled \$133.3M; while, FY2017 projected results total \$163.9M as was budgeted (or approximately 20% higher than FY2016 actual results). However, FY2016 results were mostly impacted by the drought and is the main factor driving the year-over-year difference.

PRASA has included \$165.8M for Other Expenses in its FY2018 Annual Budget, which represents an increase of approximately 1.2% over FY2017 projected results. PRASA is also projecting that Other Expenses will increase year-over-year based on the assumed inflation rate (1.3% average over forecast period), increasing from \$167.4M in FY2019 up to \$184.1M in FY2026.

Arcadis has reviewed PRASA's projections for this expense category and finds the budget amount reasonable, again so long as inflation rates do not differ significantly from those assumed by the Government and PRASA.

7. Capitalized Expenses (Exhibit 1, line 21) – PRASA's external consultant, PJ Sun LLC, completed a more recent review of PRASA's capitalization rate on April 2017. The recommendations included in the updated report, as provided by PRASA, reduced PRASA's capitalization rate from 4.7% to 3.7%. FY2017 projected results for Capitalized Expenses amount to \$26.8M. PRASA has included in its FY2018 Annual Budget \$28.4M for Capitalized Expenses. For FY2019 to FY2026, PRASA is projecting an increase from \$28.7M to \$32.7M.

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.

8.4.3.1 PRASA's Fiscal Plan Expense Savings Initiatives

The Expense Savings Initiatives as included in PRASA's Fiscal Plan include: physical losses reduction, hydroelectric power generation transfer and other expense reductions. Additional cost savings from these initiatives were projected by PRASA starting in FY2017. Table 8-21 presents the financial projection of these initiatives for the forecast period. Note though that FY2017 were not validated by Arcadis, as results were not available for review and confirmation.

Table 8-21. PRASA's Fiscal Plan Expense Savings Initiatives (\$, Millions)

Fiscal Plan	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026
Initiatives	Projected	Annual Budget	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
Physical Water Losses	\$8.2	\$10.2	\$11.8	\$13.5	\$13.5	\$13.5	\$13.5	\$13.5	\$13.5	\$13.5
Hydroelectric Transfer	0.0	0.0	0.1	0.9	8.9	8.5	4.6	4.3	2.9	2.4
Other Expense Reductions	41.9	1.8	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.1
Total Expense Savings¹	\$50.1	\$12.0	\$13.8	\$16.3	\$24.3	\$24.0	\$20.2	\$19.9	\$18.5	\$18.0

¹ Numbers may not add up due to rounding.

While PRASA is committed to these initiatives (further described below), 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, therefore, finds these projections optimistic and recommends that PRASA re-evaluate the status and schedule of these initiatives. If the benefits are not realized as projected, to meet its Forecast PRASA would likely have to reduce the amount of CIP investments planned and/or modify the projected rate increases.

Physical Losses Reduction Initiative

As previously discussed, physical losses are the largest component of NRW in PRASA's water balance. This initiative includes a series of efforts to reduce physical losses and thus NRW. PRASA expects to obtain cost savings in the amount of \$122M over the forecast period through the continuation of the water leak detection program, monitoring systems' pressure to optimize flows, and reducing the number of days required to repair leaks. These cost savings consider that PRASA will save chemical and electricity costs from a reduction in water losses and hence, in production.

The initiative for the installation of telemetry monitoring equipment at tanks is projected to provide an approximate net cost saving of \$12M over the forecast period. This initiative will require a capital investment in monitoring/communication equipment of approximately \$1.5M, but is expected to help

PRASA reduce overflows. Currently, 38% of PRASA's tanks have remote water level monitoring. PRASA's goal is to increase this amount by 65% in FY2019.

Hydroelectric Power Generation Transfer Initiative

Through this initiative, PRASA is expected to assume the operation of PREPA's hydroelectric generation units (21 at 11 sites), including reservoirs and irrigations systems and their related equipment. Although PRASA and PREPA have been in negotiations for the transfer of these assets, terms and conditions are still under consideration by upper management of both agencies.

Among the benefits that this initiative offers are: lower energy costs for PRASA, better control and management of water resources, cost savings, leverages existing infrastructure and reduces the amount of future water/sewer rate increases. Studies show that there is potential to optimize the system operation to increase energy generation and annual production could potentially be increased by 67%.

Over the forecast period, PRASA projects to obtain net cost savings in the amount of \$33M. O&M annual costs were estimated based on current PREPA costs (starting at \$5.8M), escalating at 2% per year over period plus the expected cost for renting the facilities. CIP investment costs were assumed to be financed over a 15-year period at a 10% financing cost.

Currently, the PPP Authority, PREPA and PRASA are evaluating the feasibility of entering into a PPP agreement with a private entity to rehabilitate and operate the hydroelectric facilities. Other activities being carried out by PRASA include: legal assessment of the transfer transaction, evaluation of unsolicited proposals (for O&M and capital investments) already received, and discussions with PREPA regarding transmission costs among others.

Other Initiatives

PRASA is projecting additional reductions in Other Expenses (excluding Payroll and Benefits, and Electricity) of about \$2M per year. To do so, PRASA reduced the expense budgets of the five operational Regions' to reach the \$2M expense reduction.

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 requirements²⁵ (which will be calculated annually no later than six months after the end of each fiscal year based on Operating Revenues and Authority Revenues set forth in PRASA's most recent audited financial statements):

²⁵ Capitalized terms as defined in the MAT, as amended.

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- 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 or not 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; and
 - 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; and
 - 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.

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A summary of PRASA's MAT DSC and ABT requirements is presented in Table 8-22 below.

Table 8-22. Summary of 2012 MAT DSC Requirements

Lien Level	Debt Secured	DSC for Additional Bonds Tests (MADS) ¹	DSC for Covenant Test	In Default if DSC not Achieved?
Senior	2008, 2012 & 2015 Senior Bonds	2.5/1.5	2.5	Yes
Senior Subordinate	Bond Anticipation Note & Senior Subordinate Bonds	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 and Commonwealth Supported debt would continue to be funded/paid only after funding of current operating expenses.
- All revenues shall be deposited by PRASA in the first instance to 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;

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- 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 FY2016 through FY2026 are presented in Exhibit 1, and summarized in Tables 8-23 through 8-26. PRASA's debt service includes: Senior and Senior Subordinate Bonds (the 2008 Series A and B Senior Lien Revenue Bonds, Revenue Refunding Bonds 2008 Series A and B, and the 2012 Series A and B Senior Lien Revenue Bonds), as well as the USDA RD bonds and USEPA SRF Loan debt, among others.

FY2016 debt service obligations totaled \$328.6M, of which \$325.8M were Senior lien obligations, and \$2.7M were subordinated obligations. As shown in Table 8-23, PRASA met Rate Covenant requirements in FY2016. PRASA's FY2016 Senior Debt Service was approximately \$42.2M higher than the projected Senior Debt Service included in PRASA's FY2016 budget. The net increase results from a lower Senior Lien Bonds debt service obligation due to postponement of the bond issuance PRASA was planning to complete during FY2016 (\$230.8M due and paid, versus \$283.6M budgeted), and a payment of \$90M (excluding interest, legal, and financial costs) made by PRASA to repay the outstanding balance of certain lines of credit that were provided to PRASA in anticipation of the bonds and that were to be refinanced through the bond issuance and settled with bond proceeds.

Also, in FY2016 PRASA only made partial fund deposits in the CGI Account of approximately \$53.2M of the \$88.4M amount due according to the corresponding debt amortization tables. Payments of debt service that were due to the USDA and USEPA in July 2016 were not made by PRASA. Similarly, in FY2017 PRASA is projecting to only have made partial fund deposits in the CGI Account of approximately \$21.2M of the \$79.9M amount due according to the corresponding debt amortization tables.

As previously mentioned, PRASA entered into forbearance agreements with both USDA and PRIFA (as operating agent for the SRFs) which were granted extensions until April 30, 2018 and June 30, 2018, respectively. The forbearance agreements grant PRASA a reduction of principal and interest on both programs of approximately \$58.8M for FY2017, which was reduced from the total FY2017 CGI debt service leaving a balance to be paid of \$21.2M. Additionally, as in FY2015, no funds were deposited in the CSO Account during FY2016 and FY2017, 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. Finally, during FY2016 and FY2017 PRASA did not make all the payments due under the Term Loan with the GDB. However, per bond counsel's opinion, this debt is not covered under the MAT. Finally, as communicated by the Trustee via letter dated August 1, 2017, as of July 31, 2017, the Commonwealth Payments Fund deficiency is approximately \$98.2M. Nevertheless, such deposit and payment shortfalls are not considered to be an Event of Default under the MAT. In future years, PRASA is projecting

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deposits to the Commonwealth payments fund to cover CGI debt in the amount of \$80.4M in FY2018 up to \$89.9M in FY2026. As included in its Fiscal Plan, PRASA has assumed that it will not pay the CSO debt totaling about \$9M per year.

The DSC results presented in Table 8-26 for the forecast period have been calculated using the Rate Covenant requirements per the MAT, as amended, and debt service obligations per amortization tables. PRASA's forecasted Operating and Authority Revenues would not be sufficient to meet all DSC requirements through FY2026.

Table 8-23. FY2016 Debt Service Obligations and Actual Results (\$, Thousands)

Debt Category	FY2016 Obligations without Forbearance Agreements ¹	FY2016 Actual Results ²
Senior Debt	\$325,883	\$325,883
Senior Subordinated Debt	2,721	2,721
Subordinated Debt	-	-
Commonwealth Guaranteed Indebtedness	96,309	53,198
Commonwealth Supported Obligations	8,999	-
Debt not Covered under the MAT ³	8,752	2,393

¹ Considers the full debt service obligations due in FY2016 per amortization schedule; excludes forbearance agreements.

² Considers the forbearance agreements, no payment of the PFC bonds under the CSO, and partial payment of GDB Term-Loan.

³ Term Loan with the GDB.

Table 8-24. FY2017 Debt Service Obligations and Budget (\$, Thousands)

Debt Category	FY2017 Obligations without Forbearance Agreements ¹	FY2017 Projected Results ²
Senior Debt	\$230,789	\$230,789
Senior Subordinated Debt	2,721	2,721
Subordinated Debt	-	-
Commonwealth Guaranteed Indebtedness	79,917	21,164
Commonwealth Supported Obligations	8,999	-
Debt not Covered under the MAT ³	-	-

¹ Considers the full debt service obligations due in FY2017 per amortization schedules.

² Considers the forbearance agreements and no payment of the PFC bonds under the CSO nor the Term-Loan with the GDB.

³ Term-Loan with the GDB.

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Table 8-25. FY2018-FY2026 Debt Service Obligations (\$, Thousands)

Debt Category	FY2018 Projection	FY2019 Projection	FY2020 Projection	FY2021 Projection	FY2022 Projection	FY2023 Projection	FY2024 Projection	FY2025 Projection	FY2026 Projection
Senior Debt	\$230,788	\$230,790	\$230,791	\$230,790	\$230,789	\$230,788	\$230,787	\$230,789	\$230,789
Senior Subordinated Debt	1,387	-	-	-	-	-	-	-	-
Subordinated Debt	-	-	-	-	-	-	-	-	-
Commonwealth Guaranteed Indebtedness	80,402	81,677	80,651	87,967	88,079	88,023	91,049	91,114	89,870
Commonwealth Supported Obligations	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999
Total Debt	\$321,576	\$321,466	\$320,441	\$327,756	\$327,867	\$327,810	\$330,835	\$330,902	\$329,658

Table 8-26. FY2016 - FY2026¹ Debt Service Coverage

Debt Service Level	DSC Requirement	FY2016 Actual	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026
Senior Debt ²	2.50	3.40	4.51	4.71	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
Senior Subordinated Debt ²	2.00	3.37	4.46	4.69	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
Subordinated Debt ²	1.50	3.37	4.46	4.69	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
All Obligations ³	1.00	1.05	0.94	0.79	0.84	0.88	0.90	0.94	0.94	0.95	0.99	0.98

¹FY2016 actual results and FY2017 to FY2026 projected results.

²DSC calculated with respect to Operating Revenues.

³DSC calculated with respect to Authority Revenues.

³Considers the full debt service obligations due per amortization schedule including CGI debt, CSO debt and debt not covered per MAT (GDB Term-Loan); excludes forbearance agreements.

8.5.3 Debt Service Restructuring and Forecast Assumptions

PRASA is assuming that it will restructure part (or all) of its existing debt service to reduce obligations over the Forecast period. Because negotiations with bondholders both at the Senior lien level and with federal agencies (CGI level) are ongoing and confidential, at this time there is no additional information available to determine the reasonableness of this assumption. PRASA has also assumed that over the forecast period, no deposits will be made into the CSO Account for payment of the PFC Bonds (a debt

service reduction of \$9M in each year of the Forecast) and no payments will be made for the Term Loan with the GDB. PRASA is also assuming that it will be able to secure additional federal funds of about \$23.3M in each year of the Forecast after negotiations with federal agencies conclude. If PRASA is not able to complete its intended debt restructuring or secure the new federal funds, PRASA will be required to reduce its projected CIP expenditures and/or increase the proposed rate adjustments to successfully meet its obligations.

8.6 Reserve and Funds Deposit Requirements

8.6.1 Debt Service Reserve Funds

In accordance with the MAT as amended by the Sixth Supplemental Agreement of Trust, 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 and
 - 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 part 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 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.

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The Sixth Supplemental Agreement to the MAT, amended Section 5.10 (a) and (c) of the Operating Reserve Fund to read as follows:

- (a) In each month, the Trustee shall deposit to the Operating Reserve Fund (i) beginning on the first Business Day of the month and after making the deposits required by Section 5.02 (b) (i) through (vii), an amount of the Authority Revenues equal to 1/60 of the amount, if any, necessary to restore the amount on deposit therein to the Operating Reserve Requirement and to pay interest on any reimbursement obligations due with respect to an Operating Reserve Facility. Earnings on moneys held in the Operating Reserve Fund shall be retained therein.*
- (b) In lieu of or in addition to cash or investments, at any time, the Authority may cause to be deposited to the credit of the Operating Reserve Fund, an Operating Reserve Facility, in the stated amount equal to all or a portion of the application Operating Reserve Requirement. Any withdrawals from the Operating Reserve Fund made in accordance with the above paragraph (b), shall be made first from any cash or investments on deposit therein and then to the extent no such cash or investments are available, from a draw on any Operating Reserve Facility.*

PRASA had a loan agreement (the GDB Loan Agreement) with the 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. Under the GDB Loan Agreement, this line of credit is payable from moneys on deposit in the Operating Reserve Fund (after making deposits to the Current Expenses Fund) or proceeds from additional indebtedness issued under the MAT. The maturity of such 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 is projecting to deposit \$36M in the Operating Reserve Fund during FY2017 (funding of approximately 1/5 of the Operating Reserve Fund). This deposit will continue recurrently for four additional years, until PRASA achieves the reserve fund of three months of current expenses. Deposits for the forecast period are projected to be in accordance with the MAT, as amended. By 2021, PRASA is forecasting to have a total deposit balance in its Operating Fund of \$192.3M. 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.

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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:

- (i) The proceeds of any condemnation awards,
- (ii) The proceeds of insurance (other than use and occupancy insurance),
- (iii) The proceeds of sales of property constituting a part of the Systems, and
- (iv) The proceeds of any termination or similar payment received by PRASA under any interest rate swap or similar hedge agreement.

No deposits were made in FY2015 and, even though, PRASA budgeted a \$50M deposit to the Capital Improvement Fund in FY2016, no deposit was made. PRASA projects to deposit \$97M in the Capital Improvement Fund during FY2017 to finance a portion of its projected CIP as well as a projected debt repayment to its contractors.

From FY2018 onwards, PRASA projects to make deposits in the Capital Improvement Fund in the average amount of \$264M per year from both Operating Revenues and from annual new Federal Funds of about \$23.3M on average.

8.6.4 Construction Fund

In accordance with the MAT, a Construction Fund must be established and funded with the following deposits:

- (i) the amounts required to be deposited under the resolution of the Board authorizing the issuance of particular Series of Bonds or the applicable Supplemental Agreement and,
- (ii) any moneys of the Authority that may properly be deposited to the credit of said Fund, or the proceeds of any grants received from any source, to be used for the purpose of paying the Cost of Improvements.

PRASA has not included any deposits into the Construction Fund for the forecast period.

8.6.5 Commonwealth Payments Fund

As previously mentioned, payment of debt service that was due to the USDA and USEPA on July 2016, was not able to be transferred and forbearance agreements were signed. In addition, no funds were deposited in the CSO Account during FY2016 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.

In its FY2017 projected results, PRASA expects to make a \$21.2M deposit to the Commonwealth Payments Fund considering (1) the extended forbearance agreements with USDA and USEPA, (2) the exclusion of the note outstanding debt service payment related to the North Coast Superaqueduct System, and (3) the exclusion of the payment of an existing line of credit with GDB which is not covered under the MAT. The budgeted deposit amount for FY2017 (\$19.2M) is about \$80.5M less than actual deposits due based on CGI and CSO debt amortization schedules. However, the forbearance agreements grant PRASA a reduction of principal and interest on both programs of approximately \$60M for FY2017, which was reduced from the FY2017 debt service.

In its FY2018 Annual Budget, PRASA projects to make a \$80.4M deposit to the Commonwealth Payment Fund. For the rest of the forecast period, PRASA projects to make an annual average deposit of \$87.3M. Also, as part of PRASA's Fiscal Plan debt service reduction initiatives, PRASA has eliminated the related outstanding debt service payments related to the CSO debt, which amount to \$9M per year, from the projections of the forecast period.

8.6.6 Budgetary Reserve Fund

Under the 2012 FOA, a new Budgetary Reserve Fund was created. PRASA initially funded the Budgetary Reserve Fund with \$240M of the 2012 bond proceeds. According to the 2012 FOA, GDB will hold the Budgetary Reserve Fund in trust for, and for the benefit of, PRASA. The Commonwealth agrees that, no later than February 1, 2013 and by each February 1st thereafter it shall either (i) obtain an appropriation or a commitment for another source of funding for the projected Budgetary Reserve Requirement applicable to the next succeeding fiscal year or (ii) advise PRASA that it does not intend to request an appropriation or provide a commitment for another source of funding to cover all or a portion of the projected Budgetary Reserve Requirement for that fiscal year. The Budgetary Reserve Requirement will be projected by PRASA in its five-year *Fiscal Improvement Plan* (a requirement of the 2012 FOA) which will be reviewed and commented, as necessary, by GDB. The Budgetary Reserve Requirement will be recalculated annually in connection with the update to the *Fiscal Improvement Plan* each February 1st.

If the DSC requirement under the Rate Covenant is not met, and neither the Commonwealth nor the GDB advance funds to PRASA to cover shortfalls, PRASA would then be required to implement rate increases and/or revenue enhancement, expense reducing measures, or a combination of these measures, to satisfy the requirements of the Rate Covenant.

In FY2013, PRASA drew the \$145M balance available in the Budgetary Reserve Fund for the purposes of satisfying the requirements of the Rate Covenant. Upon receiving the GDB's notice that it would not intend to request an appropriation or provide a commitment for another source of funding to cover all or a portion of PRASA's projected Budgetary Reserve Requirement for FY2014, PRASA proceeded to activate its rate revision process to implement the necessary rate increase which allowed PRASA to meet its obligations in FY2014 and FY2015. No additional deposits to the Budgetary Reserve Fund were made in FY2016, nor are included in the forecast period.

8.6.7 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. No deposit was made during FY2016 to the Rate Stabilization Account, while a \$90M withdrawal was made to settle an outstanding line of credit (LOC) and part of the remaining balance was used for payment of interests accrued, and other disbursements made by PRASA as provided in its Rate Stabilization Account roll forward balance. PRASA is not projecting to make any deposits to the Rate Stabilization Account during FY2017 or the forecast period. As of July 31, 2017, the remaining balance in the Rate Stabilization Account totaled \$3,291.

8.7 Conclusions

PRASA's Forecast (see Exhibit 1) reflects the Financial Plan submitted to and certified by the Oversight Board. Despite PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total deficit of \$965.2M. Annual deficits range from \$273.4M in FY2018 down to \$12.9M in FY2026. PRASA plans to bridge this gap with a debt restructuring and/or by identifying and securing additional revenue sources or financing.

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 to meet All Obligations per the MAT which include the payment of the CGI and CSO debt service obligations in full. Therefore, PRASA will not meet its Rate Covenant requirement of 1.0x coverage of its current obligations throughout the Forecast. To the extent that PRASA can re-negotiate and restructure existing debt obligations, its ability to meet Rate Covenant requirements will improve. However, if this is not accomplished, PRASA will be forced to reduce its projected CIP investments or increase projected annual rate adjustments. 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 would further exacerbate PRASA's financial situation going forward:

- Lower revenues or savings achieved, or timeliness of the Fiscal Plan initiatives.
- Higher overtime than currently planned as a result of further delays in filling vacant positions.
- Higher energy costs as a result of lower savings achieved through its Comprehensive Energy Management Program and/or higher PREPA electric costs (per kWh).
- Higher annual inflation rates.

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

1. **PRASA's ability to maintain its Service Revenues, billings, and collections in a continuing challenging economic environment** – Continued uncertainty and strain on the economy, and population shifts, and consumption patterns could continue to cause further declines in PRASA's billings (reflected in lower Service Revenues than budgeted) and collections (reflected in high Adjustment for Uncollectibles).
2. **PRASA's ability to implement the necessary annual rate increases** – PRASA is projecting to implement annual, but more modest rate increases that will generate about \$1.1B between FY2018 and FY2026. Since FY2014, PRASA has not increased or changed its rate structure for water and sewer services as controlled by public policy. However, PRASA is now bound to its certified Fiscal Plan. The actual amount of the rate increases will depend on PRASA's financial results, CIP investments, customer base and consumption trends, among others.
3. **PRASA's ability to continue to successfully implement its Revenue Optimization Program and the new Fiscal Plan initiatives** – PRASA's Forecast includes certain revenue enhancing and cost reduction initiatives that are currently underway and new ones proposed under the Fiscal Plan. Any changes to the funding, framework and execution of these initiatives would significantly alter

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PRASA's projected financial results. Although PRASA has made a commitment to implement the initiatives described in this Report, there is a possibility that the projected results and, more specifically, the timing of those results may not be achieved.

4. **PRASA's ability to self-fund its pension costs** – PRASA's plan to self-fund pension costs is underway; if PRASA is not able to fully fund pension benefits on a Pay-Go basis and is otherwise required to make the contributions to the ERS, PRASA's Payroll and Benefits costs could increase by as much as \$47M.
5. **PRASA's permanent debt restructuring** – PRASA will have to reduce its debt service to reduce its forecasted annual deficits. PRASA continues to work with federal entities to negotiate a permanent restructuring of both USDA RD and USEPA SRF debt, and has engaged in negotiations with Senior bondholders. However, there is insufficient information available to determine if PRASA will be successful in either of these efforts.

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EXHIBIT 1

PRASA FINANCIAL FORECAST PRO FORMA* (\$ Thousands)	FY2016 RESULTS	FY2017 PROJECTION	FY2018 PROJECTION	FY2019 PROJECTION	FY2020 PROJECTION	FY2021 PROJECTION	FY2022 PROJECTION	FY2023 PROJECTION	FY2024 PROJECTION	FY2025 PROJECTION	FY2026 PROJECTION
OPERATING REVENUES											
1. Service Revenues (Base Fee and Service Charges, Net of Subsidies) ⁵	\$902,625	\$984,562	\$1,017,277	\$1,053,620	\$1,077,503	\$1,101,191	\$1,126,548	\$1,153,595	\$1,181,432	\$1,210,083	\$1,239,571
2. Transfer from Rate Stabilization Account	90,000	-	-	-	-	-	-	-	-	-	-
3. Operational Initiatives - Additional Billings	103,182	98,650	98,406	98,162	97,920	97,678	97,436	97,195	96,955	96,715	96,476
4. Operational Initiatives - Collections from Prior Years	8,516	4,500	4,500	3,600	-	-	-	-	-	-	-
5. Adjustment for Uncollectibles	(6,465)	(54,161)	(44,421)	(44,312)	(44,202)	(44,093)	(43,984)	(43,875)	(43,766)	(43,658)	(43,550)
6. Other Income (Miscellaneous/Special Assessments/ZumFiber-PRASA Holdings)	10,025	7,980	7,960	7,941	7,921	7,902	7,882	7,863	7,843	7,824	7,804
7. Fiscal Plan - Revenue Enhancing Initiatives ⁶	-	-	4,254	(4,404)	20,354	42,824	56,539	66,917	76,845	86,513	93,771
8. Total Operating Revenues (Sum Lines 1-7)	\$1,107,883	\$1,041,531	\$1,087,976	\$1,114,608	\$1,159,496	\$1,205,502	\$1,244,422	\$1,281,694	\$1,319,308	\$1,357,477	\$1,394,072
ADDITIONAL REVENUES											
9. Transfer from Budgetary Reserve Fund	-	-	-	-	-	-	-	-	-	-	-
10. General Fund Grants/Appropriations/Contributions	-	-	-	-	-	-	-	-	-	-	-
11. Reimbursements to the Authority Revenues	-	-	-	-	-	-	-	-	-	-	-
12. Total Other Sources of Revenue (Sum Lines 9-11)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13. Total Authority Revenues (Line 8 + Line 12)	\$1,107,883	\$1,041,531	\$1,087,976	\$1,114,608	\$1,159,496	\$1,205,502	\$1,244,422	\$1,281,694	\$1,319,308	\$1,357,477	\$1,394,072
OPERATING EXPENSES											
14. Payroll and Benefits	\$293,511	\$327,824	\$353,609	\$345,209	\$348,567	\$351,976	\$359,212	\$367,586	\$376,014	\$384,496	\$393,033
15. Electric Power	141,743	140,788	153,263	168,641	166,297	178,943	183,741	196,529	199,482	197,344	201,374
16. Maintenance and Repair	36,200	52,271	52,884	53,399	53,926	54,535	55,253	56,071	56,939	57,827	58,730
17. Chemicals	27,766	32,198	32,576	32,893	33,218	33,592	34,035	34,539	35,074	35,620	36,176
18. Insurance	7,989	8,269	8,366	8,447	8,531	8,627	8,741	8,870	9,008	9,148	9,291
19. Other Expenses	134,356	163,874	165,796	167,409	169,063	170,970	173,224	175,788	178,510	181,293	184,123
20. Fiscal Plan - Cost Saving Initiatives ⁶	-	(50,103)	(12,045)	(13,770)	(16,262)	(24,343)	(23,972)	(20,167)	(19,899)	(18,456)	(18,033)
21. Capitalized Operating Expenses	(21,909)	(26,833)	(28,360)	(28,712)	(28,845)	(29,550)	(30,126)	(31,057)	(31,636)	(32,032)	(32,661)
22. Total Operating Expenses (Sum Lines 14-21)	\$619,656	\$648,287	\$726,088	\$733,515	\$734,495	\$744,750	\$760,109	\$788,159	\$803,491	\$815,241	\$832,033
DEPOSITS											
23. Deposit to the Senior Bond Fund	\$325,883	\$230,789	\$230,788	\$230,790	\$230,791	\$230,790	\$230,789	\$230,788	\$230,787	\$230,789	\$230,789
24. Deposit to the Senior Debt Service Reserve Fund	2,721	2,721	1,387	-	-	-	-	-	-	-	-
25. Deposit to the Senior Subordinate Bond Fund	-	-	-	-	-	-	-	-	-	-	-
26. Deposit to the Senior Subordinate Debt Service Reserve Fund	-	-	-	-	-	-	-	-	-	-	-
27. Deposit to the Subordinate Bond Fund	-	-	-	-	-	-	-	-	-	-	-
28. Deposit to the Subordinate Debt Service Reserve Fund	-	-	-	-	-	-	-	-	-	-	-
29. Deposit to the Current Expense Fund	-	-	-	-	-	-	-	-	-	-	-
30. Deposit to the Operating Reserve Fund	-	34,920	38,894	38,280	38,058	42,122	3,747	6,061	3,766	2,577	4,092
31. Deposit to the Capital Improvement Fund (Net of Projected New Federal Funds) ⁷	-	97,226	283,744	236,150	229,787	218,233	230,937	245,907	251,043	217,164	250,195
32. Deposit to the Construction Fund	-	-	-	-	-	-	-	-	-	-	-
33. Deposit to the Commonwealth Payments Fund ⁸	53,198	21,164	80,402	81,677	80,651	87,967	88,079	88,023	91,049	91,114	89,870
34. Deposit to the Surplus Fund	-	-	-	-	-	-	-	-	-	-	-
35. Deposit to the Rate Stabilization Account	-	-	-	-	-	-	-	-	-	-	-
36. Total Deposits (Sum Lines 30-37)	\$381,802	\$386,820	\$635,215	\$506,897	\$579,286	\$579,112	\$553,551	\$570,779	\$576,645	\$541,643	\$574,946
37. Net Authority Revenues After Obligations and Deposits (Line 13-Line 26-Line 29-Line 38-Line 39)	\$106,425	\$6,424	(\$273,327)	(\$205,804)	(\$154,285)	(\$118,360)	(\$69,238)	(\$77,243)	(\$60,828)	\$593	(\$12,906)
38. Net Authority Revenues Advanced to Pay CIP Related Expenses and Other Obligations	(\$106,425)	-	-	-	-	-	-	-	-	-	-
39. Final Balance (Line 38 - Line 39)	\$0	\$6,424	(\$273,327)	(\$205,804)	(\$154,285)	(\$118,360)	(\$69,238)	(\$77,243)	(\$60,828)	\$593	(\$12,906)
DEBT SERVICE PAYMENTS DUE											
40. Senior (S)	\$325,883	\$230,789	\$230,788	\$230,790	\$230,791	\$230,790	\$230,789	\$230,788	\$230,787	\$230,789	\$230,789
41. DS Coverage Required = 2.50	3.40	4.51	4.71	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
42. Senior Subordinated (SSUB)	2,721	2,721	1,387	-	-	-	-	-	-	-	-
43. DS Coverage Required = 2.00	3.37	4.46	4.69	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
44. Subordinated (SUB)	-	-	-	-	-	-	-	-	-	-	-
45. DS Coverage Required = 1.50	3.37	4.46	4.69	4.83	5.02	5.22	5.39	5.55	5.72	5.88	6.04
46. Commonwealth Guaranteed Indebtedness (CGI)	96,309	79,917	80,402	81,677	80,651	87,967	88,079	88,023	91,049	91,114	89,870
47. Commonwealth Supported Obligations (CSO)	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999	8,999
48. Debt Not Covered Under the MAT	2,393	-	-	-	-	-	-	-	-	-	-
49. Total Debt Service Including Debt Not Covered Under the MAT, Net of Existing Deposits	\$436,306	\$322,427	\$321,877	\$321,467	\$320,440	\$327,756	\$327,867	\$327,810	\$330,835	\$330,901	\$329,659
DS Coverage on All Obligations (Coverage Required = 1.00)	1.05	0.94	0.79	0.84	0.88	0.90	0.94	0.94	0.95	0.99	0.98
RATE STABILIZATION ACCOUNT BALANCE											
50. Rate Stabilization Account Balance, beginning of period	\$93,000	\$1,201	\$0.329	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
51. Rate Stabilization Account Balance, end of period	\$1,201	\$0.329	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

* Numbers may not add up due to rounding.

⁵ Starting in FY2018, includes additional revenues from rate increases and electronic bill discount.

⁶ Projected additional revenues from initiatives included in Fiscal Plan: PG Project, New Disconnection Fee, and Adjustment Policy Revision.

⁷ Projected expense reductions from initiatives included in Fiscal Plan: Physical Losses Reduction, Hydroelectric Power Generation, and Other Expense Reductions.

⁸ Amount to be deposited from PRASA Authority Revenues, net of annual new Federal Funds of about \$23.3M (average).

⁹ FY2018 through FY2026 includes debt service due on USDA RD bonds and USEPA SRF loans per amortization schedule, and excludes payments of the CSO debt. PRASA will seek to restructure and reduce its CGI obligations and eliminate CSO obligations.

¹⁰ Not all budgeted funds were deposited in the Commonwealth Guaranteed Indebtedness Account during FY2016 and FY2017 for payment of the Commonwealth obligations of PRASA included in the CGI for the payment of debt service that was due during each fiscal year; a forbearance period was granted by USDA and USEPA on Rural Development and SRF loans, respectively.

No funds were deposited in the Commonwealth Supported Obligations Account during FY2016 for payment of the Puerto Rico Public Finance Corporation (PFC) debt included in the CSO, and, accordingly, no funds were transferred by PRASA to the trustee of the PFC Superaqueduct Bonds for the payment of debt service that was due in FY2016. Per the MAT, this is not considered an Event of Default.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Considerations and Assumption

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 lower capital investment levels projected in future years.

Set forth below are the most relevant opinions which Arcadis has reached regarding the review of PRASA's System, CIP and financial projections, as per the 2017 Certified Fiscal Plan.

1. Although PRASA has achieved the optimum staffing level stipulated by the Executive Management Team, it lacks sufficient personnel in the operations department, mostly operators for treatment facilities and meter readers, having to incur in extra hours or in the case of readers, estimate more consumption. PRASA needs to balance the employees with skill sets to fill technical and operator needs while maintaining the optimum staffing level. Also, it must consider the additional reduction of employees when personnel that qualify for the Voluntary Pre-retirement Program (approximately 351) retire. Filling certain vacant position could help PRASA reduce overtime costs and address System O&M needs more efficiently. As per AWWA's 2016 Benchmarking Performance indicators, PRASA's customer account per employee ratio falls on the lower side of the industry median, which can be attributed to the larger size and higher complexity of PRASA's System compared to U.S. systems. To the extent that PRASA is able to accelerate its staff management plan, additional cost efficiencies could be achieved.
2. PRASA's 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 have

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contributed to improvements and optimization of operations and overall organization.

Notwithstanding, PRASA's new Executive Management Team is in the process of revising the Strategic Plan and the KPIs to make modifications as necessary, add new performance indicators, and establish aggressive metrics to meet the Fiscal Plan and the Government of Puerto Rico's "Plan para Puerto Rico".

3. In general, the condition of the facilities visited for the 2017 condition assessment, varied from those still in good condition to those requiring capital upgrades. Although approximately 95% of the 155 facilities inspected are in the adequate to good range, when compared to the previous inspection results, there was a noticeable decrease in number of facilities rated as good (17 facilities compared to 58). While most of the treatment facilities were rated as adequate (90 of 93), there is a concern pertaining to the physical condition (the equipment/maintenance criterion) as fifty-nine (38%) of the facilities visited were rated below 2.0. If unattended, the condition of these facilities could continue to deteriorate and fall to poor or unacceptable rating in the future. Even though most WTPs were classified as adequate, fifteen (21%) of the WTPs received a low-end rating that put them close to being rated poor. As mentioned, this was mostly driven by physical deterioration due the reduction and ultimate suspension of the CIP. Whereas PRASA acknowledges that it still has some challenges ahead with the Stage 2 D/DBPR compliance, it has developed an action plan to address exceedances to TTHM and HAA. This conscientious effort to improve DBPs in the System has improved compliance performance with SDWA parameters. However, regulatory compliance results might be misleading since several NPDES parameters include interim limits or are only being monitored. Moreover, several facilities lack STS or have an STS that has been out of service for an extended period. It is recommended that the STS be repaired or constructed to achieve compliance with the NPDES parameters, as required by the 2015 USEPA Consent Decree. Regarding the WWTPs, evaluations generally ranged from poor to good condition with equipment/maintenance as the category of primary concern. Whilst there was only one facility rated as poor compared to nine in 2015, sixteen (70%) of the twenty-three facilities visited received a score below 2.0 and are in danger of continued deterioration. As with WTPs, the greatest current concern is the physical condition of the facilities which continues to deteriorate due to the reduction in capital investments. Process control also continues to be a challenge in some of the facilities. Concerning WWTP compliance criteria, the overall rating increased significantly since the previous inspection. However, as with the WTPs, much has to do with having several NPDES parameters with interim limits or only monitoring (as per consent decree requirements) and it is unknown whether the facility can meet the actual limit when the interim/monitoring limits expire. Finally, as it pertains to the ancillary assets, there was an equivalent or slight improvement in overall scores for WSTs and WPSs and a slight decrease for wells. The wells decrease from 2014 to 2015 and again in this inspection cycle, maintaining the trend that deterioration will continue if CIP or R&R investments are not made. Also, a significant lower rating of -0.6 rating in WWPS overall scores compared to the 2015 results. Furthermore, 67% of the visited WWPSs have recorded overflows during the evaluation period. Despite the fact that most of the deficiencies noted can be addressed through PRASA's R&R program and may not require major capital improvements, implementation of the R&R program also depends on PRASA's ability to identify and obtain funding sources. In addition, 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.

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4. PRASA recognizes that the current amount of NRW is high and is implementing sound strategic programs and initiatives to measure, manage, and reduce water losses and NRW. PRASA continues to work on and improve its leak detection and monitoring practices and continues to aggressively address leak occurrences. Currently, PRASA is remotely monitoring levels of a number of the tanks in the distribution system to avoid tank overflows and improve the water distribution balance. Also, PRASA has established a resource and a NRW management team fully dedicated to NRW monitoring and continues conducting periodic water audits, which are used to implement the necessary controls and develop action items to address NRW. The decreasing trend reported by PRASA since FY2012 demonstrates a positive change in PRASA's efforts to reduce water losses and NRW. Moreover, some of the actions and projects to be implemented by PRASA to achieve the additional reductions in NRW and water losses as included in PRASA's Fiscal Plan are: 1) the P3 Project, intended to reduce mostly commercial losses; and 2) Physical Losses Reduction initiatives. Lastly, 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.
5. Although the number of sanitary overflows is also high compared to the U.S., PRASA has continued to improve its response time and attention/repair effectiveness to minimize the duration of these overflow events and their environmental impact. However, it is important to indicate that the current fiscal situation can adversely affect the sewer overflow repair and attention rates as well.
6. PRASA's Operational Initiatives address critical aspects of PRASA's operation such as NRW, energy management and efficiency, and revenue stream diversification. However, the development, implementation and overall schedules and benefits realization of these initiatives have been negatively affected due to funding issues. This, in turn, has affected the projected additional revenues and cost savings to be realized through some of these initiatives that had been projected for FY2016 and FY2017 and, more likely than not, for future fiscal years. Nevertheless, the Revenue Optimization Program has continued to provide significant benefits to PRASA in the form of increased revenues as evidenced by recent and historical financial results.
7. Except for buried infrastructure improvements, PRASA's Board-Approved 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. It is important that PRASA maintain an adequate level of R&R spend to maintain and renovate the System. U.S. industry guidelines recommend that assets, particularly buried infrastructure, be replaced at a rate of 1% of total assets (within an asset class) annually. 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. Thus, CIP modifications will be required to adequately accommodate resulting needs. Notwithstanding, any additional CIP needs will be prioritized and implementation schedules will depend on PRASA's financial capacity. PRASA's CIP was suspended in FY2016 due to funding problems and PRASA accumulated an outstanding debt of approximately \$150M owed to its contractors and suppliers, which, as of June 2017, has been reduced to approximately \$60M. Furthermore, PRASA included in its ten-year CIP, the payment of the balance owed to contractors and \$100M in deferred projects. The ten-year CIP was updated to: (1) Reprioritize non-regulatory compliance CIP projects to give more importance to efficiency projects; (2) further extend regulatory compliance timeframes so that PRASA can better coordinate capital spending to achieve other

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outcomes within the timeframe; and (3) address long-term infrastructure rehabilitation and replacement by increasing the amount of investment in capital renewal including the replacement of meters and buried infrastructure.

8. 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 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:
 - Re-Conduct a PML Study considering new Catastrophe (CAT) Modellings and parameters.
 - 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 & severity of a breach.
 - Consideration of Terrorism Coverage, which is excluded under all current PRASA's Insurance Programs.
 - Consideration to include in next Crime Policy renewal - Knowledge or Discovery of Loss clauses should be re-negotiated to specifically identify positions triggering knowledge of incidents to minimize the risk of carrier declines for late reporting.
 - Consideration to broaden Drive Other Car coverage to include both Physical Damage and Medical Payments coverage.
9. PRASA's Forecast (see Exhibit 1) reflects the Financial Plan submitted to and certified by the Oversight Board. Despite PRASA's projected additional revenues, cost savings, new federal funds, and proposed rate increases, the Forecast reflects a total deficit of \$965.2M. Annual deficits range from \$273.4M in FY2018 down to \$12.9M in FY2026. PRASA plans to bridge this gap with a debt restructuring and/or by identifying and securing additional revenue sources or financing.

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 to meet All Obligations per the MAT which include the payment of the CGI and CSO debt service obligations in full.

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

- PRASA's ability to maintain its Service Revenues, billings, and collections in a continuing challenging economic environment – Continued uncertainty and strain on the economy, and population shifts, and consumption patterns could continue to cause further declines in PRASA's billings (reflected in lower Service Revenues than budgeted) and collections (reflected in high Adjustment for Uncollectibles).
- PRASA's ability to implement the necessary annual rate increases – PRASA is projecting to implement annual, but more modest rate increases that will generate about \$1.1B between FY2018 and FY2026. Since FY2014, PRASA has not increased or changed its rate structure for water and sewer services as controlled by public policy. However, PRASA is bound to its 2017

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Certified Fiscal Plan, which is being revised²⁶. The amount realized from the rate increases will depend on PRASA's financial results, CIP investments, customer base and consumption trends, among others.

- PRASA's ability to continue to successfully implement its Revenue Optimization Program and the new Fiscal Plan initiatives – PRASA's Forecast includes certain revenue enhancing and cost reduction initiatives that are currently underway and new ones proposed under the Fiscal Plan. Any changes to the funding, framework and execution of these initiatives would significantly alter PRASA's projected financial results. Although PRASA has made a commitment to implement the initiatives described in this Report, there is a possibility that the projected results and, more specifically, the timing of those results may not be achieved.
- PRASA's ability to self-fund its pension costs – PRASA's plan to self-fund pension costs is underway; if PRASA is not able to fully fund pension benefits on a Pay-Go basis and is otherwise required to make the contributions to the ERS, PRASA's Payroll and Benefits costs could increase by as much as \$47M.
- PRASA's permanent debt restructuring – PRASA will have to reduce its debt service to reduce its forecasted annual deficits. PRASA continues to work with federal entities to negotiate a permanent restructuring of both USDA RD and USEPA SRF debt, and has engaged in negotiations with Senior bondholders. However, there is insufficient information available to determine if PRASA will be successful in either of these efforts.

These conclusions and recommendations, as well as the and the report in its entirety, is qualified by, and should be considered in light of, the limitations, conditions and considerations described in Section 1.5.

²⁶ A revised Fiscal Plan was submitted to the Financial Oversight and Management Board (the Oversight Board) established under PROMESA for evaluation and re-certification on January 24, 2018.

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