



Puerto Rico  
Aqueduct and  
Sewer Authority

COMMONWEALTH OF PUERTO RICO

Puerto Rico Aqueduct and Sewer Authority

FINAL REPORT

# Fiscal Year 2013 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority



January 2014

**MP** ENGINEERS  
of PUERTO RICO

affiliate of **ARCADIS**  
Infrastructure · Water · Environment · Buildings



## **Puerto Rico Aqueduct and Sewer Authority**

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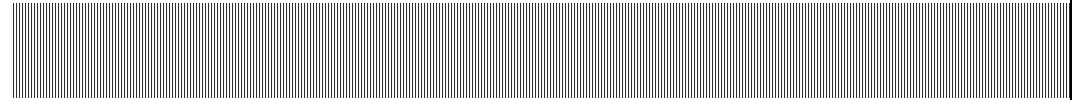
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### **FINAL REPORT**

# **Fiscal Year 2013 Consulting Engineer's Report for the Puerto Rico Aqueduct and Sewer Authority**

**with FY2014 Preliminary Results through December 31, 2013**

To satisfy the requirements of Section 7.07 of the 2012 Master of 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 Government Development Bank for Puerto Rico



Report Prepared By:

**MP Engineers of Puerto Rico, PSC**  
**Affiliate of ARCADIS U.S., Inc.**



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## Acronyms

Capitalized and abbreviated terms contained in this report are defined below. The terms listed below appear in multiple sections of this report, and are thus defined here for reference.

<b>Acronym</b>	<b>Definition</b>
ABT	Additional Bonds Test
ASD	Automatic Shutdown
AMR/AMI	Automatic Meter Reading and/or Advanced Metering Infrastructure
AWWA	American Water Works Association
CAA	Coefficient of Annual Adjustment
CAB	Annual Base Coefficient
CAGR	Compound Annual Growth Rate
CBA	Collective Bargaining Agreement
CCL	Contaminant Candidate List
CD	Coefficient of Deficiency
CER	Consulting Engineer's Report
CFE	Combined Filter Effluent
CIP	Capital Improvements Program
CMMP	Capacity, Management, Operations, and Maintenance
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DBP	Disinfection Byproduct
DBPR	Disinfection Byproducts Rule
DSC	Debt Service Coverage
ECRC	Environmental Compliance and Regulatory Charge
EPC	Energy Performance Contract
ESCO	Energy Service Companies
FOA	Fiscal Oversight and Support Agreement
FY	Fiscal Year
GDB	Government Development Bank for Puerto Rico
GIS	Geographic Information System
GWR	Groundwater Rule
GWUDI	Groundwater Under the Direct Influence of Surface Water
HAA	Haloacetic Acid
HIEPAAA	Hermandad Independiente de Empleados Profesionales de la Autoridad de Acueductos y Alcantarillados
IGEA	Investment Grade Energy Audits
IMP	Integrated Maintenance Program



<b>Acronym</b>	<b>Definition</b>
KPI	Key Performance Metrics
kWh	Kilowatt-Hour
LOC	Line of Credit
LRAA	Locational Running Annual Average
LTCP	Long-Term Control Plan
LT2 ESWTR	Long Term 2 – Enhanced Surface Water Treatment Rule
M	Million
MAT	Master Agreement of Trust
MG	Million Gallons
MGD	Million Gallons per Day
MPPR	MP Engineers of Puerto Rico, PSC
NMC	Nine Minimum Controls
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulations
NRW	Non-Revenue Water
O&M	Operation and Maintenance
PAN	Programa de Asistencia Nutricional
PCC	Plant Control Center
PMC	Program Management Consultant
PMO	Program Management Office
PPA	Power Purchase Agreement
PRASA	Puerto Rico Aqueduct and Sewer Authority
PRDOH	Puerto Rico Department of Health
PREPA	Puerto Rico Electric Power Authority
PWS	Potable Water Systems
ROC	Regional Operational Center
RFP	Request for Proposals
RFQ	Request for Qualifications
R&R	Renewal and Replacement
SAP	Systems, Applications, and Products in Data Processing
SDWA	Safe Drinking Water Act
SSOMP	Sewer System Operation & Maintenance Plan
STS	Sludge Treatment System
TANF	Programa de Asistencia Temporal para Familias Necesitadas
TOC	Total Organic Carbon
THM	Trihalomethane

<b>Acronym</b>	<b>Definition</b>
UIA-AAA	Unión Independiente Auténtica de la Autoridad de Acueductos y Alcantarillados
U.S.	United States
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
WPS	Water Pump Station
WTP	Water Treatment Plant
WWPS	Wastewater Pump Station
WWTP	Wastewater Treatment Plant

# Executive Summary

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## E.1. Introduction

MP Engineers of Puerto Rico, PSC an affiliate of ARCADIS U.S., Inc. (MPPR/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 of 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 for Puerto Rico (GDB).

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 twenty-four (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. Among these reporting requirements is the preparation and filing of a report prepared by the Consulting Engineer. As a result of the credit downgrades of PRASA's bonds to non-investment grade level in fiscal year (FY) 2013, MPPR/ARCADIS has prepared this Consulting Engineer's Report for 2013 (2013 CER). Given the elapsed time between the closing of FY2013 and the issuance of this report, the 2013 CER also includes commentaries, information, and preliminary results for the first six months of FY2014.

Unless otherwise indicated, MPPR/ARCADIS's opinion with respect to the technical, operational and financial situation and related matters of PRASA's System is presented for FY2013 and/or based on the information and preliminary results through December 31, 2013 where noted. 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. MPPR/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 MPPR/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 the 2013 CER could affect the material presented to the extent of such changes. MPPR/ARCADIS has no responsibility for updating this report for changes that occur beyond the date of its issuance.

## E.2. 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.

On May 6, 2013, through the enactment of Act No. 15, PRASA's Board of Directors (now the Governing Board) was re-structured. Although it continues to be a nine-member Board as previously enacted under Act No. 92 of 2004, the Governing Board is now comprised of the following: two ex officio members, the Secretary of the Puerto Rico Highway Transportation Authority and the Puerto Rico Planning Board Director; one engineer licensed to practice the engineering profession in Puerto Rico; one authorized legal advisor with at least seven years of experience in the profession in Puerto Rico; one member with a wide knowledge and experience in corporate finances; the Executive Director of the Mayors Association; the Executive Director of the Mayors Federation; and two customer representatives.

Since Act No. 92 was implemented in 2004, PRASA has gone through several management changes at many levels of its organization including the executive level. In general, these changes and their resulting successions and transitions have been adequately executed and have not affected the stability of the organization or the continuity of the operations.

PRASA's overall staff levels continue to be high when compared to industry benchmarks. However, during FY2013, there was an atypical personnel reduction as a result of the Government's retirement system's reform plan, which incentivized over 300 of PRASA's employees to retire. Hence, as of June 30, 2013, PRASA's staff totaled 4,888 (a 3.7% reduction compared to FY2012). PRASA is currently conducting an organizational study to determine its optimum staffing level and to identify opportunities to further reduce staff and/or re-allocate staff to other areas. This study will be completed during FY2014. Also, PRASA is in the process of hiring employees to fill certain critical operational positions that were left vacant as a result of the numerous personnel retirements that took place in FY2013 due to legislated changes to the retirement conditions. As of December 2013, PRASA's staff totaled 5,113.

On January 20, 2012 PRASA and its larger union, the UIA-AAA, signed a new Collective Bargaining Agreement (CBA), effective from January 2012 through December 2015. It includes certain retroactive and future economic agreements that have an impact on PRASA's payroll and benefits expense projections starting on FY2013. PRASA has indicated that negotiations for the new CBA are expected to begin in late FY2014 or early FY2015. Also, PRASA and the HIEPAAA signed a new CBA effective from May 2012 through June 2016. It also contains certain economic agreements (i.e., salary increases) that have an impact on PRASA's Payroll and Benefits expenses starting in FY2013. PRASA's management continues to maintain a positive working relationship and open communication channels with the unions.

Finally, PRASA continues to assess administrative and operational optimization with the purpose of improving System logistic performance, customer service, human resources and training

development programs, and technology innovation. PRASA continues to engage with numerous internationally recognized consultants to assist with several aspects of its operations. PRASA's organizational and management changes have been smoothly implemented to ensure continuance of policy and programs implementation and an appropriate operation and maintenance (O&M) of the System.

### **E.3. 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. In FY2012, MPPR/ARCADIS assessed the condition of PRASA's System by inspecting a sample of the major elements of the System. The purpose of these inspections was to identify the overall condition of the facilities and to determine if they are being operated and maintained in a manner consistent with their operating goals. MPPR/ARCADIS is conducting these facility inspections approximately every two years; therefore, no inspections were performed for the 2013 CER. Nevertheless, MPPR/ARCADIS evaluated the compliance performance results for all PRASA water treatment plants (WTPs) and wastewater treatment plants (WWTPs) for the period from July 1, 2012 through December 31, 2013. Also, MPPR held meetings with the five Regional Directors and their respective management teams to obtain updated information regarding the condition of the System (i.e., material operational and asset condition changes). The next round of facility inspections will be completed in FY2014.

Regarding the 2012 inspections, and as noted in the 2012 Consulting Engineer's Supplemental Report, the condition of the facilities visited varied from new to those requiring capital upgrades and/or operational/process improvements. Compliance with discharge permit limits and drinking water standards varied depending on the plant age, condition and experience of operators. In general, the condition of the facilities averaged an adequate rating, and an overall improvement from previous results was observed as shown in Table ES-1.

**Table ES-1:  
FY2012 Asset Condition Ratings by Category**

Asset Category	Overall Condition Ratings				2012 vs. 2010		2012 vs. 2008	
	2008 CER	2009 CER	2010 CER	2012 CER	Change in Overall Score	Percent Change	Change in Overall Score	Percent Change
Regulated Dams	Adequate	Adequate	Adequate	Adequate	0.0	-	0.0	-
Water Treatment Plants	Adequate	Adequate	Adequate	Adequate	0.3	13.0%	0.4	18.2%
Wastewater Treatment Plants	Adequate	Adequate	Adequate	Adequate	0.0	-	0.1	5.3%
Wells	Adequate	Adequate	Adequate	Adequate	0.1	4.8%	0.2	10.0%
Water Pump Stations	Adequate	Adequate	Adequate	Adequate	0.1	4.3%	0.2	9.1%
Wastewater Pump Stations	Adequate	Adequate	Adequate	Adequate	0.1	5.0%	0.4	23.5%
Water Storage Tanks	Adequate	Adequate	Adequate	Adequate	0.3	18.8%	0.0	-

Based on the regulatory compliance results evaluated for the 2013 CER and the operational update provided by PRASA's Regions, despite some operational compliance issues, the treatment facilities are generally producing and delivering potable water and conveying and treating wastewater adequately. PRASA has shown that with the implementation of several initiatives that include O&M improvements and with the establishment of a planned Capital Improvements Program (CIP), among others.

MPPR/ARCADIS analyzed the PRASA-reported data on water leaks and sewer overflows. Reported active leaks and sewer overflows remain at high levels when compared to other utilities in the United States (U.S.) and Canada; however, in FY2013 PRASA improved its percent repaired and backlog days of pending repairs with duration greater than seven days metrics for these incidences. In FY2013 PRASA reports that, on average, 99% of island-wide weekly reported leaks were repaired; this represents an improvement of 5% over FY2012 reported results. Also, PRASA managed to decrease its backlog days of pending leaks with duration greater than seven days from 1.4 days (FY2012 result) down to 0.5 days. With regards to overflows, PRASA also reported improvements in FY2013; on average, 100% of island-wide weekly reported overflows were repaired. Also, PRASA managed to decrease its backlog days of pending overflows with duration greater than seven days from 0.5 days (FY2012 result) down to 0.2 days.

PRASA reports to have reduced both the amount of water produced and the amount of Non-Revenue Water (NRW). PRASA attributes these reductions to two main contributing factors: water system optimization measures and corrections made in water production and data collection practices. On average, PRASA reports to have produced about 617 million gallons per day (MGD) of potable water in FY2013, which is about 12 MGD less than in FY2012. Also, PRASA reports to have reduced its NRW to 58.9% from the 61% 10-year average. Of this amount, PRASA estimates that 57.4% was due to water losses (both apparent and real) and 1.5% was due to unbilled authorized consumption. Of the total amount of water losses in FY2013, it is estimated that 17% was due to apparent (commercial) losses and 83% due to real (physical) losses. Finally, PRASA reports to have treated, on average, 242 MGD of wastewater during FY2013 which is about 2 MGD less than reported for FY2012.

#### **E.4. O&M Practices and Strategic Plan**

MPPR/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 2012 asset condition assessment effort previously described. Overall, MPPR/ARCADIS found PRASA's O&M practices to be adequate.

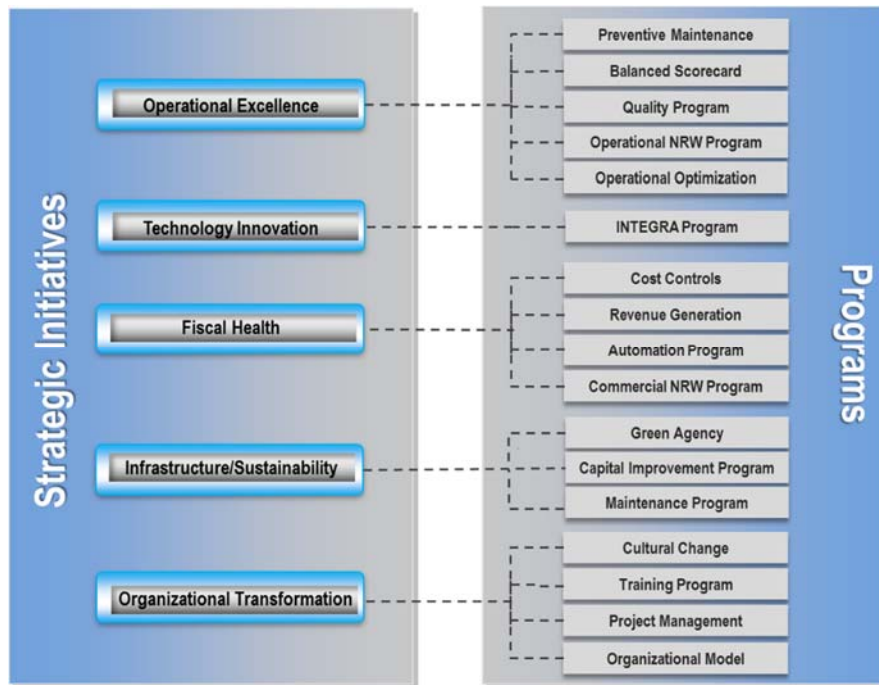
All the Dams facilities and the majority of WTPs and WWTPs were found to be adequately operated and maintained. However, there were a few WTP and WWTP facilities that reported exceedances in compliance treatment parameters during the evaluation period and/or lacked the appropriate operational tools (i.e., O&M manuals, process controls, and laboratory equipment) at the moment inspections were conducted. Also, even though PRASA has improved its processes for



prioritizing, scheduling, and executing preventive, corrective and routine maintenance activities; there is still room for further improvement, particularly for buried infrastructure. In overall, MPPR/ARCADIS observed that, throughout time, PRASA’s O&M efforts have improved. MPPR/ARCADIS also found that ancillary facilities, for the most part, are being adequately operated and maintained. Nevertheless, a number of these facilities were found to have at least one operational and/or maintenance shortcoming that should be addressed by PRASA.

As previously noted, MPPR/ARCADIS conducted meetings with PRASA’s Regional Directors and operational personnel to obtain a current status regional O&M activities. PRASA’s Regions are focusing on System simplification, O&M metrics measurement, and identifying and implementing cost reduction measures such as electric energy conservation measures, among other key activities.

PRASA has adopted the mission of providing quality water and wastewater services at the lowest possible cost. In order to reach that goal, PRASA’s Executive Management Team has developed and implemented a Strategic Plan that, as shown in Figure ES-1, is comprised of five key strategic initiatives: 1) Fiscal Health, 2) Operational Excellence, 3) Infrastructure and Sustainability, 4) Organizational Transformation, and 5) Technological Innovation. In turn, the Strategic Plan initiatives includes programs involving projects to be executed between FY2014 through FY2018. The Strategic Plan also includes key performance indicators and metrics established by PRASA’s Executive Management Team to track and improve operational performance.



**Figure ES-1: Strategic Plan Initiatives and Programs**

MPPR/ARCADIS also evaluated PRASA’s annual System O&M budget to assess its adequacy. Over the past five fiscal years, PRASA’s O&M budget has increased at a compounded annual growth rate (CAGR) of less than 1% per year. PRASA has been able to implement cost reduction measures to counteract the higher electric power costs that have affected the public corporation’s finances in recent years. Compared to other utilities in the U.S., PRASA’s O&M budgets are comparable to the most recently published median benchmark results. Table ES-2 provides a comparison of PRASA’s metrics to several key O&M benchmark performance indicators.

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

Benchmark Category	2011 Benchmarks <sup>1</sup>			PRASA <sup>2</sup>
	Top Quartile	Median	Bottom Quartile	
Water O&M Cost per Account	\$210	\$340	\$470	FY2009: \$294 FY2010: \$292 FY2011: \$309 FY2012: \$321 FY2013: \$357
Water O&M Cost per MG Processed	\$1,540	\$2,002	\$2,596	FY2009: \$1,585 FY2010: \$1,555 FY2011: \$1,702 FY2012: \$1,777 FY2013: \$1,991
Wastewater O&M Cost per Account	\$271	\$344	\$468	FY2009: \$216 FY2010: \$214 FY2011: \$225 FY2012: \$236 FY2013: \$199
Wastewater O&M Cost per MG Processed	\$1,535	\$2,784	\$3,673	FY2009: \$1,984 FY2010: \$1,949 FY2011: \$2,067 FY2012: \$2,151 FY2013: \$1,692

<sup>1</sup> Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2011 Annual Survey Data and Analyses Report, AWWA (2013)

<sup>2</sup> 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 presents a summary of PRASA’s key performance indicators. Unless otherwise noted, the results are presented based on the average results for the FY2013. The table also presents management’s FY2014 goals and the average results for the first six months of FY2014.

**Table ES-3:  
PRASA Operations Key Performance Indicators**

Key Performance Indicators	Strategic Plan Goal	Results as of June 2013	Results as of December 2013
Compliance - Water System	Increase to 97%	93%	94%
Compliance - Wastewater System	Increase to 95%	92%	93%
Service Interruptions	Reduce to 9%	10%	8%
Customers with Deficient Services	Reduce to 3,892	4,325	3,752
Average Processing Time of Purchase Orders	Less than 25 days	33 days	29 days
Vehicle Availability	Increase to 90%	66%	96%
Average Time for Equipment Repairs	Less than 20 days	22 days	24 days
Preventive vs. Corrective Maintenance Ratio	Increase to 80% : 20%	60% : 40%	72% : 28%
Work Effectiveness (Absenteeism)	Reduce to 13%	18%	N/A <sup>1</sup>
Percent Readings	Increase to 85%	83%	N/A <sup>1</sup>
Customer Attention Time (Commercial Office)	Maintain below 25 min.	21.6 min.	22.6 min.
Average Customers with Service Interruptions (as a Percentage of Total Customers)	Reduce to 9%	9%	8%
Complaints in Customer Service (per 1,000 clients)	Reduce to 10	10.6	34.3
Repair time for leaks	Reduce to 60.0 hrs.	87.4 hrs.	63.0 hrs.

<sup>1</sup> Information not available.

## E.5. Capital Improvement Program and Regulatory Compliance

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 renewal and replacements (R&R) to the System. From FY2006 through FY2012, PRASA invested about \$3,000 million (M) to improve and modernize the System, and bring the System's facilities (treatment plants, pump stations, etc.) to continuous and sustainable compliance. In FY2013, PRASA's capital expenditures totaled \$329M.

Since 2005, PRASA has annually invested about 54% of its CIP in compliance-related projects which include mandated requirements of existing consent decrees and agreements with Regulatory Agencies (U.S. Environmental Protection Agency, or USEPA; and the Puerto Rico Department of Health, or PRDOH). However, PRASA and the Regulatory Agencies are currently in discussions 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. These modifications are expected to result in the postponement or advancement of the implementation of certain projects currently included in the CIP, and/or the modification of their scope of work. As part of the renegotiation process, PRASA and the Regulatory Agencies agreed to revise PRASA's prioritization system which establishes the relative priority of all planned upcoming projects with the objectives of allocating its limited financial resources according to such priority. With the

exception of certain projects that have been included in what PRASA and the Regulatory Agencies have defined as the Base List (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); all other projects to be included in PRASA's CIP will be prioritized accordingly. PRASA expects to close the negotiation process and file the amended consent decrees/agreements with the court during FY2015.

There are 998 projects currently included in the Governing Board-approved CIP for the FY2014–FY2018 period, with total projected expenditures of \$1,423.1M. Approximately \$664.1M of this amount corresponds to capital expenditures for compliance related projects of which \$404.5M are mandatory. Hence, about 46.7% of PRASA's planned five-year CIP is compliance driven. This reduction is mostly due to the proposed changes in the negotiations with the Regulatory Agencies.

PRASA's CIP addresses requirements of the following existing consent decrees and agreements with Regulatory Agencies: the 2003 PRASA IV Consent Decree, the 2006 USEPA Wastewater Consent Decree, the 2006 PRDOH Drinking Water Settlement Agreement, and the 2010 USEPA STS Consent Decree. Review of PRASA's CIP showed that all of the WTP and WWTP facilities that received a low rank in terms of compliance are either currently being addressed by PRASA's operational department and/or currently have CIP projects identified to either rehabilitate or close the facility, thus addressing existing compliance problems.

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 repair improvements that PRASA may be required to implement to bring these into compliance, and 2) future regulations that may impact PRASA's System. Based on the condition assessment and CIP review completed by MPPR/ARCADIS, PRASA has an adequate CIP implementation program that continues to meet PRASA's needs. The existing CIP includes a contingency to address future regulations and any other regulatory requirements that PRASA may need to comply with. However, the impact of these future regulations may require significant operational and capital investments, which may not be covered by these contingencies. 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.

Finally, in FY2013 PRASA began updating its 2011 Water and Wastewater Infrastructure Master Plan to revise its identified future needs based on the most recent population data reported in the U.S. Census 2010, the population projections published by the Puerto Rico Planning Board on December of 2013, and PRASA's most recent compliance results and capacity data. The updated Master Plan will provide PRASA with an updated roadmap for the implementation of its future investments in water and wastewater infrastructure over the next 20 years. The updated Master Plan

will also take into consideration recent renegotiation agreements with Regulating Agencies and the project prioritization system.

## **E.6. Insurance Program**

In order to meet the requirements of the MAT as it regards to PRASA’s insurance program, MPPR/ARCADIS subcontracted AON Global Risk Consulting (AON) to review PRASA’s current insurance coverage and determine its adequacy considering the type and value of PRASA’s fixed assets. AON also provided a professional opinion on the appropriateness of such coverage and recommendations related to PRASA’s insurance coverage.

AON concluded that the insurance program covering PRASA’s exposures to risks of accidental property and liability losses arising from on-going operations, as well as the Owner Controlled Insurance Program (OCIP) covering PRASA’s exposures to risks of accidental property and liability losses arising from construction activities provide reasonable coverages. AON provided the following recommendations for PRASA’s consideration:

1. Review of the adequacy of the property insurance limit in relation to the 2010 Probable Maximum Loss Study.
2. Review the downstream liability exposure for PRASA’s dams.
3. Consider adding underground storage tank coverage to the pollution liability policy.
4. In the OCIP, consider amending the misrepresentation and fraud condition to limit its application only to the party committing the misrepresentation or fraud.

## **E.7. System Assets and Financial Analysis**

PRASA reported an estimated total book value of fixed assets of approximately \$6,253M (see Table ES-4). Additionally, PRASA reported it had approximately \$1,096M of assets that are currently under construction or as “Work in Process”. Including land and other non-depreciable assets, as of June 30, 2013, the book value of PRASA’s total fixed assets amounts to \$7,420M (net of accumulated depreciation).

**Table ES-4:  
Fixed Assets Summary through June 30, 2013 (\$, Millions)**

	Original Cost	Accumulated Depreciation	Book Value
Fixed Assets	\$9,499	(\$3,246)	\$6,253
Work in Process	1,096	-	1,096
Land and other Non-Depreciable Assets	71		71
<b>Total Fixed Assets</b>	<b>\$10,666</b>	<b>(\$3,246)</b>	<b>\$7,420</b>

In the preparation of this 2013 CER, MPPR/ARCADIS reviewed PRASA's FY2013 results, PRASA's FY2014 first semester results, and the PRASA-prepared FY2014 through FY2018 financial forecast (the Forecast) shown in Exhibit 1 (enclosed at the end of this section). The purpose of MPPR/ARCADIS's review was to assess the adequacy of the revenues and expense categories that make up PRASA's Forecast as well as the anticipated debt service coverage (DSC) for the five fiscal years from July 1, 2012 through June 30, 2018 (the forecast period). MPPR/ARCADIS opined on the reasonableness of this Forecast and provided recommendations to PRASA. As part of its review, MPPR/ARCADIS also completed a sensitivity analysis to demonstrate the impact that a change in certain Forecast assumptions will have on PRASA's projected financial results and DSC.

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.

In connection with PRASA's 2012 bond issue, on January 24, 2012 PRASA's Governing Board authorized the execution of an amended and restated Master Agreement of Trust (2012 MAT) by and between PRASA and Banco Popular de Puerto Rico as Trustee; and an amended and restated Fiscal Oversight and Support Agreement (2012 FOA) by and between PRASA, the Commonwealth of Puerto Rico and the GDB. PRASA's Forecast has been structured considering the requirements of both the 2012 MAT and the 2012 FOA.

On February 1, 2013, in compliance with the requirements of the 2012 FOA, PRASA submitted to GDB an updated *Fiscal Improvement Plan* which presented annual deficits starting in FY2014. The GDB, in turn, informed PRASA that it would not appropriate additional funds to supplement PRASA's revenues for FY2014. As a result, and in compliance with the 2012 MAT and the 2012 FOA, PRASA moved forward with its rate revision and increase process. The process was completed on July 3<sup>rd</sup>, 2013, when PRASA's Governing Board approved the final rate structure to be implemented and that would become effective on July 15, 2013. The Governing Board-approved rate structure includes increases of PRASA's base and volume charges and it incorporates a new monthly fix charge, the Environmental Compliance and Regulatory Charge (ECRC), which varies by customer class and by either consumption or meter size. Subsequently, on December 18, 2013 the Governing Board amended the ECRC billing structure for non-residential customers.

PRASA also included an additional \$2.00 monthly Special Charge for all customers to facilitate the development of CIP projects that focus on the sustainable management of water resources in accordance with the existing Environmental Public Policy Law (Act 416 of September 2004, as amended) and the Puerto Rico Water Resources Comprehensive Plan (2008); and both water and



wastewater improvement projects in Non-PRASA<sup>1</sup> systems. This Special Charge is expected to generate \$18M in FY2014 (adjusted to account for the rate increase implementation lag) and \$25M in each year thereafter. PRASA has included deposit transfers into the Capital Improvement Fund in each year of the Forecast equivalent to these amounts to partially fund its CIP.

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 will be implemented in a phased approach over the next three fiscal years (FY2014-FY2016).

The Operating Revenues (presented on a cash basis as required by the 2012 MAT) include Service Revenues (net of subsidies), incremental revenues from the rate increase, adjustments for uncollectible accounts, revenues from certain operational initiatives, as well as other sources of revenues such as interest income, and developer fee contributions. 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. FY2013 results show that PRASA's Operating Revenues were approximately \$759M. For FY2014, PRASA is projecting about \$995M in Operating Revenues, net of a transfer to the Rate Stabilization Account of \$64M. The Operating Revenues include the additional projected revenues resulting from the rate increase that was approved by PRASA's Governing Board, which amounts to \$357M in FY2014. This amount is net of PRASA's estimated implementation lag adjustments which amount to \$74.1M and include a \$13M reduction due to subsequent modifications to the non-residential ECRC. In future years, Operating Revenues are expected to be in the range of \$1,135M (in FY2015) up to \$1,212M (in FY2018); these amounts are slightly higher since the implementation lag adjustment is not applicable.

As defined in the 2012 MAT and 2012 FOA, the Budgetary Reserve Fund and other sources of revenues such as special assignments from the Central Government, combined with the Operating Revenues, make up the Authority Revenues. In FY2013, Authority Revenues totaled \$904M, given that PRASA withdrew the \$145M remaining balance from the Budgetary Reserve Fund. This amount was funded with 2012 bonds proceeds. No additional transfers from the Budgetary Reserve Fund have been projected for future years. The FY2013 ending balance (\$43.6M) will be deposited by PRASA into the Senior Bond Fund to cover, in part, the Senior debt service obligations for FY2014. Finally, PRASA is projecting that no additional sources of funds will be needed until FY2018; in this year, PRASA's Forecast includes \$10M from additional sources of funds. Hence, Authority Revenues are expected to be in the range of \$995M in FY2014 up to \$1,222M in FY2018.

The Operating (Current) Expenses projections (presented on an accrual basis as required by the 2012 MAT), include Payroll and Benefits costs, as well as Electric Power, Chemicals, Maintenance

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<sup>1</sup> A Non-PRASA system is a water community-operated or wastewater system that is not connected to PRASA's system.

and Repair, among others. Payroll and Benefits expenses take into consideration the conditions of PRASA's negotiations of the CBAs with its unions which include additional salary increase in the future for certain employee categories. Other expense projections such as Chemicals, Maintenance and Repair, and Other Expenses include provisions to account for inflation over the forecast period. Results for FY2013 show that PRASA's Operating Expenses were approximately \$695M. PRASA has projected that Operating Expenses will increase, on average, at a CAGR of about 0.7% per year over the forecast period. Operating Expenses are projected to fluctuate from \$700M in FY2014 up to \$729M in FY2018. It should be noted that PRASA's projected Operating Expenses will be positively impacted, and consider a significant reduction in Electric Power costs resulting from the preferential electricity all-in-rate approved for PRASA under Act 50 of June 2013. This preferential all-in-rate sets the cost per kilowatt-hour (kWh) at \$0.22 (for the first 750 million kWh) during FY2014-FY2016; and at \$0.16 (also for the first 750 million kWh) from FY2017 and beyond. The second phase of the preferential electricity all-in-rate is expected to save PRASA about \$45M. PRASA has included deposit transfers into the Capital Improvement Fund in each year of the Forecast equivalent to this amount to partially fund its CIP.

Table ES-5 below, summarizes PRASA's projected DSC over the forecast period (as shown in Exhibit 1). As presented, PRASA project to meet all DSC requirements over the forecast period. The projected DSC results have been calculated using the Rate Covenant requirements as per the 2012 MAT.

**Table ES-5:  
FY2013 – FY2018 Debt Service Coverage**

Debt Service Level	DSC Requirement	FY2013 Results	FY2014 Projection	FY2015 Projection	FY2016 Projection	FY2017 Projection	FY2018 Projection
Senior Debt <sup>1</sup>	2.50	8.38	5.15	3.79	3.84	3.79	3.78
Senior Subordinated Debt <sup>1</sup>	2.00	8.38	5.15	3.79	3.84	3.79	3.78
Subordinated Debt <sup>1</sup>	1.50	8.38	5.15	3.79	3.84	3.79	3.78
All Obligations <sup>2</sup>	1.00	1.05	1.00	1.00	1.00	1.00	1.00

<sup>1</sup>DSC calculated with respect to Operating Revenues.

<sup>2</sup>DSC calculated with respect to Authority Revenues.

Overall, PRASA's Forecast is reasonable. MPPR/ARCADIS preformed a sensitivity analysis of PRASA's Forecast. The objective of the sensitivity analysis is to demonstrate the impact that a change in certain Forecast assumptions will have on PRASA's projected financial results and DSC. Specifically, MPPR/ARCADIS evaluated the potential effects on PRASA's projected financial results of negative deviations in the following revenue and expense categories: lower Service Revenues, higher Rate of Uncollectibles, and higher Payroll and Benefits expenses. MPPR/ARCADIS also evaluated the effect that higher interest rates in future debt issuances would have on PRASA's debt service obligations and DSC. While, PRASA's Forecast adequately meets all DSC requirements for each fiscal year, the sensitivity analysis shows that PRASA's Forecast is sensible to negative deviations in the critical assumptions previously listed which could ultimately result in lower DSC levels and/or lower deposit amounts into the Capital Improvement Fund and the Rate Stabilization Account than currently included in the Forecast.

## **E.8. Conclusions**

In preparation of this report and the conclusions contained herein, MPPR/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. MPPR/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 forecast.

In the preparation of this report, MPPR/ARCADIS has made a number of considerations and assumptions (as provided throughout this report); some of the most notable are as follows:

1. MPPR/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, MPPR/ARCADIS has assumed that all such contracts, agreements, laws, rules and regulations will be fully enforceable in accordance with their terms.
2. PRASA will generally 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, and the CIP will be largely implemented as planned and reflected in this report.

Set forth below are the most relevant opinions which MPPR/ARCADIS has reached regarding the review of PRASA's System, CIP and financial projections. For a complete understanding of the assumptions upon which these opinions are based, this report should be read in its entirety.

1. The condition of PRASA's System facilities has visited varied from new to those requiring capital upgrades. The condition of most facilities improved. However, a number of WTP and WWTP continue to operate out of compliance with drinking water standards and discharge permit limits. Findings show that in many cases these compliance shortcomings are a result of malfunctioning equipment, lack of proper process control implementation, or a combination thereof. Nevertheless, despite these compliance problems, the facilities are generally producing and delivering potable water and conveying and treating wastewater adequately.
2. PRASA's overall staff levels have been historically high compared to industry benchmarks, even though some individual facilities and PRASA departments have staffing shortages. It is expected that upon completion of the organizational assessment that PRASA is conducting, PRASA will a) invest, to the extent possible, in re-training and re-allocating employees to address staffing needs; and b) re-initiate its staff reduction program.

3. The FY2014-FY2018 Strategic Plan should provide the necessary guidance for PRASA to continue its management, operational, and cultural transformation. Key performance metrics being measured, along with stronger management oversight should help PRASA in the improvement and optimization of its operations.
4. PRASA's Operational Initiatives are well developed and address critical aspects of PRASA's operation such as NRW and energy efficiency. The Revenue Optimization Program, in particular, has provided significant benefits to PRASA in the form of increased revenues. Also, the Electric Power preferential all-in-rate that will be in effect starting in FY2014, combined with PRASA's energy source diversification and consumption reduction initiatives, should help PRASA in the reduction and control of its Electric Power expenses over the next several years.
5. PRASA has significant opportunities to reduce its current volume of NRW and to continue to improve its billing procedures and collections. While initiatives such as the Revenue Optimization Program, the Geodatabase development, and the leak detection project that will be conducted in FY2014, will aid PRASA in its goal of reducing its high volumes of NRW; additional efforts and investments are necessary to accelerate the recovery of and make a significant impact in the reduction of NRW.
6. With the possible exception of buried infrastructure improvements, the planned CIP along with the O&M initiatives are generally in alignment with the System needs. Some additional needs at certain WTP and WWTP facilities have been identified and have been reported to PRASA as a result of the 2012 asset condition assessment conducted by MPPR/ARCADIS.
7. PRASA must continue a focused corrective maintenance and R&R program to improve leaks and overflow metrics, to maintain and improve the condition of the System, and to provide a program for the long-term preservation of the System assets. On average, PRASA has included in its CIP approximately \$70M in each year of the Forecast for R&R. While this is about \$20M more than what PRASA had budgeted in previous years, given PRASA's high rate of leaks and overflows, and continuing aging infrastructure, PRASA should consider increasing its annual R&R funding and accelerating its R&R program, to the extent that its financial situation allows. For this, as previously recommended, an analysis of PRASA's R&R needs and budget is recommended to develop a sound program that will allow PRASA to improve and extend the useful life of its System.
8. PRASA's proposed CIP adequately addresses all mandated requirements of existing consent decrees and agreements with Regulatory Agencies. 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. Although, the existing CIP includes a contingency to

address future regulations and any other regulatory requirements that PRASA may need to comply with, the impact of these may require significant operational and capital investments currently not contemplated in PRASA's CIP. PRASA continues to make allowances in its new designs to improve capabilities to meet certain future regulations. As the impact of future regulations becomes more defined, CIP modifications will be required to adequately accommodate resulting needs. It is expected then, that the identified needs will be prioritized following the process discussed with and approved by the Regulatory Agencies.

9. 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:

- Review of the adequacy of the property insurance limit in relation to the 2010 Probable Maximum Loss Study.
- Review the downstream liability exposure for PRASA's dams.
- Consider adding underground storage tank coverage to the pollution liability policy.
- Consider amending the misrepresentation and fraud condition to limit its application only to the party committing the misrepresentation or fraud.

10. Overall, PRASA's current rate structure and the Forecast (included in Exhibit 1) are reasonable. PRASA's Forecast adequately meets all DSC requirements for each fiscal year. MPPR/ARCADIS conducted an analysis to stress certain critical assumptions of PRASA's Forecast, including Service Revenues, Rate of Uncollectibles, Payroll and Benefit costs (overtime costs), and interest rates of future debt. The sensitivity analysis shows that PRASA's Forecast is highly sensible to deviations in the critical assumptions previously listed. The probability of PRASA achieving its Forecast and meeting its DSC requirements throughout the forecast period is conditioned on the following key assumptions:

- **PRASA's ability to maintain its Service Revenues in a very challenging economic environment** – Continued uncertainty and strain on the economy could cause a decline in the consumption patterns of PRASA customers and could affect PRASA's collections. Also, as a consequence of the rate increase, customers could assume water conservation measures and/or theft occurrences could increase, which could also result in a reduction in consumption and/or an increase in the rate of uncollectibles. Although PRASA's revised rate structure considers a projected reduction in consumption as a result of the increase in water and wastewater rates (elasticity effect), projected Operating Revenues could be materially affected if the projected population and/or consumption levels decrease at a higher rate than expected.

- **PRASA’s ability to continue to successfully implement all of its Operational Initiatives** – PRASA’s Forecast includes results from select Operational Initiatives that are described throughout this report. The Forecast also includes certain revenue enhancing and cost reduction initiatives that are currently underway. MPPR/ARCADIS’s conclusions regarding the Forecast assume the framework and execution of the Operational Initiatives will not materially change; any changes could significantly alter the findings contained and presented in this report. Although PRASA has made a dedicated 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 will not be achieved.
  
- **PRASA’s ability to secure future CIP financing sources (i.e., issues bonds) at an affordable cost** – PRASA’s Forecast assumes that PRASA will be able to secure future financing from either interim sources or through bond issuances to finance its CIP. However, given Puerto Rico’s current economic and fiscal situation there is a possibility that the projected bond issuances and, more specifically the timing of these, and/or the assumed issuance terms will not be achieved. In this case PRASA would need to implement one, or a combination of the following measures: a) reduce its CIP spending, b) increase Operating and/or Authority Revenues (seek additional support from the Central Government, increase rates, etc.), or c) decrease its Operating Expenses.



**EXHIBIT 1**

**PRASA FINANCIAL FORECAST PRO FORMA\***  
**(\$, Thousands)**

	<b>FY2013 RESULTS</b>	<b>FY2014 PROJECTION</b>	<b>FY2015 PROJECTION</b>	<b>FY2016 PROJECTION</b>	<b>FY2017 PROJECTION</b>	<b>FY2018 PROJECTION</b>
<b>OPERATING REVENUES</b>						
1. Service Revenues (Base Fee and Service Charges, Net of Subsidies) <sup>b</sup>	\$725,603	\$1,071,433	\$1,145,520	\$1,145,520	\$1,145,520	\$1,145,520
2. Transfer to Rate Stabilization Account	-	(63,697)	(11,146)	-	-	(4,549)
3. Transfer from the Rate Stabilization Account	-	-	-	15,153	17,838	41,852
4. Special Charges	-	18,000	25,000	25,000	25,000	25,000
5. Operational Initiatives - Additional Billings	41,955	50,470	54,781	59,775	64,579	65,909
6. Operational Initiatives - Collections from Prior Years	44,242	17,132	17,195	16,953	16,625	15,413
7. Adjustment for Uncollectibles	(65,430)	(112,190)	(108,027)	(96,424)	(96,808)	(96,914)
8. Miscellaneous Income	6,465	5,000	4,000	4,000	4,000	4,000
9. Special Assessments	6,537	4,500	4,000	4,000	4,000	4,000
10. Other Income (HUD Transfer + New Sewer Service Collections)	-	4,100	4,100	4,100	12,100	12,100
<b>11. Total Operating Revenues [Sum Lines 1-10]</b>	<b>\$759,372</b>	<b>\$994,748</b>	<b>\$1,135,423</b>	<b>\$1,178,077</b>	<b>\$1,192,854</b>	<b>\$1,212,331</b>
<b>OTHER REVENUES</b>						
12. Other Sources of Revenue	-	-	-	-	-	-
13. Transfer from Budgetary Reserve Fund	\$145,000	-	-	-	-	-
14. General Fund Contributions	-	-	-	-	-	-
15. Additional External Support/Other Measures	-	-	-	-	-	10,000
<b>16. Total Other Sources of Revenue [Sum Lines 13-15]</b>	<b>\$145,000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>\$10,000</b>
<b>17. Total Authority Revenues [Line 11+ Line 16]</b>	<b>\$904,372</b>	<b>\$994,748</b>	<b>\$1,135,423</b>	<b>\$1,178,077</b>	<b>\$1,192,854</b>	<b>\$1,222,331</b>
<b>OPERATING EXPENSES</b>						
18. Payroll and Benefits	\$302,272	\$316,383	\$328,932	\$338,268	\$347,263	\$356,258
19. Electric Power	209,168	175,395	176,721	186,436	125,382	132,160
20. Maintenance and Repair	45,214	51,217	52,754	54,336	55,966	57,645
21. Chemicals	28,872	33,412	34,414	35,447	36,510	37,606
22. Superaqueduct O&M Contract Fee	5,679	5,733	5,905	6,082	6,265	6,453
23. Insurance	9,493	9,495	9,780	10,073	10,375	10,687
24. Other Expenses	124,217	146,398	152,848	157,444	162,166	167,032
25. Capitalized Operating Expenses	(30,181)	(37,640)	(38,829)	(40,192)	(37,940)	(39,160)
<b>26. Total Operating Expenses [Sum Lines 18-25]</b>	<b>\$694,734</b>	<b>\$700,393</b>	<b>\$722,525</b>	<b>\$747,894</b>	<b>\$705,988</b>	<b>\$728,681</b>
<b>DEBT SERVICE</b>						
27. Senior Lien Debt Service (S, SSub,Sub)	\$90,600	\$193,246	\$299,827	\$306,713	\$314,985	\$320,824
28. Subordinated Debt Service (CGI & CSO)	75,392	83,108	88,071	98,469	101,881	102,826
<b>29. Total Debt Service [Line 27+Line 28]</b>	<b>\$165,992</b>	<b>\$276,354</b>	<b>\$387,898</b>	<b>\$405,182</b>	<b>\$416,866</b>	<b>\$423,650</b>
<b>DEPOSITS</b>						
30. Deposit to the Senior Bond Fund	(\$43,646) <sup>c</sup>	-	-	-	-	-
31. Deposit to the Senior Subordinate Bond Fund	-	-	-	-	-	-
32. Deposit to the Subordinate Bond Fund	-	-	-	-	-	-
33. Deposit to the Current Expense Fund	-	-	-	-	-	-
34. Deposit to the Operating Reserve Fund	-	-	-	-	-	-
35. Deposit to the Capital Improvement Fund	-	(18,000)	(25,000)	(25,000)	(70,000)	(70,000)
36. Deposit to the Commonwealth Payments Fund	-	-	-	-	-	-
37. Deposit to the Surplus Fund	-	-	-	-	-	-
<b>38. Total Deposits [Sum Lines 30-37]</b>	<b>(\$43,646)</b>	<b>(\$18,000)</b>	<b>(\$25,000)</b>	<b>(\$25,000)</b>	<b>(\$70,000)</b>	<b>(\$70,000)</b>
<b>39. Net Authority Revenues After Obligations and Deposits</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>DEBT SERVICE PAYMENTS DUE</b>						
40. Senior (S), Net of Deposits in Senior Bond Fund	\$90,600	\$193,246 <sup>c</sup>	\$299,827	\$306,713	\$314,985	\$320,824
41. Senior Subordinated (SSUB), Net of Deposits in Senior Subordinated Bond Fund	-	-	-	-	-	-
42. Subordinated (SUB), Net of Deposits in Subordinated Bond Fund	-	-	-	-	-	-
43. Commonwealth Guaranteed Indebtedness (CGI), Net of Deposits in the Commonwealth Payments Fund	75,392	83,108	86,477	89,470	92,882	93,827
44. Commonwealth Supported Obligations (CSO), Net of Deposits in the Commonwealth Payments Fund	-	-	1,594	8,999	8,999	8,999
<b>45. Total Debt Service, Net of Existing Deposits [Sum Lines 40-44]</b>	<b>\$165,992</b>	<b>\$276,354</b>	<b>\$387,898</b>	<b>\$405,182</b>	<b>\$416,866</b>	<b>\$423,650</b>

<sup>a</sup> Numbers may not add up due to rounding.

<sup>b</sup> Base Fee and Service Charges from FY2014 onward, reflect PRASA's July 15, 2013 rate increase.

<sup>c</sup> Debt Service Amount Due of \$236.8M reduced by \$43.6M deposit (made in FY2013) to the Senior Bond Fund (see Line 30).

**EXHIBIT 1**

**PRASA FINANCIAL FORECAST PRO FORMA  
DEBT SERVICE COVERAGE<sup>a</sup>  
(\$, Thousands)**

	<b>FY2013 RESULTS</b>	<b>FY2014 PROJECTION</b>	<b>FY2015 PROJECTION</b>	<b>FY2016 PROJECTION</b>	<b>FY2017 PROJECTION</b>	<b>FY2018 PROJECTION</b>
1. Operating Revenues (Net of Transfers to Rate Stabilization Account) <sup>b</sup>	\$759,372	\$994,748	\$1,135,423	\$1,178,077	\$1,192,854	\$1,212,331
2. Other Sources of Revenue	145,000	-	-	-	-	10,000
3. Authority Revenues [Line 1 + Line 2] <sup>b</sup>	<u>\$904,372</u>	<u>\$994,748</u>	<u>\$1,135,423</u>	<u>\$1,178,077</u>	<u>\$1,192,854</u>	<u>\$1,222,331</u>
4. Senior Debt						
5. Annual Debt Service	\$90,600	\$193,246 <sup>c</sup>	\$299,827	\$306,713	\$314,985	\$320,824
6. <b>DS Coverage Required = 2.50</b>	<b>8.38</b>	<b>5.15</b>	<b>3.79</b>	<b>3.84</b>	<b>3.79</b>	<b>3.78</b>
7. Senior & Senior Subordinated Debt						
8. Annual Debt Service	\$90,600	\$193,246 <sup>c</sup>	\$299,827	\$306,713	\$314,985	\$320,824
9. <b>DS Coverage Required = 2.00</b>	<b>8.38</b>	<b>5.15</b>	<b>3.79</b>	<b>3.84</b>	<b>3.79</b>	<b>3.78</b>
10. Senior, Subordinated Subordinated & Subordinated Debt						
11. Annual Debt Service	\$90,600	\$193,246 <sup>c</sup>	\$299,827	\$306,713	\$314,985	\$320,824
12. <b>DS Coverage Required = 1.50</b>	<b>8.38</b>	<b>5.15</b>	<b>3.79</b>	<b>3.84</b>	<b>3.79</b>	<b>3.78</b>
13. Operating Expenses	\$694,734	\$700,393	\$722,525	\$747,894	\$705,988	\$728,681
14. Total Subordinated Debt	75,392	83,108	88,071	98,469	101,881	102,826
15. Total Deposits to Capital Improvement Fund	-	18,000	25,000	25,000	70,000	70,000
<b>Authority Revenues / All Obligations</b>						
16. <b>DS Coverage Required = 1.00</b>	<b>1.05</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>

<sup>a</sup> Numbers may not add up due to rounding.

<sup>b</sup> Operating and Authority Revenues from FY2014 onward, reflect PRASA's July 15, 2013 rate increase.

<sup>c</sup> Debt Service Amount Due of \$236.8M reduced by \$43.6M deposit (made in FY2013) to the Senior Bond Fund.

# 1. Introduction

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## 1.1. Introduction

Since 2008, MP Engineers of Puerto Rico, PSC an affiliate of ARCADIS U.S., Inc. (MPPR/ARCADIS), has been retained by the Puerto Rico Aqueduct and Sewer Authority (PRASA) as its Consulting Engineer to assist in satisfying several requirements of its Master Agreement of Trust (MAT) with Banco Popular de Puerto Rico as Trustee. MPPR/ARCADIS understands that in March of 2008 PRASA entered into a trust agreement to enable it to issue revenue bonds and incur other indebtedness to partially finance its Capital Improvements Program (CIP) and to repay and refinance existing debt. The 2008 bond issuance totaled approximately \$1,338 million (M). Also, on July of 2009 PRASA and the Government Development Bank for Puerto Rico (GDB) entered into a Fiscal Oversight and Support Agreement (FOA) that assigned responsibilities to the GDB as fiscal agent of PRASA.

In February of 2012, PRASA returned to the bond market and issued approximately \$2,096M in new debt. The proceeds of this bond issuance were used to (i) fund a portion of the cost of its CIP, (ii) refinance certain lines of credits and bond anticipation notes, (iii) establish a debt service reserve fund, (iv) establish a deposit for capitalized interest, (v) fund payments for termination of a forward interest rate swap agreement, (vi) pay for expenses related to the issuance of the Senior Lien Revenue Bonds, (vii) refund the outstanding PRASA Series 1995 Bonds (Commonwealth Guaranteed), and (viii) pay for expenses related to the issuance of the Revenue Refunding Bonds.

In connection with the 2012 bond issue, on January 24, 2012 PRASA's Governing Board authorized the execution of an amended and restated MAT (2012 MAT) by and between PRASA and Banco Popular de Puerto Rico as Trustee. PRASA's Governing Board also authorized the execution of an amended and restated FOA (2012 FOA) by and between PRASA, the Commonwealth of Puerto Rico and the GDB. Under the 2012 FOA, GDB will continue to act as fiscal agent for PRASA. Also, PRASA must continue to comply with continuous disclosure and reporting requirements which include, but are not limited to, the development and implementation of a multi-year financial and operating plan (the *Financial Improvement Plan*) that establishes milestones for PRASA to achieve self-sufficiency through rate and cost adjustments. Furthermore, under the 2012 FOA a Budgetary Reserve Fund was created.

## 1.2. Consulting Engineer's 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 Consulting Engineer's Report (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 GDB 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. As a result of the credit downgrades of PRASA's bonds to non-investment grade level in FY2013, and in compliance with the 2012 MAT and 2012 FOA, MPPR/ARCADIS has prepared this Consulting Engineer's Report for fiscal year (FY) 2013 (2013 CER). Given the elapsed time between the closing of FY2013 and the issuance of this report, the 2013 CER also includes commentaries, information, and preliminary results for the first six months of FY2014.

Unless otherwise indicated, MPPR/ARCADIS's opinion with respect to the technical, operational and financial situation and related matters of PRASA's System is presented for FY2013 and/or based on the information and results through December 31, 2013 where noted. 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. MPPR/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 MPPR/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 2013 CER could affect the material presented to the extent of such changes. MPPR/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 1<sup>st</sup> and ends June 30<sup>th</sup>. Throughout this 2013 CER, fiscal year is identified as "FY" followed by the calendar year in which the fiscal year ends, i.e., FY2013 is the fiscal year from July 1, 2012 through June 30, 2013.

### **1.4. Acronyms**

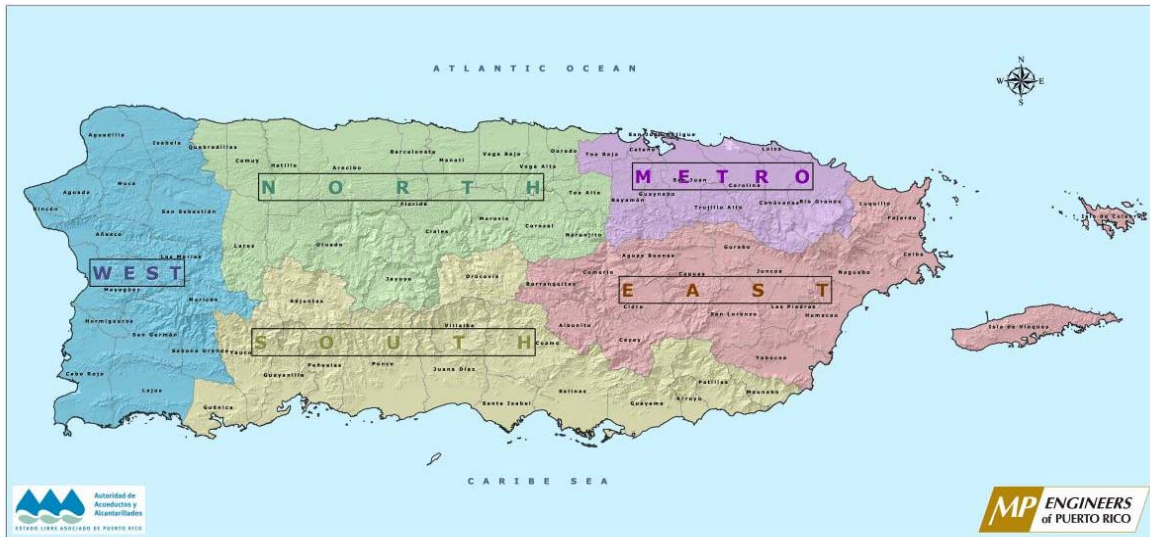
A listing of acronyms or abbreviations of terms used in this report is included in the Table of Contents.

## 2. Organizational Updates and Changes

### 2.1. Introduction

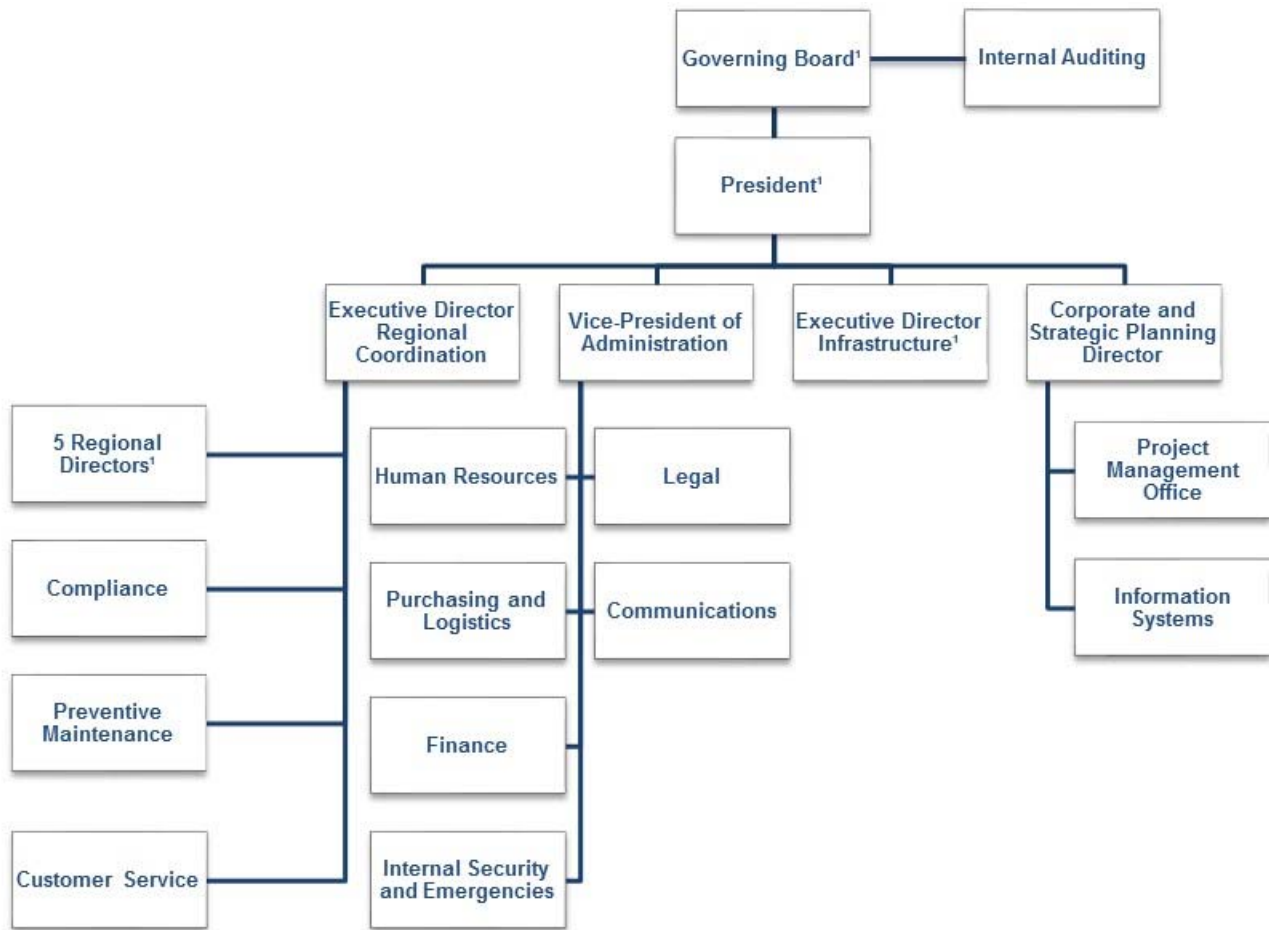
This section describes the most recent changes within PRASA’s organization and provides opinions regarding the adequacy of PRASA’s organizational structure.

As shown in Figure 2-1, 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.



**Figure 2-1: 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 2-2 provides a chart of PRASA’s organization as of December of 2013.



<sup>1</sup>Legislated Positions

**Figure 2-2: PRASA Legislated and Executive Management Structure**

Key changes in PRASA’s organization include the following:

- Creation of the Executive Director for Regional Coordination position – responsible for overseeing and managing operational, compliance, preventive maintenance and customer service matters.
- Revision of Vice-President’s responsibilities – responsible for overseeing and managing administrative matters including coordination of support departments such as human resources, legal, communications, finance, etc.
- Creation of a Corporate and Strategic Planning position – responsible for overseeing the Program Management Office (PMO) and information systems.



PRASA continues to work to achieve the objectives set forth by its Executive Management Team. In FY2013, PRASA’s Executive Management Team developed a Strategic Plan with the defined mission of providing quality water and wastewater services at the lowest possible cost, consistent with industry standards. A detailed description of PRASA’s Strategic Plan, including key performance indicators (KPIs), is included in Section 4.4.

## 2.2. Updates and Changes in PRASA’s Organization and Management

### 2.2.1. Governing Board

On May 6, 2013, through the enactment of Act No. 15, PRASA’s Governing Board (the Board) was re-structured as shown in Table 2-1. Although it continues to be a nine-member Board as previously enacted under the Commonwealth’s Act No. 92 of 2004, the Governing Board is now comprised of the following: two ex officio members, the Secretary of the Puerto Rico Highway Transportation Authority and the Puerto Rico Planning Board Director; one engineer licensed to practice the engineering profession in Puerto Rico; one authorized legal advisor with at least seven years of experience in the profession in Puerto Rico; one member with a wide knowledge and experience in corporate finances; the Executive Director of the Mayors Association; the Executive Director of the Mayors Federation; and two customer representatives.

**Table 2-1:  
PRASA Nine-Member Governing Board as of December 31, 2013**

Name	Board Position	Position	Term Ends
1. Mr. Luis García Pelatti	Acting President	President, Puerto Rico Planning Board	Ex Officio
2. Eng. Miguel Torres Díaz	Director	Secretary of Department of Transportation and Public Works of Puerto Rico	Ex Officio
3. Eng. Manuel Suárez Miranda	Director	Engineering Advisor Position	July 2, 2017
4. Mr. Pedro Crespo Claudio	Director	Executive Director of the Mayors Association	July 2, 2017
5. Mrs. Maricarmen Ramos de Szendrey, Esq.	Director	Legal Advisor Position	July 2, 2017
6. CPA Kenneth Rivera Robles	Director	Corporate Finance Position	July 2, 2017
7. Mr. Reinaldo Paniagua Látimer	Director	Executive Director of the Mayors Federation	Ex Officio
8. Vacant <sup>1</sup>	Director	Consumer Representative	TBD
9. Vacant <sup>1</sup>	Director	Consumer Representative	TBD

<sup>1</sup>Pending Election

With the exception of the two ex officio members, the two consumer representatives, and the Executive Directors of the Mayors Association and the Mayors Federation, 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 Commonwealth of Puerto Rico. The two customer representatives will be elected through a supervised election under the Department of Consumer Affairs of Puerto Rico (DACO,

by its Spanish acronym). Finally, with the exception of the elected customer representatives who will hold their positions for six years, the designated or election terms of the other Board members will be four years or until their successors take office.

### 2.2.2. Executive Management Team

Since Act No. 92 was implemented in 2004, PRASA has gone through several management changes at many levels of its organization including the executive level. In general, these changes and their resulting successions and transitions have been adequately executed, and have not affected the stability of the organization or the continuity of the operations.

In January of 2013, PRASA experienced several changes in its organization, specifically at the executive level. Eng. Alberto M. Lázaro Castro was appointed as PRASA’s Executive President; Ms. Ivonne Falcón Nieves was designated as the Vice-President of Administration; Eng. Lynnette Ramírez Rivera was appointed as Executive Director for Infrastructure; Eng. Francisco Martínez Castelló was designated as the Executive Director of Regional Coordination; and Mr. Mauricio Olaya, PhD was appointed as the Corporate and Strategic Planning Director. A summary of PRASA’s Executive Management Team, including previous positions held and years of experience, is presented in Table 2-2.

**Table 2-2:  
PRASA’s Executive Management Team**

Name	Current Role	Term Ends	Prior Role	Experience Total / PRASA
1. Eng. Alberto M. Lázaro Castro	Executive President <sup>1</sup>	January 2019	Executive Director for Infrastructure	17 years / 8 years
2. Eng. Francisco Martínez Castello	Regional Coordinator Director	December 2017	Executive Director for East Region	24 years / 10 years
3. Ms. Ivonne Falcón Nieves	Vice-President of Administration	N/A	Treasurer	23 years / 19 years
4. Eng. Lynnette Ramírez Rivera	Executive Director for Infrastructure <sup>1</sup>	January 2019	Deputy Exec. Director for Infrastructure	12 years / 6 years
5. Mr. Efraín Acosta Reboyra	Executive Director of Finance	N/A	Deputy Exec. Director of Finance PRIDCO	36 years / 10 years
6. Mr. Javier Rivera Williams	Executive Director Metro Region <sup>1</sup>	June 2018	Deputy Exec. Director Metro Region	28 years / 28 years
7. Eng. Doriel Pagán Crespo	Executive Director North Region <sup>1</sup>	December 2017	Deputy Exec. Director North Region	22 years / 20 years
8. Eng. Héctor Gierbolini Pérez	Executive Director South Region <sup>1</sup>	February 2019	Deputy Exec. Director South Region	19 years / 19 years
9. Eng. Roberto Guzmán Velázquez	Executive Director East Region <sup>1</sup>	December 2017	Deputy Exec. Director East Region	25 years / 25 years
10. Eng. Joel Lugo Rosa	Executive Director West Region <sup>1</sup>	February 2018	Deputy Exec. Director West Region	15 years / 15 years

<sup>1</sup>Legislated positions.

#### **2.2.4. Staffing Profile**

Historically, PRASA’s ratio of number of customer accounts to staff has been low in comparison to industry benchmarks. At the end of FY2013, PRASA had a total staff of 4,888, with 1,255,254 water customer accounts and 750,220 wastewater customer accounts, resulting in a ratio of about 410 customer accounts per employee (up from 407 at end of FY2012). Current industry averages range from 388 to 849, with a median of approximately 504 customer accounts per employee<sup>2</sup>. Given the large number of PRASA facilities and wide geographic distribution of these across the island, PRASA’s comparatively low ratio of customer accounts to employees is not surprising. Even though in the past five years this ratio has been improved, PRASA’s organization could still be further optimized and organized into a more lean structure.

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 inspections, 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 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 remain temporary employees pending position confirmation, but mostly with the same benefits as full-time employees.

Table 2-3 shows the staff levels by staff category over the last five fiscal years. Since FY2009, 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. Also, during FY2013, there was an atypical, one-time personnel reduction as a result of the Central Government’s retirement system’s reform. The reform changes which

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<sup>2</sup> Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2011 Annual Survey Data and Analyses Report, American Water Works Association (2013). Note that a customer with water and wastewater service is counted as two accounts for the purpose of this benchmark. Benchmarks reported for “all utilities” category.

include changes in the pension (401k) plans and an increase in the retirement age, amongst others; incentivized close to 300 of PRASA’s personnel to retire effective on June 30, 2013. As a result, PRASA reported a 3.7% net reduction of staff from FY2012 to FY2013. This net reduction includes a reduction of 186 UIA-AAA employees, 14 HIEPAA employees, 67 temporary classified employees, and five appointed employees; and an increase of 84 management employees.

**Table 2-3:  
Staff Levels**

End of FY	Appointed Employees	Management Employees	HIEPAAA Employees	UIA-AAA Employees	Temporary Employees	Total Employees
2009	165	1029	182	3,663	536	5,575
2010	161	960	171	3,391	318	5,001
2011	159	938	167	3,490	165	4,919
2012	164	917	172	2,933	890	5,076
2013	159	1,001	158	2,747	823	4,888
<b>5-year CAGR</b>	<b>-0.74%</b>	<b>-0.55%</b>	<b>-2.79%</b>	<b>-5.60%</b>	<b>8.95%</b>	<b>-2.60%</b>

Source: PRASA Human Resources Department

PRASA is currently conducting an organizational study to identify opportunities to optimize its organization. The key goals of this study, which will be completed during FY2014, are to identify areas and departments where there are staffing needs and where there are staffing surpluses in order to balance the organization; in other words, to determine PRASA’s optimum staffing levels. As indicated by PRASA, where possible, it will look to re-train and re-allocate its current staff rather than recruit new employees. However, it should be noted that towards the end of FY2013, PRASA was in the process of hiring new employees to fill certain critical operations positions that were left vacant as a result of the numerous personnel retirements that took place in FY2013 due to legislated changes to the retirement conditions.

#### **2.2.4.1. Labor Relations**

As of January 20, 2012 PRASA and its larger union, the UIA-AAA, signed a new Collective Bargaining Agreement (CBA), effective from January 2012 through December 2015. It includes certain retroactive and future economic agreements that have an impact on PRASA’s payroll and benefits expense projections starting on FY2013. PRASA has indicated that negotiations for the new CBA are expected to begin in FY2015. Also, PRASA and the HIEPAAA signed a new CBA effective from May 2012 through June 2016. It also contains certain economic agreements (i.e., salary increases) that have an impact on PRASA’s Payroll and Benefits expenses starting in FY2013. PRASA’s management continues to maintain a positive working relationship and open communication channels with the unions.

**2.2.4.2. Training**

PRASA continues to offer varied training programs to its employees to improve work management and productivity. Training topics range from technical-oriented seminars to conflict resolution and team building sessions. In FY2013, PRASA offered over 88,269 training hours to its employees; this represents an average of approximately 17.8 hours per active employee. Overall, about 80% of the employees participated in training activities offered by PRASA. PRASA also continues to offer operating training and examination reviews to prepare its water and wastewater plant operators for licensing examinations. Table 2-4 presents a summary of the number of operators by type of license they hold.

**Table 2-4:  
Operator Licensing**

	<b>In Training</b>	<b>Type I</b>	<b>Type II</b>	<b>Type III</b>	<b>Type IV</b>	<b>Total</b>
Water	53	32	64	131	230	<b>510</b>
Wastewater	21	6	21	20	91	<b>159</b>
<b>Total</b>	<b>74</b>	<b>38</b>	<b>85</b>	<b>151</b>	<b>321</b>	<b>669</b>

**2.3. Conclusions**

The current organization is sufficient for the operation, management and maintenance of the System. PRASA has been able to perform executive management transitions smoothly ensuring a continuance of policy and program implementation, and System operation and maintenance (O&M). PRASA continues to invest in the training of its staff, focusing on achieving greater job understanding, productivity, and ownership. Although PRASA continues to have some staffing needs at individual facilities or departments, PRASA’s overall staff levels also continue to be high when compared to industry standards. However, the organizational study that will be completed in FY2014 should help PRASA identify opportunities to further optimize and balance its staff and organization. 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.

## 3. Condition of System

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### 3.1. 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 3.7 million residents<sup>3</sup> 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 97% 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. Due to the fact that Puerto Rico is an island with varied topography, isolated demographic distributions, and a diverse mix of users, PRASA has a somewhat fragmented and localized system of water sources, treatment systems and delivery systems. As a result, PRASA has many more treatment facilities than most utilities serving a similar number of customers. This results in a higher degree of diversity in PRASA's assets in terms of size, treatment technologies, and age when compared to systems in the United States (U.S.) and Canada, which tend to have more centralized systems with larger regional facilities. These facts add complexity to the management of the System and contribute to higher O&M costs compared to other utilities serving similar populations.

Based on the latest data obtained from PRASA's geographic information system (GIS), as of June 30, 2013, PRASA owns and operates eight dams, 121 water treatment plants (WTPs), 52 wastewater treatment plant (WWTPs), 928 water pump stations (WPSs), 1,479 water storage tanks, 818 wastewater pump stations (WWPSs), and more than 20,000 miles of water and wastewater pipelines island-wide.

In FY2012, MPPR/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. 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. These inspections were performed between March and June of 2012. The next round of facility inspections will be completed in FY2014.

Because MPPR/ARCADIS is conducting these facility inspections approximately every two years, no inspections were performed for the 2013 CER. Nevertheless, MPPR/ARCADIS evaluated the

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<sup>3</sup> 2010 United States Census



compliance performance results for all PRASA WTPs and WWTPs for the period from July 1, 2012 through December 31, 2013. Also, MPPR held meetings with the five Regional Directors and their respective management teams to obtain updated information regarding the condition of the System (i.e., material operational and asset condition changes).

## 3.2. Facility Inspections

A summary of the facilities inspected during FY2012 is presented in Table 3-1. In total, 170 facility inspections were performed. Inspected facilities include: dams, WTPs, WWTPs, WPSs, WWPSs, wells and water storage tanks. All regulated dams (100%) were inspected, due to the value of these individual assets; as well as approximately 39% and 54% of the WTP and WWTPs (percentages calculated based on the number of facilities as of December 31, 2013), respectively. The WTPs inspected account for approximately 88% of the total water produced by PRASA; while the WWTPs inspected account for approximately 77% of the total wastewater treated by PRASA. The WTP and WWTP facilities inspected were selected based on two criteria: those that served a considerable amount of clients (higher risk impact/more critical) and those that had a lower rating in previous inspections. Finally, a small portion (about 2% in total) of the wells, pump stations and storage tanks (minor facilities) 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.

### 3.2.1. Inspections Methodology

Inspections were performed throughout PRASA's five Operational Regions: North, South, East, West, and Metro. Table 3-1 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 no wells. Nevertheless, it was inspected in a manner consistent with the other Regions.

**Table 3-1:  
Summary of Inspections by Region**

Asset Category	North	South	East	West	Metro	Total
Regulated Dams	1	1	3	1	2	8
Water Treatment Plants	7	9	14	12	5	47
Wastewater Treatment Plants	8	4	6	7	3	28
Wells	3	7	1	3	0	14
Water Pump Stations	6	1	11	4	4	26
Water Storage Tanks	4	3	11	4	2	24
Wastewater Pump Stations	3	4	8	4	4	23
<b>Total</b>	<b>32</b>	<b>29</b>	<b>54</b>	<b>34</b>	<b>20</b>	<b>170</b>

Each facility was inspected using an inspection form developed by MPPR/ARCADIS, that included scoring criteria and criteria weighting customized for each specific asset category. 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 in order to rate the facility as summarized 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.

### **3.2.2. Inspection Results**

Based on the most recent facility inspections performed between March and June of 2012, an overall condition rating for each asset category visited was determined. The condition of each of the facilities varied from new to those requiring certain capital upgrades and/or operational/process control improvements. The inspection rankings and results per facility type are summarized in this section.

#### **3.2.2.1. Dams**

All of PRASA’s regulated dams, a total of eight, were inspected in FY2012. Regulated dam structures are under the jurisdiction of the Dam Safety Unit of the Puerto Rico Electric Power Authority (PREPA). PREPA’s Dam Safety Unit performed inspections from 2006 to 2009 of seven PRASA regulated dams (Río Blanco Dam had not yet been inspected since it was completed in FY2010), creating summary reports addressing the dam structure, appurtenant works, operations and safety for each facility. MPPR/ARCADIS utilized these reports as a baseline from which to perform independent visual inspections and evaluations of the dam structures.

Table 3-2 presents the comparison of the average rating of the facilities by each category evaluated. The overall average rating of each evaluation criteria for facilities inspected in each year are also presented. In general, there is little change in rating of the four categories evaluated. Overall, all eight dams received an adequate rating.

**Table 3-2:  
Dams – Comparison of Average Inspection Results for 2008-2012**

Criteria	2008 <sup>1</sup>	2009 <sup>2</sup>	2010	2012	Change 2012 vs. 2010	Change 2012 vs. 2008
Equipment/Maintenance	2.3	2.2	2.3	2.3	0.0	0.0
Regulatory Compliance	2.2	2.2	2.2	2.3	0.1	0.1
Operations/Process Control	2.2	2.1	2.1	2.2	0.1	0.0
Staffing/Training	2.1	2.1	2.3	2.3	0.0	0.2
<b>Overall</b>	<b>2.3</b>	<b>2.1</b>	<b>2.3</b>	<b>2.3</b>	<b>0.0</b>	<b>0.0</b>

<sup>1</sup> Based on seven facilities (excludes Río Blanco Dam).

<sup>2</sup> Río Blanco Dam, under construction at the time, was included in inspections.

Two dams (Las Curías Dam and Isabela Regulator Lake) received a poor rating in at least one of the four evaluation categories; however, PRASA reports that it has already identified, or is in the process of developing, a project to address the items that need to be corrected in each of these facilities. It is important to note that the condition rating for Las Curías Dam, which received the lowest rating of the dam facilities, has dramatically improved since 2010 and would likely improve further with completion of PREPA priority action items. This dam is no longer utilized for drinking water storage but still represents a high hazard in the event of an uncontrolled release of impounded water. The Isabela Regulator Lake requires maintenance of the geo-membrane liner to avoid a potential reduced lifespan for this facility and, by addressing the PREPA priority action items its condition rating could also be improved. PRASA’s regional personnel has indicated that a CIP project has been developed for the partial renovation of the Isabela Regulator Lake’s geo-membrane liner. The project’s bid announcement is scheduled for FY2014.

### 3.2.2.2. Water Treatment Plants

Forty-seven (47) WTPs were inspected in FY2012. Each visit consisted of a site walkthrough and an interview with the operator, plant supervisor or designated personnel. Therefore, the information obtained was at least in part based on the understanding of the person that was being interviewed. Table 3-3 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 2012 inspections is also provided. On average, the WTPs were rated as good with a score of 2.6. This is indicative of the fact that approximately 90% of the WTPs are able to produce water that meets standards for disinfectant residual, turbidity, and disinfection byproducts (DBPs) at least most of the time. No WTP was rated as unacceptable or poor in overall.

**Table 3-3:  
WTPs – Comparison of Average Inspection Results for 2008-2012**

Criteria	2008	2009	2010	2012	Change 2012 vs. 2010	Change 2012 vs. 2008
Regulatory Compliance	2.2	2.3	2.1	2.5	0.4	0.3
Operations/Process Control	2.2	2.5	2.6	2.7	0.1	0.5
Equipment/Maintenance	2.1	2.3	2.3	2.3	0.0	0.2
Staffing/Training	2.2	2.6	2.4	2.9	0.5	0.7
<b>Overall</b>	<b>2.2</b>	<b>2.4</b>	<b>2.3</b>	<b>2.6</b>	<b>0.3</b>	<b>0.4</b>

In general, the WTPs are in good condition. However, five (11%) of the WTPs inspected were considered poor in terms of compliance, due to non-recurring violations of total coliforms, combined filter effluent (CFE) turbidity limits and/or DBPs. These facilities are currently being addressed either in measures identified in the 2006 Drinking Water Settlement Agreement (also referred to as the Puerto Rico Department of Health (PRDOH) Agreement), in PRASA’s CIP, or by remedial actions taken by the Regions.

Many of the WTPs have inadequate STSs and are out of compliance with their national pollutant discharge elimination system (NPDES) effluent limits. Nevertheless, the 2010 United States Environmental Protection Agency (USEPA) Sludge Treatment Systems (STS) Consent Decree addresses issues identified in the WTP STSs.

The facilities with the lowest overall score of the 47 WTPs inspected are summarized in Table 3-4. As shown, all six facilities received an overall score of 2.1 which puts them in the adequate range. PRASA has identified and included a project in its CIP for all six facilities. Table 3-4 also presents a summary of the current compliance status of these facilities.

**Table 3-4:  
FY2012 WTP Lowest Rated Facilities, Observations & Current Status**

WTP	2012 Score	Observations	CIP Identified	Current Status
Cedro Arriba (North Region)	2.1	The WTP reported exceedances related to the CFE turbidity during the evaluated period (2011 results were used). Some equipment was found out of service, including the STS units. Requires operational and process control improvements.	Yes	No exceedances were reported.
Coto Laurel (South Region)	2.1	The WTP reported exceedances related to DBPs during the evaluated period. Some equipment needs upgrades.	Yes	Four exceedances reported related to the Total Organic Carbon (TOC) and two exceedances related to the Trihalomethane (THM) parameters.
Enrique Ortega (Metro Region)	2.1	The WTP reported exceedances related to the CFE turbidity and for total coliforms during the evaluated period. Some equipment was found out of service or in need of replacement/rehabilitation.	Yes	Four exceedances reported related to the TOC parameter. PRASA is implementing improvements to the plant for sludge removal and replacement of an STS pipeline.
La Virgencita (North Region)	2.1	The WTP reported exceedances related to DBPs during the evaluated period. Facility is currently undergoing repairs.	Yes	WTP shut down by PRASA in FY2013.
Ramey (West Region)	2.1	The WTP reported exceedances related to the DBPs during evaluated period. Some equipment was found out of service, including the STS units.	Yes	Four exceedances reported related to the TOC; plant is currently shut down.
Sergio Cuevas (Metro Region)	2.1	The WTP reported exceedances related to CFE turbidity, DBPs, and total coliforms during evaluated period.	Yes	Six exceedances reported related to the TOC parameter.

While most WTP compliance parameter violations that were observed through December of 2013 were one-time events, or non-critical, during FY2013 PRASA experienced compliance problems with DBP parameters: Haloacetic Acids (HAA5), Trihalomethane (THM), and Total Organic Carbon (TOC). These compliance problems, which were observed island-wide, are directly linked to the recent change in regulation of the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 D/DBPR) which is now more restrictive on monitoring requirements and compliance determination (additional information provided in Section 5). PRASA has developed an action plan that includes conducting a hydraulic study in the distribution systems and is verifying plant processes by Region to make necessary operational/process adjustments (i.e. disinfection systems, coagulants, polymers). PRASA is also developing and implementing an optimized storage tank continuous drainage program as a control measure.

**3.2.2.3. Wastewater Treatment Plants**

Twenty-eight (28) WWTPs were inspected in FY2012. 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. Table 3-5 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 2012 is also presented. Overall, WWTP facilities were rated as adequate with a score of 2.0.

**Table 3-5:  
WWTPs – Comparison of Average Inspection Results for 2008-2012**

Criteria	2008	2009	2010	2012	Change 2012 vs. 2010	Change 2012 vs. 2008
Regulatory Compliance	1.3 <sup>1</sup>	1.5 <sup>1</sup>	1.5 <sup>2</sup>	1.4	-0.1	0.1
Operations/Process Control	2.4	2.4	2.3	2.4	0.1	0.0
Equipment/Maintenance	2.2	2.2	2.4	2.2	-0.2	0.0
Staffing/Training	1.8	2.0	1.8	2.3	0.5	0.5
<b>Overall</b>	<b>1.9</b>	<b>2.0</b>	<b>2.0</b>	<b>2.0</b>	<b>0.0</b>	<b>0.1</b>

<sup>1</sup> 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.

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

The WWTPs generally range from poor to good condition with regulatory compliance as the category of primary concern. Compliance with NPDES effluent limits has been the greatest challenge for a number of WWTPs. Thirteen (13) facilities are considered poor or unacceptable in terms of compliance as a result of multiple reported exceedances of their interim and/or final NPDES limits. Nevertheless, PRASA reports to have identified the source/causes of these compliance shortcomings and continues to work to bring these facilities back into continuous compliance. Most of the facilities rated poor or unacceptable from a compliance perspective are being addressed either in measures identified in the 2006 USEPA Consent Decree, in PRASA’s CIP, or by remedial measures (including process control adjustments) being implemented by the Regions. As a result, PRASA reports that in recent months (after the inspections were completed), the majority of these facilities have improved their compliance record.

In comparison with the 2010 inspection results, the operations/process control and staffing/training criteria scores increased, while the regulatory compliance and equipment /maintenance criteria scores decreased. Whereas, in comparison with the 2008 inspections, regulatory compliance and staffing/training scores increased and the overall condition of the facilities has slightly improved.

The facilities with the lowest overall score of the 28 WWTPs inspected are summarized in Table 3-6. Some of these facilities have recently undergone improvements and/or rehabilitations, or may



be scheduled under the 2006 USEPA Consent Decree to undergo improvements in the future. Table 3-6 also presents a summary of its current status.

**Table 3-6:  
FY2012 WWTP Lowest Rated Facilities, Observations & Current Status**

WWTP	2012 Score	Observations	CIP Identified	Current Status
Camuy-Hatillo (North Region)	1.8	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period (2011 data was used). Process control strategies have been defined but appear to not be adequately implemented based on compliance records. PRASA has indicated that several process controls and improvements have been implemented which have helped to improve compliance with several parameters. PRASA is also investigating the characteristics of the wastewaters discharged by local industries to determine if these are affecting the plant's operational efficiency.	Plant rehabilitated within last five years	Compliance data reports multiple exceedances to the NPDES permit, specifically in Total Nitrogen. PRASA reports a proposal to work with a mix zone and a screen project to eliminate solids entering the facility. PRASA identified different disinfection points that have achieved a decrease in the incompliance with the <i>Enterococcus</i> (a genus of lactic acid bacteria). PRASA continues to work and implement processes to improve the plant's operational needs.
Cayey (East Region)	1.8	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period. A number of major equipment was out of service at the time of inspection. PRASA reports that certain compliance problems have been traced back to wastewater discharges from local industries and that the facility also had operational issues with its UV disinfection system during the evaluated period, which affected its performance.	Yes	Compliance data reports multiple exceedances in Phosphorous and Fecal Coliforms parameters. PRASA reports that it continues to work to achieve an adequate process control, including sludge management in the process.
Corozal (North Region)	1.5	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period. Most of the equipment out of service at the time of the visit has been out for several months. Corrective actions should be expedited. The plant has no SCADA and only one operator working 7 days per week. PRASA reports to have implemented process	Yes	Compliance data reports some exceedances related to the Total Suspended Solids (TSS) parameters, but overall the plant improved significantly compared to the previously evaluated results.

WWTP	2012 Score	Observations	CIP Identified	Current Status
		controls which have proven effective to improve the plant's operational results.		
Guánica (South Region)	1.8	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period. Major issue with large solids in effluent. Most equipment is old, but well maintained. Grit dewatering system requires upgrade.	Yes	Compliance data reports multiple exceedances to the NPDES Permit related to the Total Nitrogen parameter. PRASA implemented a sampling process to identify the problems and control the total nitrogen and <i>Enterococcus</i> .
Patillas (South Region)	1.2	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period. Operation and process control are poor to adequate. Equipment is in adequate condition, but is poorly maintained. Clarifier weirs have excess scum accumulation. Headworks equipment is in poor to adequate condition. PRASA indicates that they have implemented process controls in the facility, which have helped improved its performance.	Yes	Compliance data reports some exceedances to the NPDES Permit in the Fecal and Total Coliforms parameters. PRASA reports that the facility still has a process control issue; recently changed the primary clarifier for an aeration tank.
San German (West Region)	1.5	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period. PRASA indicates that during the evaluated period the facility had problems with the disinfection UV system which, since then, have been corrected. PRASA indicates that during this period the facility had problems with the disinfection UV system and decantation valves in the processes. Also, there were problems with the backwash process which greatly impacted the plant's efficiency in treating bacteria. PRASA continues to work to improve and correct these problems.	No	Compliance data reports multiple exceedances to the NPDES permit parameters, mostly on Nitrite and Fecal Coliforms. PRASA reports there were modifications to the UV System and changes to the process controls.
Utua (North Region)	1.5	Compliance data reports multiple exceedances to the	New plant completed	Compliance data reports multiple exceedances to the

WWTP	2012 Score	Observations	CIP Identified	Current Status
		NPDES permit during the evaluated period. PRASA indicates that during this period the facility had problems with the disinfection UV system and decantation valves in the processes. Also, there were problems with the backwash process which greatly impacted the plant's efficiency in treating bacteria. PRASA continues to work to improve and correct these problems.	within last five years	NPDES permit parameters, mostly on Fecal Coliforms. PRASA reports they brought technical personnel to evaluate the UV System to verify design, operational and maintenance challenges.
Vega Alta (North Region)	1.4	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period. Pre-treatment equipment is out of service, resulting in excess of floating materials reaching the aeration tank and aerobic digester. PRASA indicates that it has implemented additional process controls and modified disinfection practices in order to control and treat coliforms more efficiently.	No	Compliance data reports multiple exceedances to the NPDES permit parameters, mostly on Fecal Coliforms and TSS. PRASA reports that this plant generates a high volume of solid materials and had installed a geotube system to solve the issue; however, the polymer used in the process caused problems and the equipment is out of service. PRASA is currently working on addressing this issue.
Vega Baja (North Region)	1.3	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period. The plant has three different treatment trains, which combine their respective return flows. This makes the overall process control of the facility difficult. Several pumping units were out of service. Overall deficiencies in electrical connections throughout the plant were observed. PRASA indicates that they continue to evaluate and implement process changes in order to normalize the facility's operational capabilities.	Yes (Also, plant rehabilitated within last five years)	Compliance data reports multiple exceedances to the NPDES permit parameters, mostly on Fecal Coliforms, Residual Chlorine and Phosphorous parameters. PRASA reports that the process is being impacted by fishes entering the clarification tanks before the disinfection process, which is impacting the UV system and causing bacteriology problems. PRASA is working with the UV system and is testing a new polymer for the Phosphorous parameter issue. PRASA continues to work and implement new processes to normalize the facility's operational capabilities.
Yauco (South Region)	1.8	Compliance data reports multiple exceedances to the NPDES permit during the evaluated period. PRASA indicates that during the evaluation period, the plant	Yes	Compliance data reports multiple exceedances to the NPDES Permit parameters, mostly in Ammonia Nitrite and BOD. PRASA reports the new BNR plant, that has been

WWTP	2012 Score	Observations	CIP Identified	Current Status
		was placed on line after undergoing rehabilitation. They had some issues in normalizing the flows and operational processes. However, with time, they have been able to improve the facility's operational performance.		operating a year, is still in optimization and implementing process control. But the BOD parameter has been decreasing significantly and they are proposing a sampling process in various points to achieve compliance.

Based on the discussion held with PRASA's Regional Directors and compliance department personnel, many of the facilities that had exceedances had problems with the ultraviolet (UV) disinfection systems and/or with inadequate process controls. The poor maintenance and lack of light replacement are the main factors contributing to the problems with the UV systems and, in turn, with the exceedances in bacteriological parameters.

Other facilities, including but not limited to: Aibonito WWTP, Dorado WWTP, Morovis WWTP, Alturas de Orocovis WWTP, Guayama WWTP, Guayanilla WWTP, Culebra WWTP, Vieques WWTP and Lajas WWTP also reported multiple exceedances with NPDES parameters through December of 2013. As in the case of the facilities listed in Table 3-6, PRASA has identified the problems affecting these facilities and is currently working on addressing them in order to bring them back into compliance.

Overall, PRASA's compliance and operations personnel demonstrated that they have a clear understanding of the problems and shortcomings affecting these WWTPs listed above; and indicated that they were working to correct the issues that are currently affecting compliance. PRASA continues its efforts to optimize the O&M procedures of its UV systems, and to further optimize its operational process controls.

#### **3.2.2.4. Wells**

A total of 14 wells were inspected in FY2012. 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 inspection results for previous years were compared to the inspection results from the FY2012 inspection to analyze condition changes. Table 3-7 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 2012 is also presented. Of the 14 wells inspected in 2012, poor ratings were given to two facilities (14%); whereas the remaining 12 facilities received a rating of adequate or good. Overall, wells were rated as adequate with a score of 2.2.

**Table 3-7:  
Wells – Comparison of Average Inspection Results for 2008-2012**

Criteria	2008	2009	2010	2012	Change 2012 vs. 2010	Change 2012 vs. 2008
Operations/Process Control	1.8	2.1	2.2	2.2	0.0	0.4
Equipment/Maintenance	2.1	1.8	2.1	2.2	0.1	0.1
<b>Overall</b>	<b>2.0</b>	<b>1.9</b>	<b>2.1</b>	<b>2.2</b>	<b>0.1</b>	<b>0.2</b>

As shown in Table 3-7, the rating for all categories improved or remained unchanged when compared to previous years' results. All categories evaluated yielded results in the adequate range. The deficiencies noted were minimal and were due in part to a decrease in equipment conditions as a result of missing vent screens, faulty or non-operating equipment, visible leaks, missing flow meters, deficiencies in chemical containment, and overall facility security and appearance.

Most of the deficiencies noted can be addressed through PRASA's renewal and replacement (R&R) program and may not require major capital improvements. However, regulatory requirements such as the Groundwater Under the Direct Influence of Surface Water (GWUDI) evaluations 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. Under PRASA's GWUDI evaluation program, a total of 159 wells are being evaluated and there is a possibility that as many as 100 more wells, currently not in operation, may need to be evaluated in the future. The evaluations were divided into five priority groups. Priority 1 includes 38 wells for which sampling and evaluation has been completed. Of these, about 16 wells were found to be at risk of surface water influence and will need to be further evaluated to determine the extent of remediation action needs. Priority 2 includes 25 wells for which the sampling phase of the program was completed in FY2013. The data is currently being evaluated to determine if there are any wells that may be under the influence of surface water and that may require additional evaluation. The sampling phase and evaluation for Priority 3, Priority 4, and Priority 5 wells (96 wells in total) are projected to be completed in FY2014, FY2015, and FY2016, respectively.

### 3.2.2.5. Water Pump Stations

WPSs consist of two major categories: 1) above ground pumps and 2) below ground pumps in vaults with heavy covers that cannot be readily removed by field inspectors (underground booster stations) – not inspected. A total of 26 above ground WPSs were inspected on FY2012. 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 inspection results for previous years were compared to the inspection results from FY2012 inspection to analyze performance changes since the previous inspections. Table 3-8 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 2012 is also presented. The average WPSs overall rating for 2012 resulted in the adequate range with an overall rating of 2.4.

**Table 3-8:  
WPSs – Comparison of Average Inspection Results for 2008-2012**

Criteria	2008	2009	2010	2012	Change 2012 vs. 2010	Change 2012 vs. 2008
Operations/Process Control	2.1	2.6	2.5	2.5	0.0	0.4
Equipment/Maintenance	2.3	1.7	2.1	2.3	0.2	0.0
<b>Overall</b>	<b>2.2</b>	<b>2.2</b>	<b>2.3</b>	<b>2.4</b>	<b>0.1</b>	<b>0.2</b>

As shown in Table 3-8, the rating for all categories improved or remained equal to previous inspection results, and the overall score slightly improved. The sample of WPSs that were inspected is generally in adequate to good condition; they are expected to continue to serve their intended function of delivering drinking water throughout the distribution systems. The deficiencies noted are related to lack of features to optimize maintenance practices, and condition of equipment of facilities including but not limited to: missing vent screens, faulty or non-operating equipment, visible leaks, lack of flow meter, deficiencies in chemical containment, and overall facility security and appearance. However, these shortcomings can be addressed through routine maintenance or PRASA's R&R program. As of December of 2013, PRASA does not report any material changes in the O&M and condition of the WPSs.

### 3.2.2.6. Wastewater Pump Stations

A total of 23 WWPSs were inspected in FY2012. Each visit consisted of a site walkthrough and an interview with the designated personnel. In general, the inspected facilities predominantly use wet pit type using submersible pumps, although several dry pit type stations were also inspected. The results of the assessments of those stations are described below. The inspection results for previous years were compared to the inspection results from FY2012 to analyze performance changes since the previous inspections. Table 3-9 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 2012 is also presented. The average WWPSs rating for 2012 resulted in the adequate range with an overall rating of 2.1.

**Table 3-9:  
WWPSs – Comparison of Average Inspection Results for 2008-2012**

Criteria	2008	2009	2010	2012	Change 2012 vs. 2010	Change 2012 vs. 2008
Operations/Process Control	1.3	1.6	1.6	1.6	0.0	0.3
Equipment/Maintenance	2.2	2.2	2.3	2.6	0.3	0.4
Staffing/Training	2.1	2.4	2.3	2.6	0.3	0.5
<b>Overall</b>	<b>1.7</b>	<b>2.0</b>	<b>2.0</b>	<b>2.1</b>	<b>0.1</b>	<b>0.4</b>



The overall condition of WWPSs slightly improved since the 2010 inspections. In general, the WWPSs are in adequate condition. The overall improvement observed in the WWPSs could be a result of PRASA’s efforts under its Integrated Preventive Maintenance Program and improvements in its staffing/training. However, issues such as equipment out of service, lack of emergency power supply (generator), security concerns, and general maintenance were still observed. Also, some facilities still lack adequate alarm systems and/or telemetry systems. However, these shortcomings can be addressed through routine maintenance or PRASA’s R&R program and do not require major capital improvements. As of December of 2013, PRASA does not report any material changes in the O&M and condition of the WWPSs.

### 3.2.2.7. Water Storage Tanks

A total of 24 water storage tanks were inspected in FY2012. 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 inspection results for previous years were compared to the inspection results from FY2012 inspection to analyze performance changes since the previous inspections. Table 3-10 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 2012 is also presented.

**Table 3-10:  
Tanks – Comparison of Average Inspection Results for 2008-2012**

Criteria	2008	2009	2010	2012	Change 2012 vs. 2010	Change 2012 vs. 2008
Operations/Process Control	1.6	1.5	1.6	1.9	0.3	0.3
Equipment/Maintenance	2.2	1.6	1.6	1.9	0.3	-0.3
<b>Overall</b>	<b>1.9</b>	<b>1.6</b>	<b>1.6</b>	<b>1.9</b>	<b>0.3</b>	<b>0.0</b>

The overall 2012 rating was in the adequate range, with an overall rating of 1.9. On average, equipment conditions, operations and process control and overall ratings improved from the 2010 inspections. Although the majority of the tanks were generally observed to be in adequate or good condition, there were a number of factors that resulted in some tanks being rated lower, especially within the operations/process control criterion. These include, but are not limited to: lack of security on facility premises, missing access hatches and vent screens, lack of remote monitoring, and poor overall maintenance conditions. 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). As of December of 2013, PRASA does not report any material changes in the O&M and condition of the water storage tanks.

### **3.3. 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 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. Pipe R&R, which targets pipe break and leak-prone areas, are identified by PRASA's Operational Areas and prioritized according to severity of the problem. Meter replacements are programmed and managed through PRASA's Non-Revenue Water (NRW) Reduction Program.

#### **3.3.1. Water Meters**

PRASA owns over 1.3 million water meters ranging from 5/8 to 12 inches in diameter. Over the past five fiscal years, PRASA has been implementing an aggressive meter replacement program to replace aging meters in order to improve its metering and billings capabilities. As reported by PRASA, around 529,000 small meters (1-inch in diameter or less) have been replaced between FY2009 and FY2013. Also, during this period PRASA replaced approximately 3,075 large meters (greater than 1-inch in diameter). 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.

#### **3.3.2. Water Distribution System**

Based on the GIS database information, as of June 30, 2013, PRASA owns over 14,544 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 MPPR/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.

##### **3.3.2.1. 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 3-1, 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.

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

Source: American Water Works Association and International Water Association

**Figure 3-1: Water Balance Summary**

Table 3-11 provides a summary of key water distribution system metrics for FY2013, including current levels of water losses and NRW, as reported by PRASA.

**Table 3-11:  
Water Losses and Non-Revenue Water**

Fiscal Year	Total Water Production (MGD) <sup>1</sup>	Water Losses		Non-Revenue Water	
		(MGD)	(%)	(MGD)	(%)
FY2012	629	370	58.9%	387	61.5%
FY2013	617	354	57.4%	363	58.9%
Difference	-12	-16	-1.5%	-24	-2.6%

<sup>1</sup>Includes a metering-error adjustment of about 18 MGD identified by PRASA in its FY2013 water balance audit; FY2012 data was also adjusted by this amount.

PRASA’s average NRW percentage for the past 10 fiscal years has been about 61%. In FY2013, PRASA’s NRW amounted to 58.9% of the total water produced, of which 57.4% was due to water losses (both apparent and real) and 1.5% was due to unbilled authorized consumption. Of the total amount of water losses in FY2013, 17% was due to apparent (commercial) losses, and 83% due to real (physical) losses. As shown in Table 3-11, the percentage amount of water losses and NRW in FY2013 reduced from FY2012 results by about 1.5% and 2.6%, respectively. Also, PRASA reports

to have reduced both the amount of water produced and the amount of NRW (in MGD). PRASA attributes these reductions to two main contributing factors: water system optimization measures and corrections made in water production and data collection practices.

PRASA's level of NRW is higher than average utility benchmarks results for U.S. and Canada. Based on the most recent AWWA<sup>4</sup> benchmarking report, NRW ranges for utilities with combined (water and wastewater) operations range from 3.2% to 18.9%. The median percentage of apparent and real losses are about 5% each. However, PRASA's high NRW levels are comparable to those of developing and some emerging countries. The Asian Development Bank mentions a study performed by the South East Asian Water Utilities Network analyzing NRW levels of 47 water utilities across Indonesia, Malaysia, Thailand, the Philippines, and Vietnam, which concluded that the levels of NRW average 30% of the water produced, with wide variations among individual utilities ranging from 4% to 65%<sup>5</sup>. For comparison purposes, the following are some additional NRW estimates published by The International Benchmarking Networks for Water and Sanitation Utilities (number in parenthesis refer to the year results were reported in)<sup>6</sup>:

- Johannesburg, South Africa – 41% (2009)
- Rio de Janeiro, Brazil – 52% (2011)
- Guayaquil, Ecuador – 63% (2009)
- Sao Paulo, Brazil – 32% (2011)
- Quito, Ecuador – 31% (2010)
- Montevideo, Uruguay – 49% (2011)
- Karachi, Pakistan – 30% (2010)
- Khulna, Bangladesh – 26% (2013)
- Bogotá, Colombia – 51% (2010)
- Lima, Peru – 37% (2008)

PRASA's management recognizes that its amount of NRW must be reduced and has designated this as a priority. PRASA also recognizes that if it can reduce NRW, it will increase revenue, reduce O&M expenses, and reduce the need for capital improvements to increase water supply. Therefore, PRASA is implementing a series of initiatives, including an island-wide 7,000 mile leak detection effort, to address the primary contributors of these water losses. These initiatives are discussed in detail in Section 4 of this report.

### **3.3.2.2. Leak Monitoring and Control**

As shown in Table 3-12, in FY2013 PRASA indicates that a total of 47,032 leaks were reported. Table 3-12 also shows the average annual leaks occurrence per 100 miles of water piping. The total number of leaks reported annually has been considerably reduced since FY2009. However, as shown in the table, there was an increase of total annual reported leaks of about 9% from FY2012 to FY2013 which could be due to an increase in the actual number of leak occurrences, to an increase in the number of people that are reporting leaks, or a combination of the two. Nevertheless, PRASA's reported rate of leak occurrence continues to be very high compared to other utilities in

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<sup>4</sup> Sources: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2011 Annual Survey Data and Analyses Report, published by the AWWA (2013)

<sup>5</sup> Source: Nonrevenue Water: A Governance Challenge, published by the ADB (2006)

<sup>6</sup> Source: <https://www.ib-net.org/>

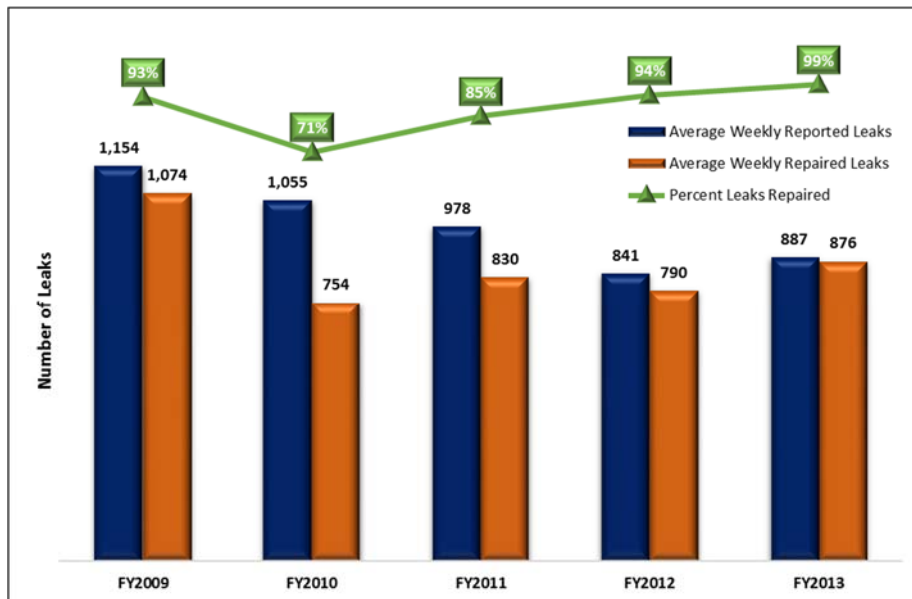
the U.S. and Canada (benchmark metrics for average annual leak and breaks per 100 miles are between 12 and 68). Although this high rate is not surprising, given the size and complexity of the System, this high rate of occurrence contributes to PRASA’s NRW. Aging infrastructure is another contributing factor to the high rate of leaks.

**Table 3-12:  
Reported Leaks from FY2009 to FY2013**

Fiscal Year	Total Annual Reported Leaks	Annual Leaks per 100 miles Using 14,031 miles of Water Pipeline
2009	58,875	420
2010	55,897	398
2011	52,817	376
2012	42,868	306
2013	47,032	335

Source: PRASA SAP (Commercial) Database

The average weekly reported and repaired leaks per fiscal year are shown in Figure 3-2. For FY2013, PRASA reports an average of approximately 887 leaks per week. Also shown in Figure 3-2 is the percentage of repaired leaks with respect to the number of leaks reported in each fiscal year. As shown, the reported leaks consistently decreased from FY2009 through FY2012. For FY2013 the average weekly reported leaks increased by about 6% over FY2012 results; however, PRASA also increased the percent of repaired leaks by about 5%. In other words, PRASA improved its efficiency in addressing and repairing leaks island-wide.



Source: PRASA SAP (Commercial) Database

**Figure 3-2: Island-Wide Weekly Average Leaks Reported and Repaired**

Table 3-13 provides a summary of the average repaired leaks per working day and average backlog. In FY2013, the number of leaks with duration greater than seven days was significantly reduced. PRASA reports to have ended the fiscal year with a total of 619 pending leaks. Based on these results, it can be observed that in FY2013 PRASA averaged a backlog of approximately 6.4 days of pending leaks, and a backlog of approximately 0.5 days of pending leaks with duration greater than seven days. PRASA’s effectiveness in repairing pending leaks in a timely manner has continued to improve.

**Table 3-13:  
Annual Average Backlog of Pending Leaks**

Fiscal Year	Average Weekly Pending Leaks	Average Weekly Pending Leaks >7 Days	Average Repaired Leaks per Working Day <sup>1</sup>	Average Backlog Days for Pending Leaks	Average Backlog Days for Pending Leaks >7 Days
2009	1,616	602	215	7.5	2.8
2010	1,750	891	151	11.6	5.9
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

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

During the first six months of FY2014, PRASA indicates that a total of 26,040 leaks were reported. For this period, the weekly pending leaks and average weekly repaired leaks averaged about 1,114 and 984, respectively. These results represent an increase of approximately 7% and 13%, respectively, compared to the same period for FY2013. Based on these results, the average backlog of pending leaks with a duration greater than seven days improved significantly compared to the same period for FY2013: PRASA reported a backlog of 0.3 days of pending leaks with duration greater than seven days which represents a reduction of about 25% compared to the results obtained during the same period for FY2013.

### 3.3.3. Wastewater Collection System

Based on PRASA’s GIS database information, as of June 30, 2013, PRASA owns over 5,624 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. In FY2013, PRASA reports to have treated, on average, 242 MGD of wastewater.

#### 3.3.3.1. Overflow Monitoring and Control

As shown in Table 3-14, PRASA indicates that in FY2013 27,358 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.

Table 3-14 also shows the average annual overflows occurrence per 100 miles of sewer. In FY2013, an average of 514 overflows per 100 miles of sewer was reported. There was an increase of total annual reported overflows of about 1.7% from FY2012 to FY2013 which could be due to an increase in the actual number of overflow occurrences, to an increase in the number of people reporting overflows, or a combination of the two. Nevertheless, PRASA’s reported rate of overflow occurrence continues to be very high compared to other utilities in the U.S. and Canada (average annual overflows per 100 miles are between 1 and 4 overflows<sup>7</sup>); 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 discharges).

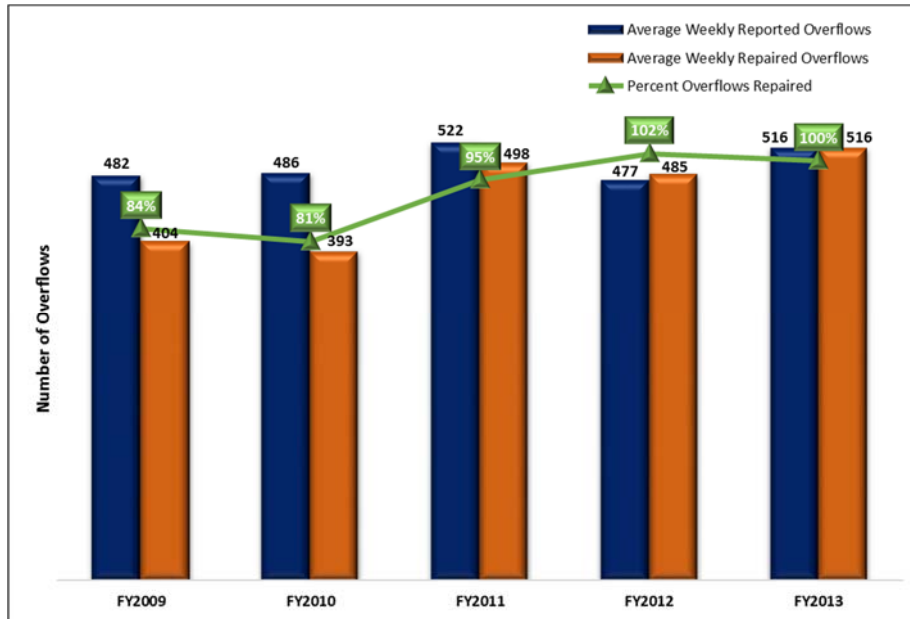
**Table 3-14:  
Reported Overflows from FY2009 to FY2013**

Fiscal Year	Reported Overflows	Annual Overflows per 100 miles Using 5,325 miles of Wastewater Pipeline
2009	24,592	462
2010	25,735	483
2011	28,185	529
2012	26,903	505
2013	27,358	514

Source: PRASA SAP (Commercial) Database

PRASA’s average weekly reported and repaired overflows per fiscal year are shown in Figure 3-3. For FY2013, PRASA reported an average of approximately 516 overflows per week. Comparing the weekly reported overflows per each fiscal year, it can be observed that after experiencing an increase from FY2009 to FY2011, the reported overflows decreased from FY2011 to 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. Also shown in Figure 3-3 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 FY2009.

<sup>7</sup> Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2011 Annual Survey Data and Analyses Report, published by the AWWA (2013).



Source: PRASA SAP (Commercial) Database

**Figure 3-3: Island-Wide Weekly Average Overflows Reported and Repaired**

Table 3-15 provides a summary of the average repaired overflows per working day and average backlog. As shown, the number of overflows with duration greater than seven days decreased from FY2010 to FY2012. Particularly, for FY2013 the average weekly pending overflows resulted a small increase compared to FY2012 results. PRASA reports to have ended the fiscal year with 28 pending overflows, which is a vast improvement compared to 122 pending overflows at the end of FY2012. Based on the average pending overflows and average pending overflows with duration greater than seven days, it can be observed that in FY2013 PRASA averaged a backlog of approximately 2.8 days of pending overflows and a backlog of 0.2 days of pending overflows with duration greater than seven days. PRASA’s effectiveness in repairing pending overflows in a timely manner has improved over the past two fiscal years.

**Table 3-15:  
Annual Average Backlog of Pending Overflows**

Fiscal Year	Average Weekly Pending Overflows	Average Weekly Pending Overflows >7 Days	Average Repaired Overflows per Working Day <sup>1</sup>	Average Backlog Days for Pending Overflows	Average Backlog Days for Pending Overflows >7 Days
2009	398	149	81	4.9	1.8
2010	467	193	79	5.9	2.4
2011	350	98	100	3.5	1.0
2012	224	52	97	2.3	0.5
2013	295	19	105	2.8	0.2

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

During the first six months of FY2014, PRASA indicates that a total of 13,028 overflows were reported. For this period, the weekly pending overflows and average weekly repaired overflows averaged about 158 and 501, respectively. These results represent a reduction of approximately 92% and 4%, respectively, which are a significant improvement compared to the same period for FY2013. Based on these results, PRASA reported an average backlog of 0.16 days of pending overflows with a duration greater than seven days, which is in line with the results obtained during same period for FY2013.

### 3.4. Conclusions

In general, the condition of the facilities visited varied from those recently upgraded/rehabilitated to those requiring capital upgrades. Table 3-16 presents a summary of the FY2012 inspection results. Facility conditions ranged from poor to good, with 95% of facilities falling within the adequate to good range.

**Table 3-16:  
FY2012 Asset Condition Inspection Results Summary**

<b>Asset Category</b>	<b>Unacceptable</b>	<b>Poor</b>	<b>Adequate</b>	<b>Good</b>	<b>Total</b>
Regulated Dams	0	0	5	3	8
Water Treatment Plants	0	0	15	32	47
Wastewater Treatment Plants	0	3	19	6	28
Wells	0	2	5	7	14
Water Pump Stations	0	0	13	13	26
Water Storage Tanks	0	4	16	4	24
Wastewater Pump Stations	0	0	19	4	23
<b>Total</b>	<b>0</b>	<b>9</b>	<b>92</b>	<b>69</b>	<b>170</b>
<b>Percent of Total Inspected</b>	<b>0%</b>	<b>5%</b>	<b>54%</b>	<b>41%</b>	<b>-</b>

Compliance with discharge permit limits and drinking water standards varied greatly depending on the plant age and condition, and experience of the operators. A number of PRASA’s WTPs and WWTPs are included in the 2006 USEPA Consent Decree, the 2006 PRDOH Agreement and the 2010 USEPA STS Consent Decree; and some of these facilities are either scheduled for closure (through consolidation to regional facilities) or have ongoing or planned capital improvements to address compliance problems and/or increase treatment capacity. Despite some compliance problems, the System is, in general, producing and delivering potable water and conveying and treating wastewater adequately. Nevertheless, PRASA must continue to proactively analyze and address process control/operational challenges, as well as equipment needs to minimize compliance-related exceedances in the future.

With the possible exception of buried infrastructure improvement needs, the planned CIP along with the O&M initiatives are generally in alignment with the System needs. Some facilities that have undergone upgrades or improvements executed as part of the CIP showed overall

improvement. However, others are still experiencing compliance-related challenges. PRASA should further investigate to identify and address process and/or operational shortcomings in order to bring these facilities to consistent and sustained compliance.

PRASA must also continue to assess and address its buried infrastructure (i.e. water and wastewater pipelines). Annual results for leaks and overflows, as reported by PRASA, show that PRASA has improved its metrics over the past few years. However, considering the number of leaks and overflows being reported, PRASA should place greater O&M focus on these assets. As such, adjustments to PRASA's buried infrastructure R&R budget, as well as an evaluation of available staff resources to perform repairs may be necessary to improve performance levels regarding number and duration of leaks and overflows in the future. Finally, although it has taken steps in the right direction by developing and implementing initiatives to reduce water losses, PRASA must continue to aggressively work on identifying and addressing its high level of NRW.

## 4. O&M Practices and Strategic Plan

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### 4.1. Introduction

MPPR/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 2012 asset condition assessment effort described in detail in Section 3. Overall, MPPR/ARCADIS found PRASA's O&M practices to be adequate.

All the Dams facilities and the majority of WTPs and WWTPs were found to be adequately operated and maintained. However, as presented in Section 3, there were a few 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. 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. MPPR/ARCADIS has observed that, throughout time, PRASA's O&M 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, particularly for ancillary facilities and buried infrastructure as noted during the 2012 asset condition inspections.

As previously mentioned, PRASA has adopted the mission of providing quality water and wastewater services at the lowest possible cost. In order to reach that goal, PRASA's Executive Management Team has developed and implemented 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. The Strategic Plan also includes key performance indicators and metrics established by PRASA's Executive Management Team to track and improve operational performance.

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.

### 4.2. O&M Budgets

Over the past five fiscal years, PRASA's O&M budgets have fluctuated from \$622M in FY2009 to \$695M in FY2013. PRASA has made an effort to become more efficient and to reduce and/or control its O&M costs through various initiatives including: some staff reallocations and hiring controls, the development and implementation of an energy management program, greater management oversight and controls, among others. However, these cost reductions have been offset by increases in Electric Power costs; higher Payroll and Benefits costs as a result of PRASA's

negotiated CBAs with its unions; higher Maintenance and Repair costs; and higher Chemicals and Miscellaneous expenses.

PRASA's FY2013 O&M expenses amounted to \$695M, of which \$598M were directly related to the O&M of the System. The other \$97M 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 approximately 75% of its System O&M budget (\$448.3M) is allocated to the water system and the remaining 25% (\$149.4M) to the wastewater system. Estimated costs per million gallons (MG) and per customer account are summarized in the Table 4-1 and Table 4-2 below.

**Table 4-1:  
PRASA FY2013 O&M Water System Budget Metrics**

Performance Indicator	PRASA	2007 Survey Benchmark Median <sup>1</sup>	2011 Survey Benchmark Median <sup>2</sup>
Total FY2013 Results	\$448.3	-	-
Cost per Account <sup>3</sup>	\$357.14	\$258.00	\$362.00
Cost per MG Processed <sup>4</sup>	\$1,990.6	\$1,459.00	\$2,164.00

<sup>1</sup> Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2007 Annual Survey Data and Analyses Report, AWWA (2008)

<sup>2</sup> Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2011 Annual Survey Data and Analyses Report, AWWA (2013)

<sup>3</sup> Based on number of accounts at the end of FY2013 of 1,255,254

<sup>4</sup> Based on FY2013 total production and distribution of approximately 617 MGD of potable water

**Table 4-2:  
PRASA FY2013 O&M Wastewater System Budget Metrics**

Performance Indicator	PRASA	2007 Survey Benchmark <sup>1</sup>	2011 Survey Benchmark <sup>2</sup>
Total FY2013 Results	\$149.43M	-	-
Cost per Account <sup>3</sup>	\$199.19	\$213.00	\$344.00
Cost per MG Processed <sup>4</sup>	\$1,691.77	\$2,022.00	\$1,246.00

<sup>1</sup> Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2007 Annual Survey Data and Analyses Report, AWWA (2008)

<sup>2</sup> Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2011 Annual Survey Data and Analyses Report, AWWA (2013)

<sup>3</sup> Based on number of accounts at the end of FY2013 of 750,220

<sup>4</sup> Based on FY2013 total treatment of approximately 242 MGD of wastewater

In 2013, the AWWA published an updated version of its annual survey data and analyses report for the year 2011 (the previous one was for the year 2007 and was published in 2008). Given the economic crisis that has affected the U.S. over the past few years, it is not a surprising to see that benchmark values have varied considering the budget cuts and economic hardships that both utilities and customers may have experienced during the Great Recession. As shown in Tables 4-1 and 4-2, there has been a significant change in the different performance indicator benchmarks



such as cost per account and cost per MG processed. When compared to the 2013 benchmark median values for utilities in the U.S., PRASA's operational and cost metrics are comparable to the average.

### **4.3. Support Departments and Regional O&M Highlights**

MPPR/ARCADIS conducted meetings with key PRASA department directors, Operational Regional Directors and other personnel to obtain a current status of departmental and regional operational activities. A summary of the information provided by PRASA is detailed below.

#### **4.3.1. Department Updates**

- *Customer Service* – As of June 30, 2013, PRASA had 24 commercial offices plus three satellite offices (in 2010, PRASA had 28 commercial offices plus two satellite offices). Two key office consolidations were completed: consolidation of the Levittown office with the Canton Mall office, and the 65 Infantería office with the San Juan office. As part of PRASA's Strategic Plan, the Customer Service Department focused on developing and implementing aggressive 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. PRASA also upgraded water meter reading handheld units and installed mobile data transfer units in its meter reader vehicles to improve the performance and supervision of meter reading activities. PRASA is implementing and leveraging technology in its day-to-day customer service activities. Specifically, the Customer Service Department has developed and implemented software applications for operational support, such as the development of a database intelligence program that focuses on analyzing customers' consumption data and consumption profiles, and identifying reading and consumption anomalies to reduce commercial water losses. PRASA also continues to monitor and improve its collections, particularly those of its large clients, which include all the government, commercial and industrial clients.
  
- *Purchasing and Logistics* – PRASA's Purchasing and Logistics Department continues to operate mainly from the central administration building; however, in FY2013 they added purchasing personnel in each of the operational Regions to facilitate and expedite the purchase order process. Also, during the second half of FY2013, PRASA's fleet management responsibilities were transferred to the Purchasing and Logistics Department. As of June of 2013, PRASA had 17 small warehouses island-wide and two main distribution centers. As part of its process revision and optimization efforts, and as included in PRASA's Strategic Plan (later discussed), the department is implementing and focusing on the following key initiatives and activities:
  - Reduction in the time of issuance of a service/purchase order

- Creation of purchasing portal in SAP to allow suppliers to directly submit proposals in response to PRASA's bids and proposal requests
- Revision of parts and supplies inventory minimums and maximums
- Implementation of a new materials requirement planning tool
- Improvement of communication capacity between warehouses to maximize parts and equipment availability and usage, and minimize inventory levels
- Improvement of the fleet's mechanical conditions and repair rate to increase vehicles availability (target of 95% fleet availability everyday)

PRASA continues to evaluate further improvements to its purchasing and logistics processes in order to reduce costs and increase operational productivity. Currently, they are considering adding three additional small warehouses and reducing the number of distribution centers from two to one (to be implemented in FY2014). Also, they are 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.

- *Systems and Information Technology* – PRASA continues to make information technology one of the key areas for management improvement. Information technology currently supports the development of technological advancements in PRASA, such as telemetry and several client service initiatives, including but not limited to:
  - Implementation of the Global Technological Innovation for PRASA's Renovation Program (INTEGRA, by its Spanish acronym) which includes over 25 projects for technological upgrades of PRASA's current information technology software, as well as for the development and implementation of new programs to support day-to-day business processes.
  - Upgrading of the information technology infrastructure (hardware).

The objective of the INTEGRA Program is to centralize the technological projects in order to maximize the use of resources, and adequately manage, implement, validate, and complete projects within schedule and budget.

- *Compliance* – PRASA's Compliance Department continues to effectively monitor regulatory compliance in PRASA facilities and maintains open channels of communication with Regulatory Agencies. Although primarily coordinated from PRASA's central administration building, there are also regional personnel who are continuously conducting facility visits and audits to help identify and minimize compliance violations and correct issues that could turn into potential violations. In FY2013, the organization of the Compliance Department was revised in order to shift additional oversight and ownership of compliance related issues to the

Regional Directors. PRASA continues to engage expert consultants to support in the compliance with regulatory mandates, and in the development and implementation of corrective measures. The Compliance Department, in collaboration with PRASA's Infrastructure Department, is currently in a negotiation process with both USEPA and PRDOH regarding PRASA's current consent decrees and agreements. Additional information on the renegotiation process is provided in Section 5.

- *Infrastructure* – PRASA's Infrastructure Department continues to manage and implement PRASA's CIP with the support of the Program Management Consultants (PMCs). PRASA's CIP currently includes over 998 projects that range from mandatory compliance-related projects, to general infrastructure (structure) improvements, renovation and replacement. The Infrastructure Department is also responsible for the management of PRASA's Comprehensive Energy Management and the Plant Automation programs (later discussed in more detail). A detailed description of PRASA CIP is provided in Section 5.

#### **4.3.2. Regional Updates**

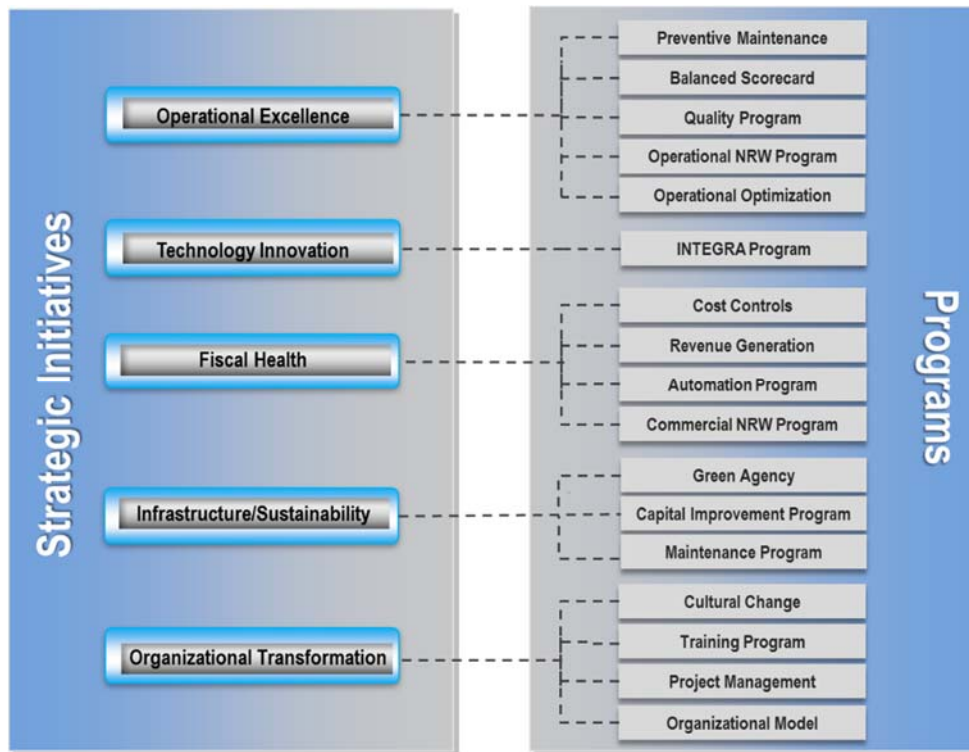
- *Metro Region*: In FY2013, a new compliance division was created in the Metro Region which, for the most part, is staffed with compliance personnel previously assigned to the central Compliance Department. Also, since FY2012, the Metro Region WTPs and WWTPs have been managed by the production and treatment division which was created in FY2012 and reports to the Metro Region director. The Region created a wastewater collection system team to work in the monitoring of wastewater collection systems and combined sewer systems (i.e. how they function, maintenance, overflow impact). The Region recognizes that it requires additional capital improvement investments to address corrosion problems in WWTPs and also that it needs to better measure the water losses experienced in WTPs. Operations personnel continue to develop and use hydraulic modeling to optimize the operation of the water distribution system.
- *North Region*: In FY2013 the Region reports that they are focusing on energy consumption reduction, plant automation, and System simplification, among other areas. The Region established a new regional supervision center to manage and supervise commercial (office and field) services. Also, they are conducting periodic facility audits to improve the overall condition and identify opportunities to further optimize operations. So far, the Region reports to have been able to reduce water production by 2.4 MGD. They continue to invest in personnel training to increase work ownership and productivity levels. In FY2013, the Region with support from PRASA's infrastructure (planning) department, identified at least 1 MGD in leaks in the Dorado Municipality area which the Region has already begun to correct. Finally, the North Region, as later discussed, will have the first clusters of automated plants being placed on line by FY2014.

- *South Region:* The Region reports that they are focusing on System simplification and optimization, and have already identified opportunities to possibly eliminate WTPs to reduce O&M costs (i.e., Guayanilla WTP and Peñuelas WTP) in the near future. However, additional evaluations are necessary. The Region is also focusing on bringing facilities into sustained compliance and in the R&R of pipelines and pressure valves in pump stations. They are also performing hydraulic and water balance models and evaluating current wells located in the Region, to identify opportunities to close, reduce operational time, or place on standby for emergency use in order to reduce O&M costs and as a measure to protect the island's South region aquifer. The Region continues to invest in remote monitoring of facilities. The Region's Regional Operating Center (ROC), currently in development as part of PRASA's Automation Program (later discussed), should be online in FY2014. This will facilitate the future operation of the plants that are currently undergoing automation improvements. The Region has also provided their field employees with leak detection equipment to help identify leaks and overflows in the System. Finally, they are actively performing camera inspections on pipes to identify and correct problems before a breakage occurs.
  
- *East Region:* In FY2013 the Region reports that they are focusing on energy consumption reduction, NRW identification and reduction, reduction in sewer overflows, improvements and optimization to facility maintenance practices, and System simplification. The Region has already identified an energy consumption and cost reduction opportunity to be achieved through the elimination of the Rio Blanco WTP helicones; the savings are estimated at approximately \$500,000 per year. PRASA is currently performing trial runs to test the treatment process without the helicones in order to then obtain PRDOH's final approval. The Region has also identified various water system simplification opportunities (i.e., WPS and WTP elimination opportunities) that are currently under evaluation, focusing on facilities that have historically high operational problems (i.e., leakages and breakages). The Region is actively performing leak detection activities in the water distribution system and has identified the need to install additional pressure control valves in the distribution system to help control breakages and water leaks. The Region has a fully functional ROC used for monitoring system performance, including storage tank levels and WWPSs performance. This has helped to reduce the number of overflows that occur at these facilities. Finally, the Region reports that they are conducting corrective and preventive maintenance activities at a ratio of about 20% to 80%, respectively.
  
- *West Region:* The Region reports that they are focusing on cost controls (i.e. overtime costs), optimization of the water system, treatment facility compliance, improvements to meter reading practices and other customer service activities, energy consumption reduction, and implementation of continuous maintenance service crews. During FY2013, the Boquerón WWTP was closed and flows were diverted to La Parguera WWTP. This helped address compliance problems in the Boquerón WWTP. The Region also began the design process for the R&R of the Isabela Regulator Lake geo-membrane liner, which had deteriorated over the years and had been noted as an action item in previous CERs. The Region continues to add

facilities in their remote monitoring program to manage the System’s operation and prevent/identify water losses in the System. Finally, the Region continues to implement System optimization measures and has already identified three additional WTP facilities to be closed over the next two years.

#### 4.4. Strategic Plan FY2014-FY2018

PRASA has adopted the mission of providing quality water and wastewater services at the lowest possible cost. In order to reach that goal, PRASA’s Executive Management Team has developed and implemented a Strategic Plan for FY2014-FY2018. The Strategic Plan includes five strategic initiatives and key programs, as shown in Figure 4-1. According to PRASA, these initiatives should address the different critical elements that affect its vision and mission.



**Figure 4-1: FY2014-FY2018 Strategic Plan Initiatives and Programs**

A brief description of each strategic initiative and related programs is provided below.

- *Operational Excellence*: The principal objective of this initiative is to develop a model for providing reliable, sensible, and economic services while assuring the full compliance of customers' expectations. The associated objectives and goals of this initiative are summarized in Table 4-3.

**Table 4-3:  
Operational Excellence Strategic Objectives & Goals**

Strategic Objectives	Program	Goals	Performance Indicator
Improve Regulatory Compliance	Quality Program	Increase the regulatory compliance	Non-compliance fines
			Potable water service compliance
			Wastewater service compliance
Operational Effectiveness	Operational Optimization/Balanced Scorecard	Improve bill precision	Billing adjustments
		Reduce quantity of customer service complaints	Customer service complaints
		Reduce quantity of clients with defective service	Service interruptions
			Deficient service clients
		Improve client satisfaction	Time of service in a commercial office
		Improve the fleet's mechanical conditions and repair rate	Available vehicles (%)
		Improve the service level of the supplier	Time of issuance service or purchase order
Improve the average logistic time level	Time of delivery of the supplier		
Improve the Integrated Maintenance Program (IMP)	IMP Program	Improve the time of repair in water production and distribution equipment	Average time of repair of equipment
		Increase the preventive maintenance level while the corrective maintenance is reduced	Preventive maintenance vs. corrective relationship
Non-revenue Water Reduction	NRW Operational Program	Improve service quality	Leak's repair time
		Non-revenue water reduction	Non-revenue water (MGD & percentage)
		Increase production efficiency	Water production (MGD)

- *Technology Innovation*: This initiative includes all projects related to software applications or infrastructure solutions aligned with the operational and functional support. The principal objective of this initiative is to centralize all technological projects in order to maximize the use of resources. The associated objectives and goals of this strategic initiative are summarized in Table 4-4.



**Table 4-4:  
Technology Innovation Strategic Objectives & Goals**

Strategic Objectives	Program	Goals	Performance Indicator
Achieve Technology Optimization	INTEGRA Program	Complete projects as scheduled	Complete projects on schedule

- *Fiscal Health*: This initiative includes all projects aimed to increase revenues or reduce costs while maintaining a balance between long-term debt, asset values, O&M expenses, and operational revenues. The principal objective of this initiative includes the improvement of PRASA’s financial capacity, capture revenue losses from existing customers, increase the budget’s management effectiveness, reduce operational costs, and link service rates to factors such as economic tendencies of consumption, short-term financial management, and long-term financial health management. This initiative is PRASA’s highest priority on its Strategic Plan. The associated objectives and goals of this initiative are summarized in Table 4-5.

**Table 4-5:  
Fiscal Health Strategic Objectives & Goals**

Strategic Objectives	Program	Goals	Performance Indicator
Cost Controls	Automation Program/Control Costs	Improve the efficiency level of the employee	Employees by connection (1,000)
		Compliance with operational expenses	Overtime (over payroll)
Increase Revenues	NRW Commercial Program/Revenue Generation Program	Increase revenue	Budget usage
		Increase revenue level while debt level is reduced	Debt service coverage
		Increase collection level	Collections percentage

- *Infrastructure and Sustainability*: This initiative includes all projects aimed to generate an efficient use of hydrological and energy resources inside PRASA and the compliance with the CIP. The principal objective is to maximize infrastructure, investments and operational resources to protect, restore, and improve the natural environment. The associated objectives and goals for this strategic initiative are summarized in Table 4-6.

**Table 4-6:  
Infrastructure and Sustainability Strategic Objectives & Goals**

Strategic Objectives	Program	Goals	Performance Indicator
Energy Consumption Reduction	Green Agency Program	Reduce the energy consumption	Electric Consumption
Comply with Capital Improvement Projections	CIP	Complete projects as scheduled	Performance Rate of Project Costs
			Performance Rate Progress of CIP Projects

- *Organizational Transformation*: This initiative includes all projects aimed to develop a proficient, adaptable, and motivated workforce under a collaborative environment. The principal objective of this initiative is the support to the improvement of PRASA’s efficiency to be profitable, dependable and sustainable on all facets of the operations and support processes. The associated objectives and goals of this initiative are summarized in the following Table 4-7.

**Table 4-7:  
Organizational Transformation Strategic Objectives & Goals**

Strategic Objectives	Program	Goals	Performance Indicator
Achieve an organization committed with the established objectives	Cultural Change Program/Training Program/Project Management/Organizational Model	Increase the Employees' Satisfaction	Employee Training
			Work Effectiveness
			Non-working days

PRASA’s Executive Management Team has also adopted an operation optimization balanced scorecard with the purpose of improving PRASA’s operational effectiveness. The indicators (previously discussed) measured in this balanced scorecard are: billing adjustments, customer service complaints, service interruptions, clients with deficient services, time of service in a commercial office, fleet availability, time of issuance/completion of service/purchase order, and effectiveness and timeliness of suppliers.

PRASA began tracking these performance indicators towards the end of FY2013 and has set aggressive metrics to be met in FY2014. Finally, PRASA is in the process of establishing a Program Management Office (PMO) to centralize all management, planning, and execution of its Strategic Plan and related initiatives and programs.

#### 4.4.1. Key Performance Indicators

Table 4-8 presents a summary of PRASA’s KPIs. Unless otherwise noted, the results are presented as of June or December 2013, respectively. The table also presents PRASA management’s goals as defined in the Strategic Plan.

**Table 4-8:  
PRASA Operations Key Performance Indicators**

Key Performance Indicators	Goal	Results as of June 2013	Results as of December 2013
Compliance - Water System	Increase to 97%	93%	94%
Compliance - Wastewater System	Increase to 95%	92%	93%
Service Interruptions	Reduce to 9%	10%	8%
Customers with Deficient Services	Reduce to 3,892	4,325	3,752
Average Processing Time of Purchase Orders	Less than 25 days	33 days	29 days
Vehicle Availability	Increase to 90%	66%	96%

Key Performance Indicators	Goal	Results as of June 2013	Results as of December 2013
Average Time for Equipment Repairs	Less than 20 days	22 days	24 days
Preventive vs. Corrective Maintenance Ratio	Increase to 80% : 20%	60% : 40%	72% : 28%
Work Effectiveness (Absenteeism)	Reduce to 13%	18%	N/A
Percent Readings	Increase to 85%	83%	N/A
Customer Attention Time (Commercial Office)	Maintain below 25 min.	21.6 min.	22.6 min.
Average Customers with Service Interruptions (as a Percentage of Total Customers)	Reduce to 9%	9%	8%
Complaints in Customer Service	Reduce to 10/1000 clients	10.6	34.3
Repair time for leaks	Reduce to 60.0 hrs.	87.4 hrs.	63.0 hrs.

## 4.5. On-Going Programs and Initiatives

The following programs and initiatives, some of which began development and implementation prior to FY2013, have been included under PRASA's Strategic Plan. A brief description and current status of each of these initiatives is provided below.

### 4.5.1. Integrated Maintenance Program (IMP)

The 2006 and 2010 Consent Decrees with USEPA and the 2006 PRDOH Agreement require that PRASA implement and continue to develop a comprehensive Integrated Preventive Maintenance Program to ensure the proper O&M of its plants and other critical facilities, including WWPSs. Through this program, PRASA established a plan to enable programmed and continuous maintenance to 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 still finances 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.

The benefits highlighted by PRASA regarding the preventive maintenance program include the following:

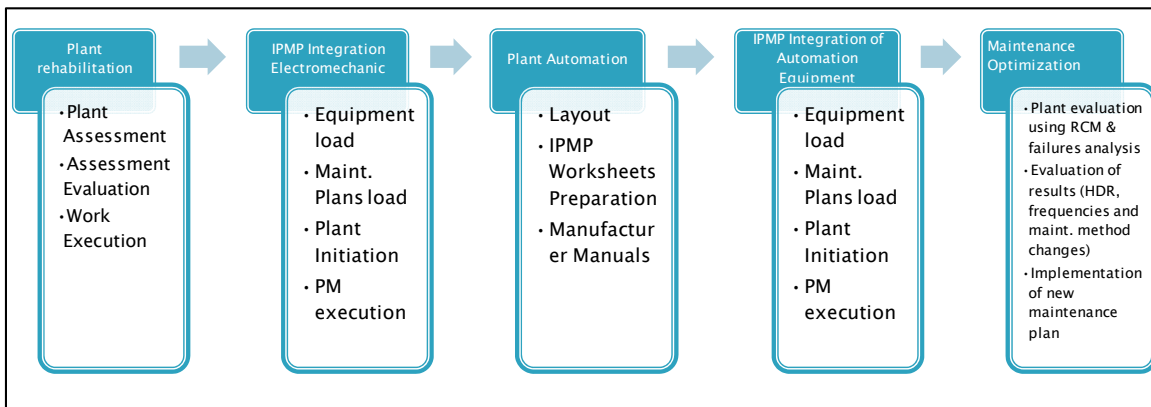
- 100% compliance with the requirements of the Regulatory Agencies.
- The elimination of hiring external O&M service crews.
- Increase the efficiency of the planning group.
- Increase reliability of operation of equipment.

Key achievements include:

- PRASA has expended approximately \$120M in the development and implementation of the preventive program (PRASA plans to spend an additional \$38M of R&R in the FY2013-FY2016 period to complete the development and implementation of the program)
- Integration of 100% of wastewater facilities and 98% of potable water facilities
- 94% of generators were operable (before this metric was about 45%)
- The average pumps redundancy was at about 92% for WPSs and 96% for WWPSs (before this metric was somewhere between 50-60%)

In FY2013 PRASA evolved the Integrated Preventive Maintenance Program into the Integrated Maintenance Program (IMP), which includes both corrective and planned (i.e. preventive and predictive) maintenance activities. PRASA has implemented a short-term and a long-term plan for the IMP. The short-term plan, to be completed by FY2015 is shown in Figure 4-2. Key short-term projects to be completed by FY2015 include the following:

- Rehabilitation of water facilities
- 100% integration of the facilities into the programs
- Mobile devices implementation for calibrations, warehouses, and facility inspections
- Plants maintenance costs optimization
- Implementation of SAP PM in WTPs
- Predictive techniques implementation with the interim service crews
- Live tracking IMP metrics
- Integrate the wastewater collection system and water distribution systems into the IMP



**Figure 4-2: IMP Short-Term Plan**

The long-term plan, to be completed beyond FY2015, includes the following projects:

- New metrics and more aggressive goals for existing metrics including average time of equipment repair and tracking of corrective versus preventive maintenance
- 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

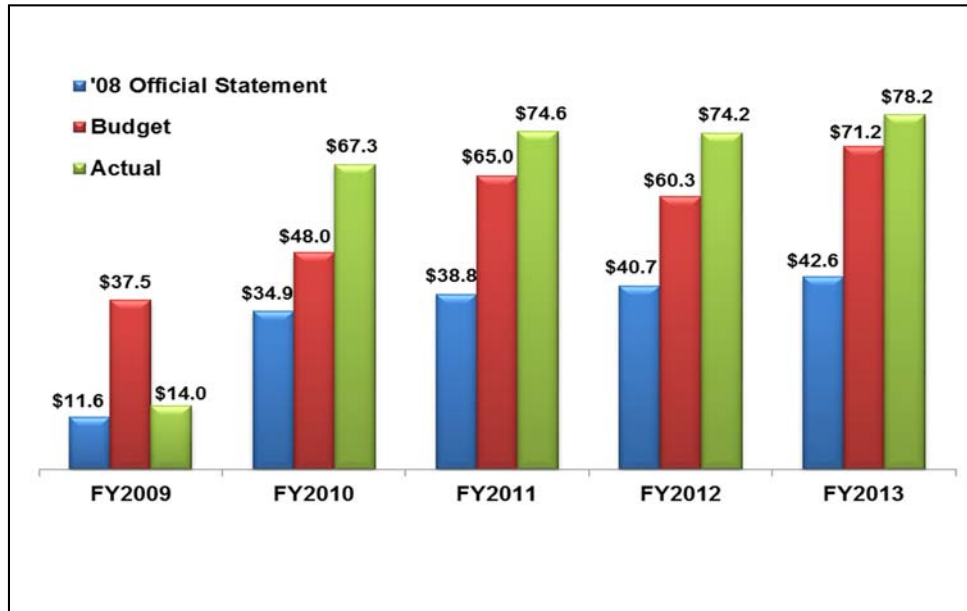
#### **4.5.2. Non-Revenue Water Reduction Program**

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. 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 is 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 to also improve its revenues and reduce expenses. The specific initiatives being implemented under this program are described below.

##### **4.5.2.1. 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. These initiatives, which together make up the Revenue Optimization Program, have resulted in significant additional revenue for PRASA over the past five fiscal years.

As shown in Figure 4-3 below, from FY2010 to FY2013 PRASA exceeded its budgeted amount for operational initiatives. In FY2013, PRASA collected approximately \$78.2M through its Revenue Optimization Program, which is 10% higher than the FY2013 approved budget amount of \$71.2M. In FY2013 PRASA improved its efficiency of operational initiatives in lowering the percent between the actual and Annual Budget compared to FY2012.



**Figure 4-3: Revenue Optimization Program Results FY2009-FY2013 (\$, Millions)**

Table 4-9 below, presents a breakdown of the Revenue Optimization Program initiatives, the revenues achieved in FY2013, and the FY2014 through FY2018 projected opportunities.

**Table 4-9:  
Revenue Optimization Program Initiatives FY2013 – FY2018 (\$, Thousands)**

Initiative	FY2013 Actual	FY2014 Projection	FY2015 Projection	FY2016 Projection	FY2017 Projection	FY2018 Projection
Small Meters	\$31,338	\$49,004	\$49,505	\$61,710	\$68,518	\$70,165
Degradation	(7,000)	-8,736	-7,000	-7,000	-7,000	-7,000
Large Meters	16,128	14,077	14,884	17,827	19,637	21,473
Theft and Tx <sup>1</sup> Accounts	20,835	22,253	29,613	31,971	33,971	35,349
Sprinklers	1,102	333	571	773	943	1,114
Disconnections	12,442	7,200	6,300	5,400	4,500	4,500
Inactive Accounts	378	-	-	-	-	-
Class Correction	918	855	1,129	1,461	1,929	2,397
Condominiums	1,126	1,109	1,386	1,386	1,386	1,386
Collection Mgmt. and Miscellaneous	939	1,521	1,521	1,281	1,281	1,281
<b>Total</b>	<b>\$78,206</b>	<b>\$87,616</b>	<b>\$97,909</b>	<b>\$114,809</b>	<b>\$125,165</b>	<b>\$130,665</b>

<sup>1</sup> Inactive customer accounts with consumption.

A description of each of the NRW operational initiatives, and underlying assumptions regarding their projected revenue impact, is discussed below.



- 1) **Small Meters:** This operational initiative consists of replacing meters less than 1-inch 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 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 reports to have replaced around 529,000 small meters from FY2009 to FY2013. In FY2013, revenues from this initiative totaled \$24.3M (net of degradation adjustment). PRASA estimates that 105,000 small meters will be replaced in FY2014. The average additional monthly revenue per meter assumed, based on the results of prior replacements, was \$8.10 per month for the first year, \$7.50 for the second year and then a yearly reduction until the tenth year. PRASA projects that over 445,000 additional meters will be replaced between FY2015 and FY2018 at a total capital cost of \$40M.

- 2) **Large Meters:** This operational initiative consists of replacing meters with a diameter equal to or 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 3,000 large meters from FY2009 through FY2013. In FY2013, revenues from this initiative were about \$16.1M. PRASA estimates that 450 large meters will be replaced in FY2014. The average additional monthly revenue per meter assumed, based on the results of prior replacements, was \$301 per month. PRASA projects that about 2,100 large meters will be replaced from FY2015 through FY2018.

- 3) **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 (inactive accounts with consumption), which specifically targets 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 five fiscal years PRASA has normalized a total of 45,828 customers. However, it is expected that as accounts are handled and normalized, the number of inactive accounts with consumption will reduce over time. In FY2013, revenues from this initiative were about \$20.8M. PRASA plans to normalize approximately 4,500 additional accounts in FY2014 and an additional 16,000 customers from FY2015 through FY2018.

- 4) **Fire Protection and Sprinkler Initiative:** PRASA currently provides fire protection sprinkler service to only 820 accounts. PRASA has targeted commercial customers required by coding specification to have a sprinkler system that are not paying for the service. 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. In FY2011 and FY2012, PRASA normalized about 266 customers, which represented additional revenues in the amount of \$1.6M. In FY2013, PRASA reduced its efforts in this initiative in order to focus on higher investment-return initiatives; as such, only 99 additional accounts were added during the fiscal year, which resulted in approximately \$1.1M in additional revenues to PRASA. PRASA plans to normalize 100 sprinkler customers each year from FY2014 through FY2018.
  
- 5) **Class Correction:** This initiative includes revenues from rate classification/categorization (class and meter size) corrections. Over the last four fiscal years PRASA has normalized a total of 1,705 customers, and has collected over \$11.0M from this initiative. FY2013 results show that PRASA collected \$0.9M. PRASA is projecting to correct about 500 customer accounts in FY2014 and projects to normalize approximately 500 customers in FY2015, and 1,000 customers each year from FY2016 through FY2018.
  
- 6) **Disconnections:** 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 four fiscal years PRASA has performed over 675,000 disconnections. Between FY2010 and FY2013, PRASA collected about \$71.6M in additional revenues from this initiative. PRASA is projecting a tapering down of the revenues to be collected through this initiative from \$6.3M in FY2014 to \$4.5M in FY2018.
  
- 7) **Miscellaneous:** These initiatives include, among others:
  - Reductions of discounts to billed amounts due to deficiencies in service. The number of clients receiving deficient service credits was reduced from 27,000 in August of 2009 (up to \$20,000 in credits per month in total) to 3,783 currently.
  - 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 de inactive account its transfer to the active account in order to initiate the collection process.
  
- 8) **Condominiums:** This initiative consists in 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. FY2013 results show

that PRASA collected \$1.1M from this initiative. Because the meters have been normalized, PRASA is projecting that revenues in future years will remain more or less at FY2013's levels.

#### **4.5.2.2. Development of a Customer Geodatabase**

This 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 and non-registered users geospatially
- the improvement of water system planning (uses and needs) and water conservation

Project development and implementation commenced in July of 2012 and was completed in November of 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 georeferenced by the contractor.
- Standardizing physical and postal 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.

The contractor will no longer be required to conduct field investigations (these will be performed by PRASA with its own personnel). PRASA is continuing the development of the Geodatabase with internal resources and support from its GIS sub-contractors. In order to further populate the Geodatabase, PRASA is leveraging the data collected by its meter readers through the new GPS-ready handheld devices.

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.

#### **4.5.2.3. Development and installation of an AMR/AMI System for Large Meter Customer in the Metro Region**

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 on expanded by PRASA. Through this project, PRASA has partner with a performance contractor to enter into a performance contract for the implementation of revenue enhancement measures, which includes the installation of an 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 an inadequately sized meters installed, particularly non-residential customers with smaller diameter meters. For purposes of this project, large meter customers are defined as those customers with water meters 1-1/2 inches or larger. Under the performance contract, the selected contractor will be required to provide a performance guaranty for the incremental revenues to be achieved through the project that must be equal to, or greater than PRASA's investment costs. The project objectives include: increasing efficiency and accuracy of the meter reading and billing process in order to reduce non-revenue water, and improving customer services.

The project will be developed in two phases: Phase 1 – Development Phase and Phase 2 – Implementation Phase. During Phase 1 the contractor will conduct a thorough audit of all large meter customers in the Metro Region, as well as identify opportunities for non-residential customers with small diameter meters. If the audit results in an economically viable project for PRASA, Phase 2 (the implementation of the identified measures) will be performed. If the audit does not result in an economically viable project for PRASA, Phase 2 will not be performed.

Phase 1 will be completed in FY2014 and, assuming that a feasible project is identified in the development phase, Phase 2 will commence by FY2015. The implementation time for this initiative is estimated at 18-24 months; therefore, final implementation for this initiative is projected to be completed by FY2016. At this time, PRASA estimates that the project investments could be about \$5.5M and the potential annual incremental revenues could be in the range of \$1-\$3M once the AMR/AMI system and other measures are implemented. PRASA will refine this estimate once the audit is completed.

#### **4.5.2.4. 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. Based on these assessments, PRASA's Executive Management Team believes that detection and repair of these leaks could significantly reduce the volume of PRASA's NRW. PRASA is expanding the leak

detection project in FY2014. About 7,000 miles of water pipelines, island-wide, will be surveyed over an 18-month period as part of the project. The project, which is already underway, will be completed in FY2015.

### **4.5.3. Comprehensive Energy Management Program**

PRASA's energy cost is the second largest cost behind Payroll and Benefits; in FY2013 it accounted for approximately 30% of its total Operating Expenses. Although PRASA's energy consumption CAGR has been about 2% per year over the last ten fiscal years, PRASA's energy costs have increased at a CAGR of about 12% per year over the same time period. This increase has been mostly due to the dramatic increase in PREPA's fuel adjustment and energy purchase charge which has increased at CAGR of about 18% per year.

However, starting in FY2014, PRASA's Electric Power costs has been significantly reduced as a result of the preferential electricity all-in-rate approved for PRASA under Act 50 of June 2013 (Act 50). PREPA will grant a special all-in-rate to PRASA of \$0.22 per kilowatt-hour (kWh) for the first 750 million kWh of consumption (the excess will be paid at PREPA's average cost per kWh for the most recent audited fiscal year). This rate will be effective from FY2014 through FY2016. Starting on FY2017 and going forward, and unless PREPA is able to provide electricity at a lower cost or that PREPA's debt service coverages are negatively affected, the all-in-rate will decrease to \$0.16 per kWh, again for the first 750 million kWh of consumption. By the approval of Act 50, the negotiations in which PRASA would acquire certain hydroelectric power generation assets, currently owned and operated by PREPA, have been postponed.

PRASA's Executive Management Team has set a goal to achieve additional energy consumption reductions of at least 5% between FY2014 and FY2017. Currently PRASA's Operational Regions are evaluating opportunities to implement energy consumption 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). Additionally, as previously reported, in order to reduce its electricity costs and reduce its dependency on PREPA, 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). PRASA has estimated that about 7.7 million kWh will be obtained from other energy sources with an average cost of \$0.15 per kWh.

#### **4.5.3.1. Demand Side Projects through Energy Performance Contracts**

PRASA has already concluded the procurement of the services and investments from private sector firms interested in entering into EPCs designed to reduce energy consumption at PRASA's facilities. The objective of this initiative is to have Energy Service Companies (also referred to as ESCOs) perform assessments and guarantee savings obtained by installing equipment and implement activities designed to reduce energy consumption. There are two important benefits for PRASA in employing this type of performance contract. First, PRASA's 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. Second, the EPCs are structured so that payments to ESCOs are only made by realizing measured and verifiable savings, placing most of the risk with the ESCOs (ESCOs guarantee savings to PRASA) and aligning the desired outcomes of both parties. 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.

Through a Request for Qualifications (RFQ) process, PRASA selected 17 companies as eligible to submit EPC proposals. PRASA developed and issued four different RFPs to the selected companies for: buildings, plants, ancillary facilities (i.e., pump stations), and the North Coast Superaqueduct System. A total of 15 proposals were received and evaluated. The procurement process included a qualification phase, followed by a proposal phase. Also, it was divided into four main types of projects: buildings, plants, Superaqueduct system, and ancillary facilities (i.e., pump stations, wells, tanks). Seventeen (17) companies were qualified through the qualification process. Five of these companies presented proposals. The proposed projects vary in complexity, investment, and projected savings.

To date, PRASA has proceeded with four projects. The Investment Grade Energy Audit (IGEA) phase (this is a requirement prior to entering into the final EPC) for all four projects have been completed. The table below provides a status summary of this initiative. In terms of capital costs, unlike the demand side PPAs, the capital investments will be financed by PRASA with bond proceeds (due to restrictions of PRASA’s 2012 MAT). As previously mentioned, approximately \$50M of the PRASA’s February 2012 bond issue was designated to finance facility improvements related to the EPCs initiative; thus, the debt service cost associated to this project is included in the financial projections discussed in Section 7.

**Table 4-10:  
PRASA EPCs**

<b>Proponent</b>	<b>Facility Type</b>	<b>No. of Facilities to be Intervened</b>	<b>Status</b>
Omega-Wendell	Buildings	8	IGEA Completed Will not be implemented
Omega-Wendell	Plants	4	IGEA Completed Will not be implemented
Honeywell	Plants <sup>1,2</sup>	5	IGEA Completed 3 Plants under implementation phase 2 plants in contract development
Honeywell	Superaqueduct <sup>3</sup>	10	IGEA Completed Contract to be signed in FY2014

<sup>1</sup> Includes top four water and top six WWTP facilities.

<sup>2</sup> Reduced from six facilities

<sup>3</sup> Includes the WTP and nine WPSs.

As shown in Table 4-10, PRASA will implement a total of five EPCs. PRASA’s decision for not implementing certain EPCs vary based by facility. For example, the Omega-Wendell proposed



buildings and plants EPCs, and one of Honeywell plants EPCs will not be implemented because return on investments were below PRASA’s goal.

**4.5.3.2. Supply Side Projects through Power Purchase Agreements**

PRASA also undertook a parallel process in which it is procuring companies who are 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. PRASA developed and issued a RFP for these services in August of 2009. PRASA received 19 proposals from interested parties in response to the RFP. The proposals that were received included different types of energy sources including: wind, solar, waste-to-energy, hydroelectric, and ocean-thermal technologies. After a thorough evaluation of the proposals, PRASA selected seven companies to pursue further negotiations with and to possibly enter into PPAs. However, only three of the seven negotiations carried out by PRASA resulted in a successful agreement between the parties. Additionally, after the completion of the RFP process, various unsolicited proposals were received. Of these, PRASA has elected to pursue two additional PPA projects. Table 4-11 below provides a status summary of the PPAs.

**Table 4-11:  
PRASA PPAs**

<b>Proponent</b>	<b>Technology</b>	<b>Status</b>
Aspenall Energies	Wind	Contract Signed for 8 facilities; Contract is being cancelled - contractor faced challenges in obtaining PREPA's connection approval
Renewable Power Development <sup>1</sup>	Gasification	Contract Signed; undergoing planning and permitting process for one 10MW facility (5MW committed to PRASA)
Windmar Renewable Energy (PV Properties)	Solar	Contract Signed; 1.5 MW in operation, 3 MW under construction, 4.1 MW in feasibility study period
Element Power Solar	Solar	3 MW; in contract development
Organics Management	Gasification	Contract signed; project in planning phase

If successfully implemented, these supply side initiatives should be able to provide larger savings to PRASA than the demand side initiatives. Additionally, there are other proposals still under evaluation (including non-solicited proposals received by PRASA), which may provide further benefits through this initiative, like the biogas PPA signed with Organics Management for the Ponce WWTP. However, it must be noted that supply side projects, in general, take longer to complete than demand side projects. This is because permitting for, and building, new plants and facilities for the provision of alternate energy (e.g., wind or solar energy facilities) usually take significantly longer than replacing equipment in existing facilities. Another item that affects the implementation of certain projects that require the use of PREPA’s grid is the wheeling regulation that will establish the real costs that PREPA will charge to the independent energy suppliers to use its grid.

### 4.5.3.3. Other Projects

In addition to the demand and supply side projects, PRASA is currently working on the rehabilitation of the Lago Loiza (Carraizo) 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. The project will be implemented using a traditional engineering design contract structure. Energy generated from the rehabilitated facility will be used to supply power to PRASA's facility on-site. Finally, during FY2014, PRASA projects to issue a new RFP to develop and implement additional PPAs.

## 4.6. Treatment Plant Automation Program

PRASA has continued the development and implementation of the Treatment Plant Automation Program, which consists in the installation of the necessary equipment and the development of the O&M and system protocols to automatically and remotely operate its WTPs. The project scope includes the procurement and installation of automation control equipment (capital investment is estimated at approximately \$400,000 per facility). The automation program underwent significant changes during the second term of FY2013. For example, the program is now under PRASA's Infrastructure Department and the organizational element of the program was eliminated to both focus and increase the efficiency of the program. 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 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 expects to complete the full automation of cluster #5 (a total of six plants) by FY2014, and cluster #9 (a total of nine plants) by FY2015. PRASA also projects to transition the Metro Region facilities into full automation sometime during FY2015. The other regions will only be partially automated following the 8-4-8-4 automation plan<sup>8</sup>. PRASA intends to complete the remote monitoring of the remaining plants during FY2015. At the same time, PRASA will negotiate with PRDOH which of these plants will be transitioned to full automation in the future.

Architectural modifications to accommodate the Plant Control Center (PCC) rooms for each cluster and the automation-capable ROCs will be delivered in Phase I. The East Region ROC was completed in FY2012. The North Region ROC and five PCC's are completely functional as of FY2013. The South and Metro Region ROCs will be completed by FY2014. The West Region ROC is partially operational and PRASA projects to complete it in FY2014.

PRDOH and PRASA agreed on an endorsement procedure prior to the implementation of 8-4-8-4 and full automation operations. This means that while plants can have ASD (needed for 8-4-8-4

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<sup>8</sup> The name 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 automated operation for the next four-hour period, and so on.

operations) or full automation capabilities, the WTPs will have to 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. To date, two endorsements have been received, and an additional six are expected by end of FY2014. As agreed with the PRDOH, the facilities will first receive approval for 8-4-8-4 operations, regardless of capability. After a maturity period, after full automation is tested, PRASA can request endorsement for full automation. Table 4-12 summarizes the projected program development schedule over the life of the project. As shown, under the revised strategy, PRASA has determined that only 108 WTPs (out of 121) will be impacted through this initiative.

**Table 4-12:  
Plant Automation Implementation Schedule**

Fiscal Year	Cumulative No. of Plants in Program with ASD Capability	Cumulative No. of Plants in Program with ASD Endorsement	Cumulative No. of Plants in Program with Full Automation Capabilities	Cumulative No. of Plants in Program with Full Automation Endorsement
>2014	28	2	5	0
2014	62	20	13	0
2015	84	58	31	0
2016	108	85	46	22
2017	108	85	80	46
2018	108	85	90	75
2019	108	85	90	85

## 4.7. Conclusions

Despite certain O&M related observations made during facility inspections in 2012, PRASA's O&M practices are adequate. The planned O&M expenses are generally in alignment with the System needs. When compared to 2011 benchmark values for utilities in the U.S., PRASA's operational and cost metrics are within the median range; this represents an improvement over the comparison to the 2007 benchmark results. Nevertheless, it is recommended that PRASA evaluate how it is currently implementing its O&M budget to identify additional optimization opportunities. PRASA continues to develop and implement operational initiatives with the goal of improving and optimizing its operations. The implementation of a Strategic Plan and the development and establishment of a PMO will help PRASA in the execution and better management of its projects and Operational Initiatives. The Operational Initiatives currently being implemented are generally aligned with PRASA's needs and represent significant potential additional cost savings or revenue enhancements that could positively impact PRASA's financial situation in future years.

## 5. Capital Improvement Program and Regulatory Compliance Status

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### 5.1. Introduction

PRASA continues to implement an aggressive CIP to improve its water and wastewater infrastructure. The purpose of the CIP is to modernize PRASA's infrastructure, protect public health, safeguard environmental quality, permit continued economic development and help bring the System into compliance with all regulatory requirements.

The CIP is a dynamic program that is constantly evolving and undergoing revision as needs and funding are identified, and as projects transition from planning through design, construction and startup. In FY2013, PRASA's CIP expenditures amounted to \$329M. As required by PRASA's Governing Board, PRASA's Infrastructure Department must annually submit for its approval an updated five-year CIP plan. PRASA's CIP, as approved by the Governing Board on December 18, 2013 (Resolution No. 2822), includes \$1,423.1M in capital expenditures from FY2014 through FY2018. It includes a total of 998 projects that are scheduled for implementation during this period. 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.

The CIP projects are divided into categories, groups and types. Additionally, PRASA has implemented a prioritization system in order to better manage the CIP, given its size and complexity. The individual project cost estimates within the CIP, including the R&R program, have not been independently verified by the Consulting Engineer, as these have been prepared by PRASA in direct collaboration with the PMCs.

This section of the report provides:

- an overview of PRASA's CIP, 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.

### 5.2. CIP Development and Management

PRASA continues to engage world renowned engineering and consulting companies, the PMCs, in the development, implementation, and evolution of the CIP. Since February 1, 2013 there are three PMCs (shown in Figure 5-1) that provide support to PRASA in the project development process and actively participate in the planning, design and construction phases island-wide. They also manage key tasks that drive CIP project budgets, such as defining project scopes, negotiating

consultant contracts for studies and design services, and preparation of project construction cost estimates. PRASA also continues to engage other engineering and consulting companies in areas such as planning, design, land acquisition and other special assignments.

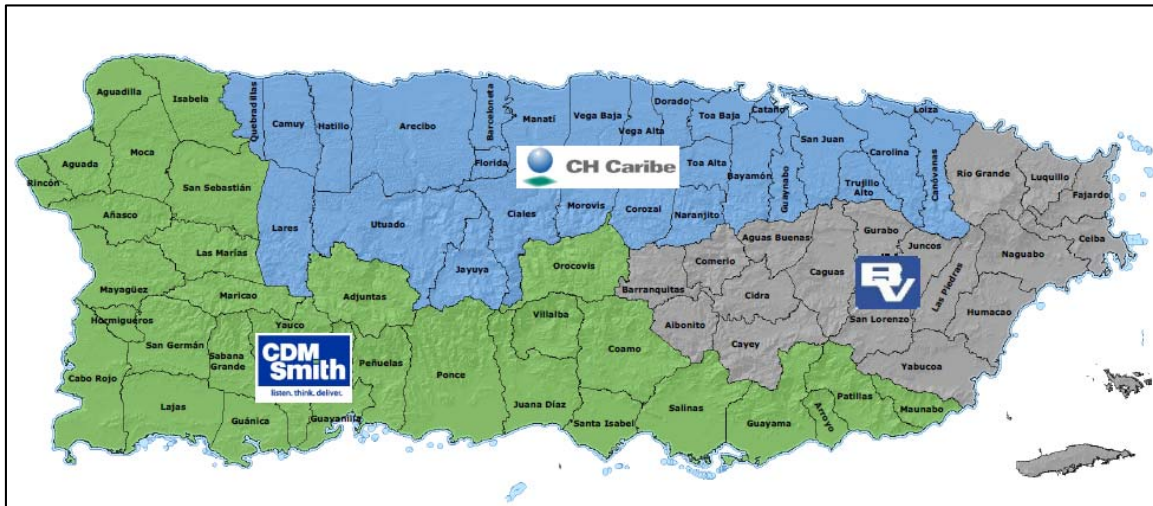


Figure 5-1: Current Program Management Consultants and their Respective Regions

### 5.3. CIP: Project Distribution and Costs

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
- Design costs
- Construction costs
- Project management and inspection costs

- Contingencies
- Miscellaneous cost (includes financing costs, insurance, O&M documents and administrative costs)

Design costs are estimated based on the College of Engineers and Land Surveyors of Puerto Rico professional services compensation guidelines (vary by project type and complexity). The project management and inspection costs are estimated to be 7.5% of the construction cost. Contingencies are estimated to be 10% of the construction cost. Project costs are inflated, on a compound basis, by 3.8% until the construction notice to proceed is executed. These percentages are considered reasonable, since they are based on historic data of completed projects. Also, throughout the development of the planning and design phases of the 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.

### 5.3.1. Project Classification and Prioritization

CIP projects are classified into mandatory and non-mandatory categories. Also, PRASA has added a new category called “Structure”. As such, there are now six CIP categories as listed below:

- Mandatory (USEPA, PRDOH, Civil Action, Administrative Orders)
- Non-Mandatory Compliance
- Non-Mandatory Quality, Efficiency, Reliability and Redundancy
- Non-Mandatory Growth
- Non-Mandatory Other
- Structure

Mandatory projects are those that are required by law, as stipulated in consent decrees, administrative orders, and agreements with Regulatory Agencies including 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. Structure category projects includes R&R projects, as well as technology improvements, meter replacement, and fleet improvement 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, amongst others. Wastewater system projects include projects for improvements or construction of new facilities regarding: wastewater collection, WWTP, WWPSs, amongst others.



**Capital Improvement Program and Regulatory Compliance Status**

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. PRASA is in the process of reviewing and updating its project prioritization system and awaiting final comments from USEPA and PRDOH on the proposed changes. The implementation schedule of future projects, currently not included in PRASA’s CIP, will be subject to the prioritization system.

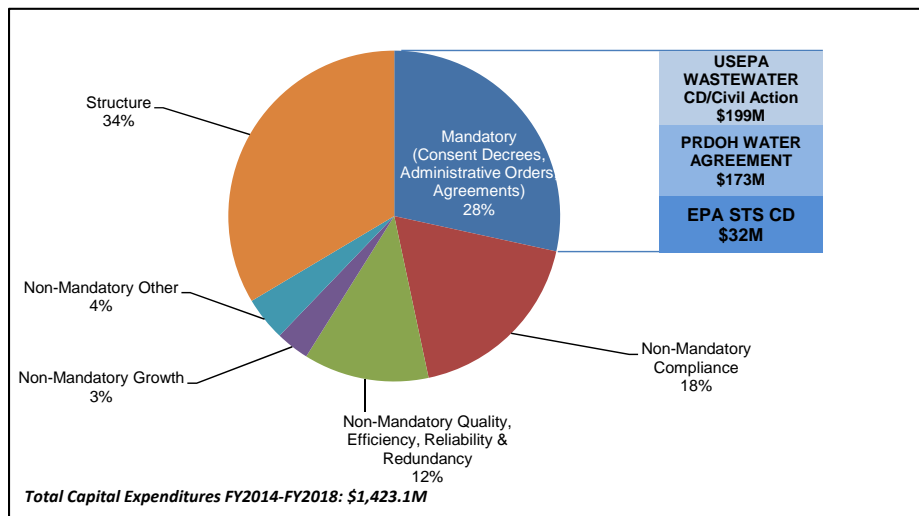
**5.3.2. CIP Programming: FY2014-2018**

The CIP budget for FY2014 through FY2018 amounts to \$1,423.1M and includes \$404.5M for mandatory projects, as shown in Table 5-1. Figure 5-2 shows the total capital expenditures by category for FY2014 through FY2018.

**Table 5-1:  
Capital Improvement Program FY2014-2018 by Category (\$, Millions)**

Project Category	Fiscal Year Ending June 30,					Total
	2014	2015	2016	2017	2018	2014-2018
Mandatory (Consent Decrees, Agreements etc.) <sup>2</sup>	\$119.7	\$130.9	\$90.4	\$48.4	\$15.2	\$404.5
Non-Mandatory Compliance	43.3	68.7	55.5	48.0	44.1	259.6
Non-Mandatory Quality, Efficiency, Reliability & Redundancy	48.7	56.2	34.8	18.0	16.2	173.9
Non-Mandatory Growth	12.4	15.5	10.6	5.2	2.7	46.5
Non-Mandatory Other	19.1	13.4	12.7	8.0	7.8	60.9
Structure	99.1	123.7	77.6	82.0	95.2	477.7
<b>TOTAL<sup>1</sup></b>	<b>\$342.2</b>	<b>\$408.5</b>	<b>\$281.7</b>	<b>\$209.5</b>	<b>\$181.2</b>	<b>\$1,423.1</b>

<sup>1</sup> Numbers may not add due to rounding.  
<sup>2</sup> Includes Caño Martin Peña/ENLACE projects.



**Figure 5-2: FY2014-FY2018 Capital Expenditures by Project Category**

**Water System Projects**

The water system projects include projects to improve compliance (mandated and not mandated), new WTPs, new reservoirs and upgrades to water distribution systems. Total capital expenditures in water system projects for FY2014–FY2018 are estimated at approximately \$408.2M, of which approximately \$204.5M is allocated for projects classified as mandatory.

**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 FY2014–FY2018 are estimated at \$347.7M, of which approximately \$170.0M is allocated for projects classified as mandatory.

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

Total capital expenditures for all other capital projects are estimated at approximately \$667.2M for FY2014–FY2018. These projects address R&R, preventive maintenance, meter replacements, office and building improvements, fleet upgrades, minor repairs, and technology improvements. R&R component of the IMP and certain minor repair projects are categorized as mandatory-driven, with an estimated FY2014–FY2018 capital expenditure of \$30.0M.

Table 5-2 shows the project distribution and capital expenditure by group and type classification for FY2014 through FY2018.

Capital Improvement Program and Regulatory Compliance Status

**Table 5-2:  
Capital Improvement Program 2014-2018 by Project Type (\$, Millions)<sup>1</sup>**

Category Type	Sub-Category	Fiscal Year Ending on June 30,					Total
		2014	2015	2016	2017	2018	2014-2018
Water System	Water Supply	\$11.8	\$20.5	\$18.0	\$10.0	\$7.0	\$67.1
	Water Pump Stations	3.4	1.9	0.6	0.0	0.0	5.9
	WTP Capacity Increase	2.0	3.7	0.6	0.0	0.0	6.2
	WTP Improvements	32.2	42.1	26.7	20.8	11.1	132.9
	WTP New	22.8	21.8	17.3	4.5	0.0	66.3
	Water Distribution	28.6	34.9	30.4	15.2	8.2	117.2
	STS	7.4	5.1	0.0	0.0	0.0	12.5
	<b>SUBTOTAL</b>	<b>\$108.1</b>	<b>\$129.9</b>	<b>\$93.6</b>	<b>\$50.5</b>	<b>\$26.2</b>	<b>\$408.2</b>
Wastewater System	Wastewater Pump Stations	\$10.1	\$5.6	\$0.6	\$2.8	\$4.1	\$23.1
	WWTP Capacity Increase	0.1	0.0	0.0	0.0	0.0	0.1
	WWTP Improvements	23.2	33.3	31.0	14.8	3.3	105.7
	WWTP New	0.0	0.0	0.0	0.0	0.0	0.0
	Wastewater Collection	40.6	76.2	59.3	27.6	15.2	218.8
	<b>SUBTOTAL</b>	<b>\$74.1</b>	<b>\$115.1</b>	<b>\$90.8</b>	<b>\$45.2</b>	<b>\$22.6</b>	<b>\$347.7</b>
Meters	Water Meters	\$23.9	\$26.7	\$22.0	\$26.6	\$35.1	\$134.2
Buildings	Buildings	5.2	6.6	10.8	4.6	0.2	27.3
Fleet	Fleet	4.6	3.4	3.0	4.5	5.0	20.5
IMP (R&R component only) <sup>2</sup>	Water & Wastewater	15.9	12.3	0.4	0.0	0.0	28.7
Minor Repairs	Water & Wastewater	43.9	38.4	5.4	5.9	3.6	97.3
Renovation & Replacement	Water & Wastewater	28.9	53.6	48.2	65.9	81.5	278.2
Technology	Water & Wastewater	37.6	22.5	7.5	6.5	7.0	81.0
	<b>SUBTOTAL</b>	<b>\$160.1</b>	<b>\$163.5</b>	<b>\$97.3</b>	<b>\$113.9</b>	<b>\$132.4</b>	<b>\$667.2</b>
<b>TOTAL</b>		<b>\$342.2</b>	<b>\$408.5</b>	<b>\$281.7</b>	<b>\$209.5</b>	<b>\$181.2</b>	<b>\$1,423.1</b>

<sup>1</sup> Numbers may not add due to rounding.

<sup>2</sup> Does not include actual maintenance costs related to the IMP; these are included in PRASA's O&M budget.

## **5.4. CIP and Current Regulatory Compliance**

In general, the CIP is structured to modernize and help bring the System into compliance with applicable environmental laws, and adequately addresses the requirements of existing consent decrees and agreements. 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.
- Willingness of the U.S. Justice Department, USEPA, PRDOH and others, to cooperate with respect to the timing of implementation and any additional requirements that may arise as PRASA implements its mandated studies and remedial plans.
- Possibility of new environmental legislation or regulations affecting the Systems.
- 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.

PRASA is currently bound by the terms of several comprehensive consent decrees and settlement agreements to eliminate treatment plant non-compliance and unpermitted discharges of untreated sewage, and to improve the quality of potable water and STSs. These agreements include the following:

1. PRASA IV: 2003 Consent Decree, 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 regard to certain of 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 regard to PRASA's WWTPs.

3. 2006 PRDOH Drinking Water Settlement Agreement Civil Action KPE 2006-08589, 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 Num 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”).
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 (NPDWRs).

The consent decrees with USEPA and the 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 evaluation concerning specific System infrastructure and operational issues. PRASA currently estimates that the total cost (incurred and projected) of compliance with the existing consent decrees and agreements will be over \$2,700M through fiscal year 2025. MPPR/ARCADIS reviewed the following reports, submitted to Regulatory Agencies in compliance with consent decree and agreement requirements:

- PRASA IV Triannual Progress Report No. 30 and No. 32, covering the period from January 1 to April 30, 2013; and September 1 to December 31, 2013, respectively.
- 2006 USEPA Consent Decree Triannual Progress Report No. 21 and No. 23, covering the period from February 1, 2013 through May 31, 2013; and October 1 to January 31, 2014.
- 2006 PRDOH Agreement Quarterly Progress Reports No. 20, No. 21 and No. 23, covering the period from January 1 to March 31, 2013; April 1 to June 30, 2013; and October 1 to December 31, 2013, respectively.
- 2010 USEPA STS Consent Decree Triannual Progress Report No. 9 and No. 11, covering the period from January 1 to April 30, 2013; and September 1 to December 31, 2013, respectively.

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

PRASA submitted to the USEPA the Triannual Progress Reports No. 30, No. 31 and No. 32 that cover the periods from January 1 to April 30, 2013; May 1 to August 31, 2013; and September 1 to December 31, 2013, respectively. As of December 2013, all measures were implemented including the Supplemental Environmental Project (SEP) and the stipulated penalties for the bypass events associated to the WWPSs are still being assessed. The proposed plan regarding this consent decree is to integrate it into the 2006 USEPA Consent Decree; this is still pending further

<sup>9</sup> In 2008 CER and PRASA’s Official Statement, it was referred to as 2006 Drinking Water Settlement Agreement. Year has been updated to reflect date Settlement Agreement was signed: March 15, 2007. Subsequently, the Settlement Agreement was amended on June 16, 2008.

negotiations between PRASA and USEPA. A summary of the status of remedial actions is listed below.

- Remedial actions to be performed at the agreed upon 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 December 2013 were organizational structure, communication plan, SAP PM implementation, integrated program and purchasing and logistics.
- 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. PRASA offered several spill response and cleanup plan refresher sessions to 150 employees during the months of July through October 2007 and summer of 2008 that were involved with the operation of wastewater lift stations, including those responsible for the notification of events. The PRASA spill response and cleanup plan is being reviewed to integrate pump stations unanticipated bypass and combined system overflow (CSO) events.
- Supplemental Environmental Project – PRASA selected the El Chichón, Villa Blanca and Lajitas communities for implementation of the supplemental environmental project. All construction and related works were completed and the project was accepted by PRASA's Operations Department.

#### **5.4.2. 2006 Consent Decree, Civil Action No. 06-1624 (SEC) (or Mega Consent Decree)**

PRASA submitted the Triannual Compliance Reports No. 21, No. 22, and No. 23 that cover the periods from February 1 to May 31, 2013; June 1 to September 30, 2013; and October 1 to January 31, 2014, respectively. The 2006 USEPA Consent Decree specifies 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. PRASA completed all short and mid-term remedial actions with the exception of the project related to the Barceloneta WWTP. On December 17, 2007, PRASA sent to the Environmental Quality Board and USEPA the final disinfection alternatives technical report for the bacterial mixing zone for the Barceloneta WWTP and since then no additional comments from the Regulatory Agencies have been received.



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PRASA has been able to complete 17 of the 20 CIP Term 1 (Term 1 ending June 1 of 2008, 2010, and 2011) projects. Weather delays, different site conditions, social impacts and permitting impacted the remaining three projects: Guánica WWTP, La Parguera/Lajas trunk sewer and pump stations (elimination of the La Parguera WWTP) and Sabana Grande WWTP expansion or elimination. According to PRASA these projects are in the construction stage and the issues affecting such projects are being addressed. Also, as of December 2013, the following projects were completed: Boquerón WWTP elimination, Ciales WWTP expansion and rehabilitation, Mayaguez WWTP raw influent channel rehabilitation, Morovis WWTP expansion, Playa Santa WWTP elimination, and Ponce collapsed trunk sewer rehabilitation. Finally, 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. It should be noted that a number of these Term 2 and Term 3 projects are currently being negotiated between PRASA and USEPA.

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 of not less than \$10M 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 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. PRASA continues the training and hiring process of water and wastewater operators. In order 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. This response and cleanup plan is still under revision to incorporate the pump stations and combined sewer systems spill response control activities.

- Section IX of the consent decree specifies that PRASA shall develop and implement a sanitary sewer system evaluation plan and a sanitary sewer system repair plan for the Aguadilla, Bayamón, Isabela, Juncos, La Parguera, San Sebastián New and Unibón Morovis WWTPs service areas. Furthermore, PRASA shall develop and implement a preliminary sanitary sewer system evaluation plan for all facilities in Puerto Rico owned and/or operated by PRASA, with the exception of the seven facilities covered by the sanitary sewer system evaluation plan and repair plan, as specified above. This process of evaluation and repairs project is a strategy focused to control the infiltration and inflow (I/I) issues in PRASA's wastewater collection system. These evaluations are currently in different stages of completion. For example, for the Bayamón WWTP I/I study, a sanitary wastewater system repair plan was submitted to USEPA and a meeting was held on February 2011 between PRASA and USEPA to discuss their general comments; however, no additional updates are reported. For La Parguera WWTP, USEPA approved the wastewater system evaluation plan; however, as requested by PRASA, on April 2010 USEPA confirmed the closure of La Parguera WWTP's study. For the other facilities, PRASA reported that wastewater system evaluation and/or repair plans had been submitted to USEPA. Some are still undergoing review/commenting process by USEPA, while others have been commented by USEPA but not additional actions have been taken.
- Section XXIII of the consent decree specifies that, as a 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. Essentially, the watersheds that shall be considered for this project are La Plata and Río Grande de Loíza watersheds. La Plata Community, located in Naranjito, Puerto Rico, was approved by EPA on December 15, 2006. After the design was placed on hold in 2009 while USEPA and PRASA discussed the possibility of replacing the SEP, the project was issued for bid on November 2011, notice to proceed was issued in May 2012 and a substantial completion date has been set for October 2014. Currently, the construction of the project is 89% completed with 63% of the contract time elapsed.

#### **5.4.3. 2006 PRDOH Drinking Water Settlement Agreement**

PRASA submitted the Quarterly Settlement Agreement Reports No. 20, No. 21, No. 22 and No. 23 that cover the periods from January 1 to March 31, 2013; April 1 to June 30, 2013; July 1 to September 30, 2013; and October 1 to December 31, 2013, 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 December 2013 is described below.

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- 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; these were completed with the exception of the Guayama WTP, which the revised date extension was due December 31, 2013. PRASA solicited an additional time extension until July 31, 2014. The periods to implement the remedial measures for Term 2 and Term 3 have due dates from December 31, 2014 through December 31, 2016.
- Article VII of the Transactional Agreement stated that PRASA will develop a program aimed to optimize treatment processes to be implemented in larger systems. According to PRASA, on May 24, 2013, PRASA submitted to PRDOH a report that summarizes their efforts in the optimization program and their proposed strategy to provide monitoring and continuity of the program. PRDOH submitted comments to PRASA. Subsequently, PRASA will have a meeting with PRDOH to discuss the comments.

### 5.4.4. 2010 USEPA STS Consent Decree

PRASA submitted the Triannual Progress Report No. 9, No. 10, and No. 11, covering the periods from January 1 through April 30, 2013; May 1 to August 31, 2013; and September 1 to December 31, 2013, respectively. 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 as a result of violations to interim and final effluent compliance parameters. A summary of the compliance status as of December 2013 is described below.

- 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. All measures to be implemented by October and December of 2012 were completed; however, measures due by March 2013 were not all completed which resulted in penalties which are being evaluated by the USEPA. PRASA reports that 348 of the 417 mid-term remedial measures have been completed.
- The long-term remedial measures have been partially completed. Eleven (11) projects out of 14 (78%) of the remedial measures have been completed.
- PRASA has completed interim limits evaluations for 62 plants. The evaluation results were submitted to USEPA. At a meeting held on December 19, 2013, between USEPA and PRASA staff, the possible amendments for the interim limits, as part of the renegotiation process, were discussed. Final modification requests shall be submitted by PRASA to USEPA for review and approval.
- PRASA submitted the plan for the implementation of the process control system for the STSs for review and approval of USEPA; and developed and implemented a standardized record system for STSs at its WTPs. PRASA also is in the process of including facilities (not already included) in its IMP program, as required by the consent decree.
- PRASA shall monitor and sample the washwater discharges from each STS. Such monitoring and sampling shall be completed for all of the effluent limitations established in the respective NPDES permit and for any interim limitations established herein, at the monitoring frequency and sample type specified in the NPDES permit or in the consent decree. Short-term remedial measures regarding to the installation of the sampling points for 60 WTPs included in the consent decree, were completed. For some of these plants some construction work is needed to ensure a proper sampling point, therefore, the proper sampling cannot be implemented immediately. These measures form part of the medium-term projects and an extension of time for these projects was approved by the USEPA and the U.S. Court.
- PRASA completed the construction and operation of the Maizales WTP for the Cubuy public water system.

## 5.5. Consent Decree Renegotiation between PRASA & Regulatory Agencies

PRASA and the Regulatory Agencies are currently in discussions 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. These modifications are expected to result in the postponement or advancement of the implementation of certain projects currently included in the

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CIP, and/or the modification of their scope of work. The discussions significantly advanced in FY2013. This renegotiation process is expected to result in the following modifications:

- The postponement or advancement in completion dates of certain projects currently included in the CIP.
- A revision to the negotiated projects' scope of work to better address the facilities' current needs.
- The elimination of projects from the consent decrees and agreements given that the facility is in compliance and the project no longer needs to be performed or because the project has already been completed and certified.
- The addition of new compliance projects – Several projects that were not originally included in the consent decrees or the agreement were negotiated to be included. Additional projects proposed for the 2006 PRDOH Agreement involve compliance projects required by the Long Term 2 Enhanced Surface Water Treatment Rule. This rule requires further treatment of cryptosporidium and other pathogenic microorganisms with the purpose of reducing the illness associated with them (detailed information on Section 5.6). Additional projects added to the 2006 USEPA Consent Decrees include: I/I studies, CSO projects, and Caño Martin Peña/ENLACE projects.
- Development of a prioritization system – Specific criteria were defined for each project category (water, wastewater or STS) and a scoring methodology was developed in order to objectively prioritize, as much as possible, the list of projects. The criteria considers 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.
- Development of a 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, USEPA and PRDOH.

PRASA expects the amended consent decrees/agreement will become final during and will be filed with the court in FY2015.

## 5.6. Future Regulations and Other Regulatory Requirements

The CIP was also reviewed for adequacy to comply with future regulations and other regulatory requirements that could impact compliance limits for PRASA's water and wastewater facilities.

Regarding the wastewater system, although plant-specific changes to effluent permit limits may change from time to time, due to site-specific issues, there are no identified future regulations anticipated to require additional capital improvements to the WWTPs beyond those future effluent limits identified in the consent decrees. However, PRASA may be required to implement a repair plan of its wastewater collection system (including any existing combined sewer systems) to eliminate sewer overflows. At this time, the economic impact of developing and implementing repair plans in these systems is uncertain. As such, PRASA is presently unable to determine the total cost of the CIP projects to be required to bring the wastewater collection systems into regulatory compliance and, as such, has not included these in its CIP.

Nevertheless, from a compliance perspective, PRASA is already under regulatory mandate to improve the collection system operating efficiency to minimize sewer overflow impacts for the Puerto Nuevo WWTP service area. The most recent NPDES permit for the Puerto Nuevo WWTP requires that PRASA implement Nine Minimum Control (NMC) measures and a Long-Term Control Plan (LTCP) for the Puerto Nuevo WWTP service area to address wastewater collection system and combined sewer system overflow occurrences. As such, in FY2013 PRASA began the development of a capacity, management, operations, and maintenance (CMMO) program for the Puerto Nuevo WWTP service area, which includes the development and implementation of a Sewer System Operation & Maintenance Plan (SSOMP). Through these efforts, PRASA expects to identify System needs related to overflows (including combined sewer overflows) and to be able to better estimate the effort and expected costs of a future repair plan. PRASA indicates that once it completes these efforts in the Puerto Nuevo WWTP service area, it will expand the program to the rest of the Metro Region and, eventually, island-wide basis. 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:

- *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 that are currently not subject to any proposed or promulgated national primary drinking water regulations, but are known or anticipated to occur in public water systems, and 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 superficial 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 3, since the implementation of the Stage 2 D/DBPR, several PWSs that were previously in compliance are now exhibiting compliance problems as a result of 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 entered into the CIP prioritization system.

## 5.7. Master Plan Updating

As reported in previous CERs, in 2011 PRASA updated its water and wastewater infrastructure Master Plan. However, recognizing the need to keep this document up to date, in FY2013 PRASA began revising it to reflect infrastructure needs based on the analysis of the most recent population projections using the data provided in the U.S. Census 2010, the Puerto Rico Planning Board population projections, and PRASA's updated compliance and capacity data. The updated Master Plan will provide PRASA with a revised roadmap for the implementation of its future investments in water and wastewater infrastructure through the year 2030. The updated Master Plan will also take into consideration recent renegotiation agreements with Regulating Agencies and the project prioritization system. Subsequently, PRASA plans to continuously revise its 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 and additional regulatory requirements arise.

## 5.8. 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 PRASA's R&R program. However, as noted in previous reports, given PRASA's high rate of leaks and overflows and continuing aging infrastructure, additional funds and an acceleration of the R&R program may be required to reduce/minimize these incidences. 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 record of compliance with the milestones of the consent decrees with USEPA and the agreement with PRDOH supports PRASA's ongoing commitment to bring its System into compliance.

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. In general, although the CIP includes some contingencies to address future regulatory needs, the existing CIP does not include projects intended solely to address future regulations or additional regulatory requirements that may be imposed on PRASA. As the impact of future regulations becomes more defined, CIP modifications will be required to adequately accommodate resulting needs. These CIP needs, as currently being negotiated with Regulatory Agencies, will be prioritized and implementation schedules will depend on PRASA's financial capacity.

## 6. Insurance Program

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### 6.1. 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.”

MPPR/ARCADIS contracted AON Global Risk Consulting (AON) to review PRASA’s current insurance coverage and determine its adequacy considering the type and value of PRASA’s fixed assets. AON also provided a professional opinion on the appropriateness of such coverage and recommendations related to PRASA’s insurance coverage, as detailed in the following sections. AON has submitted to MPPR/ARCADIS an update to its 2010 report which summarizes its findings, opinion and recommendations of PRASA’s insurance program as of June 30, 2013. In turn, MPPR/ARCADIS has submitted this report to PRASA. The data, opinions, and comments included in this section have been extracted from AON’s 2013 report. All references to specific insurance policies not defined in detail in this section shall take the meaning included in PRASA’s insurance policies and detailed in AON’s report.

### 6.2. 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 in order 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 (FEMA) and state (Commonwealth of Puerto Rico) including workers' compensation, and health/medical, among others.

### **6.2.1. 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 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.

### **6.2.2. 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. Theft of owned and non-owned property.
4. Theft of water production.
5. Liability risks, including suits from third parties for injury or loss of property, fines/penalties, injuries caused by vehicles or properties, advertising injury, liable slander, false arrest/detainment and injuries occurring on premises.
6. Pollution liability claims and fines.
7. 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.
8. Reputation risk which includes incidents, events or human actions which seriously damage the image and reputation of the organization.
9. Epidemic or pandemic that causes wide-spread injury or sickness to PRASA employees.
10. Kidnap, ransom, extortion risks.

## **6.3. Assessment of Insurance Program**

This section of the report provides AON's summary and recommendations with respect to PRASA's insurance policies currently in force.

### 6.3.1. Property Insurance

PRASA’s property is insured by a policy issued by AIG Insurance Company – Puerto Rico (AIG-PR). Two other insurance companies and the “London Market” are shown on the AIG-PR policy as “subscribers.” This means they have agreed to bear a portion of each loss.

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 for up to 18 months.

Major policy limits and deductibles are shown in Table 6-1.

**Table 6-1:  
2013-2014 Property Coverage, Limits and Deductibles**

Coverage	Limit	Deductible
Property – All Other Perils (AOP) (including transit and equipment breakdown)	\$150 million per occurrence	\$25.15 million (except, \$27.25 million for underground pipes if not included in the value of a specific location, \$25,000 for equipment breakdown and electronic data processing equipment[EDP])
Business Interruption	Included in \$150 million property limit subject to a \$100 million sublimit	5 days (10 days for equipment breakdown)
Extra Expense	Included in \$150 million property limit subject to a \$50 million sublimit	5 days (10 days for equipment breakdown)
Contingent Business Interruption	Included in \$100 million business interruption sublimit subject to a \$35 million sublimit	5 days (10 days for equipment breakdown)
Windstorm	Included in \$150 million limit	2% of total insured value (TIV) for the affected location, subject to a minimum of \$25 million and a maximum of \$32.5 million
Newly Acquired Locations	Included in \$150 million property limit subject to a \$15 million sublimit	Property – AOP deductible applies
Earthquake	\$300 million	5% of TIV for the affected location, subject to a minimum of \$25 million and a maximum of \$32.5 million (including underground pipes included in the value of a specific location).
Flood	\$300 million	2% of TIV for the affected location, subject to a minimum of \$25 million and a maximum of \$28 million

#### 6.3.1.1. Recommendations

The following recommendations were made by AON regarding PRASA’s property insurance policy:

1. **Review the property limit in relation to the 2010 Probable Maximum Loss (PML) Study.**

The property policy includes both damage to property and business interruption in the \$150M AOP limit and the \$300M flood and earthquake limits. While most of the facilities are spread throughout the island, there are three facilities which, bases on the 2006 End Book Value computations provided by MPPR/ARCADIS, have a total replacement cost of over \$300M. These are located in San Juan and are the Puerto Nuevo WWTP (\$186.14M), the Sergio Cuevas WTP (\$89.48M) and the Loiza dam (\$31.46M). Together these facilities represent total replacement costs of \$307.1M.

The property values for these locations are not current and may or may not reflect the maximum potential loss that could arise from a single event, such as a flood or earthquake. To identify PRASA's potential exposure, a PML study was recommended in AON's 2008 report. PRASA has indicated that a PML study was concluded on June 2010.

2. **Clarify the direct physical damage and business income/extra expense limits and deductibles.** Two different earthquake deductibles apply to underground piping. The two earthquake deductibles are:

- a. \$27.3M per occurrence to underground piping not common to a single location;
- b. 5% of the value of underground piping identifies to a specific location if the pipelines values are included in the value of the structure. The 5% deductible is further subject to a minimum deductible to \$25M and a maximum deductible of \$37.5M.

The Schedule of Sub-Limits shows a \$100M sublimit for business income and a \$50M sublimit for extra expense. The AOP deductible is shown at \$25.15M. Both the pipeline deductibles and the AOP deductible state they apply to combined property and business income. However, the deductible section of the policy also shows a five day deductible as being applicable to business income and extra expense. As the limits and deductible descriptions seem to contradict each other they present a confused picture of the limits and deductibles that apply.

AON recommends, to avoid confusion during the settlement of a loss, to clarify which deductible is intended to apply to direct damage to property and to business income/extra expense and clearly showing the limits which apply to direct damage and to business income/extra expense.

3. **Consider adding policy definitions and revising the flood definitions.** Other than a definition for flood in the exceptions which apply to the exclusions for damage caused by latent defects (Exclusion D) and faulty materials, maintenance or design (Exclusion B), we find no definition of flood in the policy. In the exclusion exceptions on page 19 of the policy, the definition says flood is "the arising and overflow of a body of water onto normally dry land." This definition may not be interpreted to cover flood damage to wastewater treatment facility



treatment ponds where treatment ponds are not dry land. To avoid potential claim disputes, AON recommends the elimination of the phrase “normally dry” and the revision of the flood definition to apply to the rush of water flowing over and/or onto land.

AON also recommends a definition section be added to the coverage form to include important definitions such as flood, earthquake, etc., so there is less potential for coverage disagreement over what or may not clearly be covered by such terms as “earthquake” or “flood”.

4. **Consider clarifying coverage for impounded water.** The “Property Excluded” section of the property policy excludes “water, except water which is normally contained within any type of tank, piping system, or other process equipment” (page 19, Section 11, Property Excluded, Item B). Impounded water contained by a dam would not quite fit into this exception to Property Excluded Item B. To clearly provide coverage for dam impounded water, AON recommends to amend the water exclusion to say “...except water which is normally contained within any type of tank, piping system, other process equipment or dam.”

### 6.3.2. Crime

PRASA maintains a crime policy providing the coverage and limits shown in Table 6-2 for loss discovered during the policy period. No comments or recommendations were made by AON regarding PRASA’s crime policy.

**Table 6-2:  
2013-2014 Crime Coverage, Limits and Deductibles**

Coverage	Limit	Deductible
Employee Dishonesty	\$1 million	\$10,000
Claim Preparation Expense (employee dishonesty)	\$100,000	\$0
Loss Inside Premises	\$500,000	\$10,000
Loss Outside Premises	\$500,000	\$10,000
Counterfeit currency and Money Orders	\$500,000	\$10,000
Depositors Forgery	\$500,000	\$10,000
Computer Fraud and Funds Transfer Fraud	\$500,000	\$10,000
Incoming Check Forgery	\$500,000	\$10,000
ERISA Extension	\$500,000	\$0
Extortion Threats to Persons	\$100,000	\$10,000
Extortion Threats to Property	\$100,000	\$10,000
Audit Expense – For Audit required by State of Federal bodies as result of employee dishonesty	\$100,000	\$0
Policy Aggregate	\$1 million	Not Applicable

### 6.3.3. General Liability

PRASA maintains commercial general liability coverage through Triple S Propiedad, Inc. (Triple S) with the limits shown in Table 6-3. Aggregate limits have been amended to apply per location or per project. A \$100,000 deductible applies to each occurrence.

**Table 6-3:  
General Liability Coverages and Limits**

Coverage	Limit
General Liability – Per Occurrence	\$1 million
General Liability – General Aggregate	\$2 million
Personal and Advertising Injury	\$1 million
Products/ Completed Operations	\$2 million
Employer’s Stop-Gap	\$1 million
Employee Benefit Liability	\$1 million

#### 6.3.3.1. Recommendations

The following recommendation was made by AON regarding PRASA’s general liability policy:

- Delete the Exclusion – Explosion, Collapse and Underground Property Damage Hazard exclusion (CG 21 42).** The “Puerto Rico Aqueduct Special Conditions” endorsement item 11 says any “x, c, u” (explosion collapse and underground) exclusion is deleted. Endorsement CG 21 42 has been added to the policy and specifically excludes injury or damage arising from an “x, c, u” exposure. Thus, these two endorsement conflict with each other. AON recommends, considering that PRASA depends upon underground piping for its operations, the deletion of the exclusion endorsement CG 21 42 to clearly provide liability coverage for any underground operations.

### 6.3.4. Automobile Liability

PRASA maintains automobile liability coverage through Triple S for:

- Any automobile with a \$1M per accident limit.
- Garage liability coverage for any automobile with a \$1M per accident limit and a \$3M aggregate limit for garage operations.

A \$2M limit covers physical damage to owned automobiles for any one event caused by fire, lightning, windstorm, earthquake, hail or flood, subject to a \$50,000 deductible. Subject to deductibles of \$250 for comprehensive coverage and \$500 for collision, garage keeper’s legal liability is provided at a \$1M limit per location for non-owned automobiles in the insured’s care. Trailer interchange coverage is also provided for non-owned trailers, subject to a physical damage limit of \$35,000 each trailer. No comments or recommendations were made by AON regarding PRASA’s automobile coverage policy.

### 6.3.5. 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 \$1M self-insured retention (SIR) for bodily injury, property damage and personal and advertising injury losses not covered by the primary insurance. Coverage is provided through Triple S.

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

#### 6.3.5.1. Recommendations

The following recommendation was made by AON regarding PRASA’s excess liability policy:

1. **Review the downstream liability exposure and the liability limit for PRASA’s dams.** The failure of a PRASA dam could potentially cause a very large liability loss, especially if there are residential communities located below a dam. The question of PRASA’s exposure to liability from destruction of a dam was raised previously and AON understands that there is a potential for a substantial loss of life were a PRASA dam to collapse. In such an event, according to AON, \$60M total liability limit may not be enough to settle claims if PRASA was found to be negligent.

### 6.3.6. Directors and Officers Liability

PRASA maintains one primary and one excess layer of directors & officers (D&O) liability insurance. Coverage for both layers is written on a claims-made basis and is subject to a prior litigation date of July 1, 2013 (meaning the policy will not cover claims arising from or connected to litigation started prior to July 1, 2013). The D&O carriers and limits are shown in Table 6-4.

**Table 6-4:  
Directors and Officers Liability**

Insurer	Limit
ACE Insurance Company (Primary)	\$20 million
Liberty International Underwriters (First Excess Layer)	\$20 million excess of \$20 million
Total D&O Limit	\$40 million

The primary layer of D&O insurance is subject to a \$200,000 SIR for claims against indemnified persons or a claim against PRASA alleging a breach of duty involving securities issued by PRASA.

### 6.3.7. Employment Practices Liability

PRASA maintains primary and excess employment practices liability (EPL) policies providing total limits of \$10M in the aggregate annually for employee claims alleging wrongful termination, employment related misrepresentation, sexual harassment, retaliation or other violation of an employee’s civil rights. A \$100,000 SIR applies to each claim. Primary coverage is provided

through ACE Insurance Company (ACE). Excess EPL coverage is through Liberty Mutual Insurance Company.

### **6.3.8. Premises Pollution Liability**

ACE Insurance Company of Puerto Rico provides pollution liability coverage on a claims-made basis at \$5M per occurrence, \$10M annual aggregate limits. Coverage is subject to a \$250,000 per accident SIR. A retroactive date of July 1, 2012 applies.

#### **6.3.8.1. Recommendations**

The following recommendations was made by AON regarding the 2012-2013 policy and the 2013-2014 renewal binder for the pollution liability:

1. **Consider obtaining coverage for pre-existing pollution conditions (Coverage B).** Coverage A provides coverage for claims, remediation expense and defense costs arising from pollution conditions which first originate and are discovered during the policy period. As respects Coverage A, the policy period is defined as July 1, 2012-2013 in the 2012-2013 policy form (Section V Definitions, definition U). This would change to July, 2013-2014 in the renewal policy.

Coverage B is not currently purchased in the 2012-2013 policy form. Coverage B would cover claims, remediation expense and defense costs arising from pollution conditions discovered during the policy period if the pollution condition originated prior to the policy inception date. Based on Section II Limits of Liability and Self Insured Retention, item H, 2, ACE will consider any claim made as a result of a pollution condition originating and discovered during any policy period in which ACE provided coverage to be a pollution incident discovered during the current policy period. Thus, the longer ACE has maintained the coverage the less likely Coverage B would be needed.

According to AON, ACE has provided coverage since July 1, 2012. Thus, any leak of an underground storage tank or any other pollution event which originated prior to July 1, 2012 would not be covered unless Coverage B is obtained and the retroactive date is moved back prior to July 1, 2012.

2. **Consider adding underground storage tank (UST) coverage.** Exclusion O excludes pollution arising from a UST unless the UST is listed in the Schedule of Underground Storage Tanks. The application attached to the 2012-2013 policy shows five USTs. However, no Schedule of Underground Storage Tanks is attached to the 2012-2013 policy. AON recommends to consider to add coverage for the USTs, because the 2013-2014 policy is to be issued with the same provisions as in the 2012-2013 policy, thus, the USTs would not be covered.

### **6.3.9. Professional Liability**

PRASA maintains a miscellaneous errors & omissions liability policy through ACE Seguros, providing a \$25M per claim limit and a \$50M annual aggregate limit, subject to a \$250,000 per claim deductible. The policy is written on a claims-made basis and claims and defense costs are included within the limit. The policy maintains 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.

#### **6.3.9.1. Recommendations**

The following recommendations were made by AON regarding PRASA's ACE Seguros errors & omissions liability policy:

1. **Consider amending the Defense and Claims Expenses (Section I, B).** The second paragraph of the Defense and Claims Expenses agreement says the insurer is not obligated to investigate or defend a claim after the limit of liability has been exhausted, "*or after the Company (the insurer) has deposited the remaining available limit of liability into a court of competent jurisdiction.*" Defense costs can be high and can surpass the cost of damage or injury in the event of serious loss. A provision which allows the insurer to walk away from defending the insured by depositing the balance of the liability limit with a court means the insured can be left with the cost of defending itself from that point forward, and forced to absorb defense costs it had expected the insurer to pay. AON recommends to try to delete the phrase shown in italics above which allows the insurer to deposit the remaining liability limit with the court and avoid defense costs.
  
2. **Consider amending the Settlement condition (Condition G).** Condition G says the insurer cannot settle any claim without the insured's permission. However, in the event the insurer recommends settlement and the insured is unwilling to settle, the insurer then has the right to cease its defense efforts. In that event the limit of liability is then limited to the amount the claim could have been settled for at the time the insurer recommended settlement. This "hammer clause" is harsh compared to similar clauses in many policy settlement provisions.

Most errors & omissions policy settlement provisions allow the insured to not settle upon the insurers recommendation, and the insurer is then obligated to provide a defense and ultimately pay damages and defense costs the claim could have been settled for at the time of the insurer recommended settlement, plus a percentage of 50% to 75% of the damages and defense costs incurred above the settlement amount for which the claim could have been settled. Aon recommends to request a revision to a less harsh settlement provision at the June 2014 renewal.

3. **Consider amending the Extended Reporting Period Amendment Endorsement (Endorsement 1).** Endorsement 1 appears intended to expand coverage to include all projects initiated or declared as commencing during the “Policy Period”. However, as worded, Endorsement 1 could be restricting coverage for projects begun prior to the policy inception date, unless they are declared as commencing during the policy period. The definition of “Policy Period” is the period of time between the effective date stated in Item 3 of the Declarations page and the termination, expiration or cancellation date of the policy, plus any Extended Reporting Period if elected. With this definition, the policy would not apply to an ongoing project that was begun prior to the June 30, 2013 policy inception. There is also no provision in Endorsement 1 on how to “declare” a project as commencing during the policy period.

AON recommends, to take advantage of the policy’s September 21, 2004 retroactive date for any ongoing projects, amend the Extended Reporting Period Amendment Endorsement to apply to all projects initiated during the “Policy Period” or subsequent to any applicable retroactive date.

### **6.3.10. Cyber Liability**

PRASA does not currently purchase cyber liability insurance. PRASA has indicated that the website allows for on-line customer payment of water and sewer bills. To the extent customer account information and customer payment information is maintained by PRASA’s computer system, such customer information is potentially at risk if an accomplished computer hacker were able to access customer’s personal information. The cost of notifying customers of such an incident alone can run over \$180<sup>10</sup> each in the U.S.

#### **6.3.10.1. Recommendations**

The following recommendation was made by AON regarding PRASA’s cyber liability policy:

1. **Consider cyber liability coverage.** PRASA should consider cyber liability coverage to insure 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.

### **6.3.11. Helipad Liability**

PRASA owns and maintains a helipad on the roof of its main building. PRASA has indicated that the helipad is rarely or never used. If there is a potential for emergency use of the helipad, or possible future use, AON recommends that PRASA obtain liability coverage for this exposure. Coverage is now excluded from other liability policies.

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<sup>10</sup> Based on the 2013 Cost of Data Breach Study published by Symantec Corporation and the Ponemon Institute, the average cost for each notification in the U.S. is \$188.



## 6.4. Owner Controlled Insurance Program

PRASA maintains an Owner Controlled Insurance Program (OCIP) for its multi-year CIP. In addition to covering PRASA, the OCIP is designed to insure enrolled contractors, subcontractors and design professionals working on the CIP. The OCIP is not open to suppliers, site security firms, vendors, truck and delivery personnel or other parties which are not directly involved in construction. The OCIP program provides builder's risk, general liability, umbrella and excess liability, and pollution liability insurance. Each of these coverages is discussed below.

### 6.4.1. Builder's Risk

PRASA maintains a builder's risk policy as part of its OCIP program. AIG - PR is the insurer. Coverage applies to all risks of direct physical loss, except as excluded by the policy. Coverage applies to scheduled projects under \$50M in contract value. The policy provides a \$100M per occurrence and annual aggregate limit each to the perils of earthquake, flood and windstorm and is further subject to various sublimits. Details are in AON's report.

The All Other Perils deductible is \$20,000. There are additional deductibles for some losses, which range from \$100,000 to \$250,000, with percentage deductibles of 2% for flood and named windstorm, and 5% for earthquake. All percentage deductibles are subject to a minimum deductible of \$100,000.

#### 6.4.1.1. Recommendations

The following recommendations were made by AON regarding PRASA's OCIP builder's risk policy:

1. **Clarify the \$100,000 deductible for "Other Acts of God".** A deductible of \$100,000 applies to "Other Acts of God". However, while the term is capitalized, indicating it is a defined term, AON didn't find a definition of "Other Acts of God" in the policy. Where the term is not defined, in the event of fire damage to a project under construction caused by a lightning strike it is unclear if the \$20,000 AOP deductible or the \$100,000 "Other Acts of God" deductible would apply. In addition, the final paragraph in the Deductible section of page 4 of the declarations pages says if there is more than one deductible that applies to a loss, the largest deductible will be applied.
2. **Consider revising the flood definition.** The flood definition describes flood, in part, as "A general and temporary condition of complete inundation of normally dry land areas..." The reference to "normally dry land areas" could be interpreted to exclude damage to holding or treatment ponds or similar property located in a water treatment facility, as those facilities are not a normally dry land areas. PRASA should request that the definition eliminate the word "dry" and simply refer to the inundation of land areas.

3. **Consider amending Endorsement 1 to include coverage for wet works.** AON understands that PRASA’s OCIP operations will include some wet work. Endorsement 1, page 20 of the builder’s risk policy lists “Wet Works” among the “Exclusions”. The term “Wet Works” is not defined in the policy. To cover the application of unset cement (wet works), AON recommends to ask the insurer to amend the endorsement to clarify the term “Wet Works” does not apply to the application of cement.
4. **Consider coverage for impounded water.** In the “Property Excluded” section of the builder’s risk policy, item D excludes coverage for water. Work on an existing dam or other normally used water containment system could mean the loss of impounded water in addition to the loss of the containment structure if a structural collapse occurred. AON recommends, to the extent PRASA will have work done on existing dams, or other water containment systems, ask that the “water” exclusion in item B be exempt from this limitation.
5. **Consider amending Exclusion C, (4).** Exclusion C, (4) excludes actual or attempted hijacking, unlawful seizure or wrongful control of a transportation mode. This effectively would exclude theft of a truck load of materials or equipment destined for the Project site. In contrast, Section A – Declarations, sublimit of liability item 6, B, (3) provides a \$1 million limit per conveyance for property in transit, which is added in the policy “Extensions of Coverage”. AON recommends to amend the Exclusion C, (4) to add wording saying “except as otherwise provided in the policy “Extensions of Coverage””.
6. **Consider amending General Condition 3 – Misrepresentation & Fraud.** Section C- General Conditions, General Condition 3 voids the policy if the Named Insured has concealed or misrepresented any material fact or circumstance concerning this insurance. The definition of Named Insured in the second paragraph of Section A – Declarations, Item 1, A, includes joint venture companies and/or all contractors and/or subcontractors of any tier. Thus, if a sub-subcontractor lied about their involvement in a loss, the policy would technically be void. AON recommends to limit the General Condition 3 to void the policy only with respect to the Named Insured which concealed or misrepresented any material fact or circumstance concerning this insurance.

### 6.4.3. General Liability

The OCIP general liability policy is as “per occurrence” policy provided by ACE and includes the limits shown in Table 6-5.

**Table 6-5:  
2013-2014 OCIP General Liability Coverages and Limits**

Coverage	Limit
General Liability – Per 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	\$250,000
Medical Expense	\$5,000

A \$10,000 per claim deductible applies for bodily injury and a \$10,000 per claim deductible applies to property damage.

### 6.4.4. Umbrella Liability

The OCIP umbrella liability policy is provided by ACE. Except for employer’s liability, the policy provides a limit of \$25M per occurrence subject to a \$50M annual policy aggregate, in excess of the primary OCIP general liability limits. An SIR of \$10,000 applies to liability not covered under the scheduled underlying commercial general liability and employer’s liability policies

### 6.4.5. Excess Liability

The excess liability policy is issued by AIG - PR. It applies in excess of the OCIP umbrella policy. The excess policy limits are \$25M per occurrence, \$50M annual policy aggregate. This provides total umbrella and excess liability limits of \$50M per occurrence, \$100M annual aggregate.

### 6.4.6. Contractor’s Pollution Liability

The OCIP contractor’s pollution liability insurance is provided by AIG - PR. 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 \$15,000 SIR, and covers PRASA and OCIP contractor participants. Defense costs and other claim expense erode the aggregate limit.

### 6.4.7. Conclusions

In the opinion of AON, the insurance program covering PRASA’s exposures to risks of accidental property and liability losses arising from on-going operations provides reasonable coverage. AON has provided several recommendations to PRASA’s insurance program. Particularly, PRASA should address the following key recommendations:

1. Review of the adequacy of the property insurance limit in relation to the 2010 Probable Maximum Loss Study.
2. Review the downstream liability exposure for PRASA's dams.
3. Consider adding underground storage tank coverage to the pollution liability policy.

The OCIP covering PRASA's exposures to risks of accidental property and liability losses arising from construction activities provides reasonable coverage. AON has provided several recommendations to PRASA's OCIP. Particularly, PRASA should address the following key recommendations:

1. Consider amending the misrepresentation and fraud condition to limit its application only to the party committing the misrepresentation or fraud.

## 7. System Assets and Financial Analysis

### 7.1. Introduction

In accordance with the 2012 MAT and 2012 FOA, MPPR/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 FY2013. Also, MPPR/ARCADIS evaluated PRASA's financial forecast and assessed the appropriateness of rates and charges. A summary of the findings is provided in this section.

### 7.2. System Assets

#### 7.2.1. Fixed Assets Changes

Table 7-1 shows that, as of June 30, 2013, PRASA reported an estimated total book value of fixed assets of approximately \$6,253M. Additionally, PRASA reported it had approximately \$1,096M of assets that are currently under construction or as "Work in Process". As such, as of June 30, 2013, the book value of PRASA's total fixed assets amounts to \$7,420M. Table 7-2 provides a summary of the fixed assets changes from FY2011 to FY2012, and from FY2012 to FY2013. For additional discussion regarding PRASA's fixed assets, please refer to PRASA's Audited Financial Statements for the years ended June 30, 2013 and 2012.

**Table 7-1:  
Fixed Assets Summary through June 30, 2013 (\$, Millions)**

	Original Cost	Accumulated Depreciation	Book Value
Fixed Assets	\$9,499	(\$3,246)	\$6,253
Work in Process	1,096	-	1,096
Land and other Non-Depreciable Assets	71	-	71
Total Fixed Assets	\$10,666	(\$3,246)	\$7,420

**Table 7-2:  
Fixed Assets Changes (\$, Thousands)**

	FY2011-FY2012	FY2012-FY2013
Fixed Assets (Net of Accumulated Depreciation)	\$207,993	\$611,645
Work in Process	(64,291)	(551,236)
Land and other Non-Depreciable Assets	3,080	1,257
Total Fixed Asset Changes	\$146,782	\$61,666

### 7.3. PRASA's Rate Structure

On February 1, 2013, in compliance with the requirements of the 2012 FOA, PRASA submitted to GDB an updated *Fiscal Improvement Plan* which presented annual deficits starting in FY2014. The GDB, in turn, informed PRASA that it would not appropriate additional funds to supplement PRASA's revenues for FY2014. As a result, and in compliance with the 2012 MAT and the 2012 FOA, PRASA moved forward with its rate revision and increase process. The process was completed on July 3<sup>rd</sup>, 2013, when PRASA's Governing Board approved the final rate structure to be implemented and that would become effective on July 15, 2013. The Governing Board-approved rate structure includes increases of PRASA's base and volume charges and it incorporates a new monthly fix charge, the Environmental Compliance and Regulatory Charge (ECRC), which varies by customer class and by either consumption or meter size. Subsequently, on December 18, 2013 the Governing Board amended the ECRC billing structure for non-residential customers.

PRASA also included an additional \$2.00 monthly special charge for all customers, to facilitate the development of CIP projects that focus on the sustainable management of water resources in accordance with the existing Environmental Public Policy Law (Act 416 of September 2004, as amended) and the Puerto Rico Water Resources Comprehensive Plan (2008); and both water and wastewater improvement projects for Non-PRASA<sup>11</sup> systems.

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 will be implemented on a phased approach over the next three fiscal years (FY2014-FY2016).

Tables 7-3 through 7-5 summarize the Board-approved rates for residential customers.

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<sup>11</sup> A Non-PRASA system is a water community-operated or wastewater system that is not connected to PRASA's system.



**Table 7-3:  
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 7-4:  
Residential Volumetric Rate per Cubic Meter<sup>1</sup>**

Use Block (m <sup>3</sup> )	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

<sup>1</sup>Under the Board-approved rate structure, the number of residential volumetric blocks was increased from three to four and the use block thresholds were modified.

**Table 7-5:  
Residential Environmental Compliance and Regulatory Charge (ECRC)**

Use Block (m3)	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 7-6 through 7-9 summarize the Board-approved rates for non-residential customers (includes commercial, industrial and government customer classes).

**Table 7-6:  
Non-Residential Monthly Base Charge per Account<sup>1</sup>**

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

<sup>1</sup>Under the Board-approved rate structure, the allotment of the first 10 cubic meters of consumption previously included in the base charge was eliminated.

**Table 7-7:  
Commercial and Government Volumetric Rate per Cubic Meter**

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

**Table 7-8:  
Industrial Volumetric Rate per Cubic Meter**

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

**Table 7-9:  
ECRC for Non-Residential Customers**

<b>Commercial and Government ECRC Meter Size Equal to or Less than 2-inches</b>			
<b>Use Block (m<sup>3</sup>)</b>	<b>Water</b>	<b>Wastewater</b>	<b>Water &amp; Wastewater</b>
>0-100	\$1.22	\$0.98	\$2.20
>100-200	1.26	1.04	2.30
>200	1.44	1.16	2.60
<b>Industrial ECRC Meter Size Equal to or Less than 2-inches</b>			
>0	\$1.54	\$1.22	\$2.76
<b>Non-Residential ECRC Meter Size Greater than 2-inches</b>			
<b>Meter Size</b>	<b>Water</b>	<b>Wastewater</b>	<b>Water &amp; Wastewater</b>
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

Table 7-10 provides an example calculation of the resulting bill impacts from the Board-approved rate structure, ECRC and the Special Charge for residential and non-residential customers. On average, residential customers will experience a 62% increase. For non-residential customers, the percent increase is in the range of about 50% to over 100% in some cases<sup>12</sup>.

<sup>12</sup> Some non-residential customers will experience a higher percentage increase as a result of their consumption profile and over-sized water meters.

**Table 7-10:  
Comparison of Monthly Bills for Existing and Approved Rate Structures**

Consumption m <sup>3</sup>	Total Bill (Previous Rate Structure)	Total New Base & Vol. Charge	ECRC	Special Charge	Total New Bill (Approved Rate Structure)	Difference
<b>Residential with 5/8" Meter Water and Sewer Services</b>						
16	\$32.64	\$34.64	\$13.00	\$2.00	\$49.64	\$17.00
<b>Commercial and Government with 3/4" meter Water and Sewer Services</b>						
45	\$157.73	\$211.04	\$99.00	\$2.00	\$324.04	\$154.31
<b>Industrial with 4" meter Water and Sewer Services</b>						
500	\$2,577.33	\$3,230.56	\$1,679.00	\$2.00	\$4,911.56	\$2,334.23

Based on FY2013 water usage, PRASA's average residential customer consumed 16.35 cubic meters of water. Table 7-11 shows a typical residential bill under the approved water and wastewater rates for 16.35 cubic meters of use. When compared to the 2011 water and wastewater benchmarks, PRASA's average monthly rates currently fall between the median and the top quartile values.

**Table 7-11:  
Average Residential Bill Starting FY2014**

Rate	Water	Wastewater	Water and Wastewater
PRASA (16.35 cubic meters) <sup>1</sup>	\$32.04	\$28.86	\$58.89
<b>2011 Benchmarks<sup>2</sup>: Average Residential Bill for One Month of Service Combined Operations</b>			
Performance Indicator	Bottom Quartile	Median	Top Quartile
<i>Water Service</i>	\$20.17	\$25.86	\$33.59
<i>Wastewater Service</i>	\$21.59	\$28.54	\$38.81

<sup>1</sup>Monthly usage average based on FY2013 results.

<sup>2</sup> Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2011 Annual Survey Data and Analyses Report, AWWA (2013)

### 7.3.1. 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) 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%;

- 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 for requesting a rate increase.

Increases implemented after July 1, 2017 are limited by the calculation of the CAA described in the Resolution. 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 Annual Base Coefficient (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.

Act 21 of 1985, as amended, of the Commonwealth of Puerto Rico requires that PRASA follow and comply with specific requirements in order to modify its rate structure and increase tariffs. The first step requires review and ratification of 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.

#### **7.4. FY2013 Results and FY2014 – FY2018 Forecast**

MPPR/ARCADIS reviewed the PRASA-prepared financial forecast (the Forecast) shown in Exhibit 1 (included at the end of this section). This section summarizes the findings of MPPR/ARCADIS's review and provides an assessment of the reasonableness of PRASA's assumptions in the preparation of the Forecast. The purpose of this review was to assess the sufficiency of the proposed financial plan to provide the revenues necessary to support the projected costs shown in Exhibit 1, including O&M expenses, debt service payments, and required deposits, in compliance with the 2012 MAT and the 2012 FOA. Additionally, the Forecast illustrates the

FY2013 debt service coverage (DSC), and the anticipated DSC for the five fiscal years from July 1, 2013 through June 30, 2018 (the forecast period).

The Forecast represents PRASA's estimate of the most probable results of operations and debt service requirements for the forecast period. Thus, it reflects PRASA's judgment, based upon present circumstances, as to the most likely set of conditions and course of action. MPPR/ARCADIS worked closely with PRASA to obtain the information necessary to support its conclusions regarding the Forecast. The following information, provided by PRASA, was used in this review:

- Amended and restated 2012 MAT
- Amended and restated 2012 FOA
- Audited financial statements for FY2008 to FY2013
- PRASA's FY2014 Annual Budget
- PRASA's FY2014 Projections (through December 31, 2013)
- PRASA's FY2015-FY2018 revenue and expense projections
- Debt service schedules for all currently outstanding debt service and preliminary projected debt obligations

Finally, it should be noted that 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.

#### **7.4.1. Operating Revenues**

As defined in the 2012 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 projections for Operating Revenues, on a cash basis, and associated assumptions are discussed below.

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, and the ECRC. PRASA’s FY2013 revenues from base fee and service charges (Service Revenues) net of subsidies amounted to \$726M. For FY2014 PRASA is projecting Service Revenues of \$1,071M. This increase in Service Revenues is due to the additional projected revenues resulting from the rate increase that was approved by PRASA’s Governing Board, which amounts to \$357M in FY2014. This amount is net of PRASA’s estimated implementation lag adjustments which amount to \$74.1M. PRASA’s Forecast projections for FY2015 through FY2018 include Service Revenues, also net of subsidies, of \$1,145.5M in each year (in future years the lag adjustment of \$74.1M is not applicable; hence projected Service Revenues are higher than in FY2014).

PRASA’s Service Revenue projections are based on certain assumptions regarding customer growth projections and average billed consumption. From FY2004 through FY2013, PRASA experienced a CAGR in number of accounts of approximately 0.27% per year. However, as shown in Table 7-12, from FY2012 to FY2013 the number of customer accounts decreased by 0.07% overall.

**Table 7-12:  
Customer Accounts**

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2012 <sup>1</sup>	1,186,748	57,676	1,041	11,048	1,256,513
FY 2013 <sup>2</sup>	1,186,319	57,344	1,006	11,003	1,255,672
<b>% Difference</b>	<b>-0.04%</b>	<b>-0.58%</b>	<b>-3.36%</b>	<b>-0.41%</b>	<b>-0.07%</b>

<sup>1</sup> Number of accounts by customer class through December 31, 2012.

<sup>2</sup> Number of accounts by customer class through June 30, 2013.

As of December 2013, PRASA had a total of 1,247,517 customer accounts. This represents a further reduction of about 0.64% from FY2013 results. The largest reduction was observed in the number of residential accounts which experienced a reduction of about 0.8% when compared to the December 2012 results. According to the U.S. Census Bureau, there was a 3.7% decline in Puerto Rico’s population between 2000 and 2012.<sup>13</sup> Additionally, both the U.S. Census Bureau and the Puerto Rico Planning Board are projecting that Puerto Rico’s population will continue to decline over the next 10 years at an estimated annual rate of 1.3%. Considering the historically low annual growth rate, the reduction in Puerto Rico’s population, and the slight reduction in number of accounts that occurred from FY2012 to FY2013, PRASA has assumed zero percent (0%) customer growth in each fiscal year of the Forecast.

From FY2004 through FY2013, PRASA experienced a CAGR of -1.12% in average monthly billed consumption and of -1.38% in average monthly consumption per account. However, as shown in Table 7-13, total consumption in FY2013 increased approximately 2.5% compared to FY2012. This increase in consumption represents an increase in the average billed consumption per account of approximately 2.6%, as shown in Table 7-14. This increase could be a result of more accurate metering due to PRASA’s meter replacement program, an increase in customer consumption, or a combination of these factors.

**Table 7-13:  
Average Monthly Billed Consumption by Class FY2012 – FY2013  
(1,000 Cubic Meters)**

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2012 <sup>1</sup>	19,052	3,064	1,212	2,990	26,318
FY 2013 <sup>2</sup>	19,398	3,228	1,250	3,111	26,986
<b>% Difference</b>	<b>1.82%</b>	<b>5.35%</b>	<b>3.14%</b>	<b>4.05%</b>	<b>2.54%</b>

<sup>1</sup> Updated based on actual results for FY2012.

<sup>2</sup> Based on results through June 30, 2013.

**Table 7-14:  
Average Monthly Consumption per Account FY2012 – FY2013  
(Cubic Meters)**

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
FY 2012 <sup>1</sup>	16.05	53.13	1,164.64	270.61	20.95
FY 2013 <sup>2</sup>	16.35	56.29	1,242.54	282.74	21.50
<b>% Difference</b>	<b>1.87%</b>	<b>5.95%</b>	<b>6.69%</b>	<b>4.48%</b>	<b>2.63%</b>

<sup>1</sup> Updated based on actual results for FY2012 and revised number of customer accounts.

<sup>2</sup> Based on results through June 30, 2013.

<sup>13</sup> The U.S. Census Bureau shows Puerto Rico population in 2000 was 3,808,610 and 3,667,084 in 2012.

The average monthly consumption for the July through December 2013 period was about 26.6M cubic meters. This represents an average monthly consumption of about 21.4 cubic meters per customer. When compared to the FY2013 results, both the average monthly consumption and the consumption per customer have decreased by about 1.5% and 0.92% respectively. These reductions, including the reduction in the number of customer accounts, is likely a result of the rate increase implemented on July 15, 2013. However, it should be noted that PRASA's revised rate structure considers a projected reduction in consumption as a result of the increase in water and wastewater rates (elasticity effect). PRASA projected a 5% consumption reduction (equivalent to approximately 15M cubic meters) as a result of the rate increase; as abovementioned, results as of December of 2013 are below this threshold. PRASA's projections assume an annual consumption of about 300M cubic meters per year. Based on the results through December 2013, PRASA is projecting to surpass this amount during FY2014.

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 Program or residents under the TANF Program; both government assistance programs. Also, since FY2010, and in compliance with ACT 69 approved by the Puerto Rico Legislative Assembly in August of 2009, 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 (\$19.71 per month). In total, PRASA offers annual subsidies of approximately \$16M to qualifying customers. Table 7-15 summarizes the number of residential customers that are provided a subsidy for water and wastewater bills as of June 30, 2013.

**Table 7-15:  
Water and Wastewater Subsidized Customer Accounts**

Subsidy	Number of Customers	Percent of Total Residential Customers <sup>1</sup>
PAN Subsidy	44,960	3.8%
TANF Subsidy	12,731	1.1%
Fixed Tariff (Public Housing)	61,261	5.2%
<b>Total</b>	<b>118,952</b>	<b>10.1%</b>

<sup>1</sup>Based on a total number of residential customers of 1,182,724 as of June 30, 2013.

The PAN/TANF programs subsidy for FY2013 projected results amounted to \$4.1M and PRASA is projecting them at \$4.0M in each year thereafter of the Forecast. In recent years, this subsidy has averaged approximately \$3.3M per year. Additionally, PRASA has estimated that the public housing subsidy could amount up to a maximum of about \$12M annually.

MPPR/ARCADIS believes that PRASA's assumptions are reasonable. However, it should be noted that continued strain on the economy and the high unemployment rate in Puerto Rico<sup>14</sup> could cause a decline in the consumption patterns of PRASA customers, resulting in reductions of projected Service Revenues. Also, the rates increase could negatively affect Service Revenues as customers could adopt additional water conservation measures and/or incidences of theft could increase. Hence, results should be closely monitored and projections for subsequent fiscal years shall be adjusted accordingly if necessary. Finally, it should be noted that any changes in the rate increase approved by PRASA's Governing Board could materially affect PRASA's projections for Service Revenues.

2. Transfers to/from the Rate Stabilization Account (Exhibit 1, lines 2 & 3) – In accordance with the 2012 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 to equal to the balance set forth in the annual budget.

PRASA's July 15, 2013 increase is projected to generate excess Service Revenues during FY2014 and FY2015 that PRASA plans to use in future years to meet its operational and debt service obligations. As such, PRASA is projecting to transfer \$63.7M, \$11.1M, and \$4.5M to the Rate Stabilization Account in FY2014, FY2015, and FY2018, respectively. In future years, PRASA projects the following transfers from the Rate Stabilization Account: \$15.2M in FY2016, \$17.8M in FY2017, and \$41.9M in FY2018. MPPR/ARCADIS believes that PRASA's assumptions are reasonable. However, as noted regarding PRASA's Service Revenues, continued strain on the economy and the high unemployment rate in Puerto Rico could cause a decline in the consumption patterns of PRASA customers, resulting in reductions of projected Service Revenues which could negatively impact PRASA's ability to make these transfers. Results should be closely monitored and projections for subsequent fiscal years shall be adjusted accordingly if necessary.

3. Special Charge (Exhibit 1, lines 4) – PRASA's July 15, 2013 increase includes a Special Charge of \$2.00 (refer to Section 7.3 for additional information). PRASA projects that in FY2014 the Special Charge will generate \$18M in revenues (adjusted to account for the rate increase implementation lag equivalent to \$7M); while in future years it will generate about \$25M each year. PRASA is projecting to deposit an equivalent amount into the Capital Improvement Fund. MPPR/ARCADIS believes that PRASA's projections are reasonable.
4. Operational Initiatives (Exhibit 1, lines 5 & 6) – As previously mentioned, PRASA's operational initiatives includes: 1) Revenue Optimization Program which is a set of programs

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<sup>14</sup> Based on the United States Bureau of Labor Statistics, as of June of 2013 the unemployment rate in Puerto Rico was 13.8%, which is 0.4% lower than reported in June of 2012; Source: [www.bls.gov/lau/](http://www.bls.gov/lau/)

implemented by PRASA to increase revenues and collections, and 2) Additional NRW Reduction Initiatives. Table 7-16 presents a summary of the projected revenues to be generated through these initiatives (a detailed breakdown is included in Section 4). These projections have been adjusted to reflect the impact of the rate increase previously discussed.

**Table 7-16:  
Revenue Optimization Program Initiatives FY2013 – FY2018  
(\$, Thousands)**

	<b>FY2013 Actual</b>	<b>FY2014 Projection</b>	<b>FY2015 Projection</b>	<b>FY2016 Projection</b>	<b>FY2017 Projection</b>	<b>FY2018 Projection</b>
Forecast	\$78,206	\$67,615	\$71,976	\$76,728	\$81,204	\$81,322

MPPR/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. As presented in Section 4, FY2013 results show that PRASA collected \$78.2M in additional revenue from these initiatives. This amount is more than budgeted and those results are mostly due to an increase effort in collections from prior years, large meter replacements, and addressing theft and inactive accounts. PRASA reports that in FY2014, the potential revenues from Operational Initiatives (additional billings and collections) could amount to \$87.6M. However, PRASA’s FY2014 Annual Budget and projections only include \$67.6M in revenues from Operational Initiatives. Similarly, PRASA has included a lower amount of revenues from Operational Initiatives in its Forecast considering historical results, the rate increase implementation lag (applicable only to the FY2014 projection) and the effects that the rate increase could have on the Operational Initiatives.

MPPR/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. 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.

5. Adjustment for Uncollectibles (Exhibit 1, line 7) – PRASA’s results for FY2013 include about \$65M in adjustments for uncollectible accounts. This represents a rate of uncollectibles of about 8% of Service Revenues and additional billings from Operational Initiatives. However, considering the FY2013 projected collections of \$44M from prior years’ billings, the total rate for uncollectibles for FY2013 decreases to about 3%. In FY2014, PRASA is projecting that the adjustments for uncollectibles will amount to approximately \$112.2M (10% of Service Revenues and additional billings from Operational Initiatives). PRASA has projected that in FY2015 the adjustment for uncollectibles will amount to 9% of Service Revenues and additional billings from Operational Initiatives; and about 8% in each year thereafter. As such, PRASA’s projections include an adjustment for uncollectible accounts of about \$108M in FY2015, \$96M in FY2016, and \$97M in FY2017 and FY2018.

It should be noted that prior to the 2005/2006 rate increases, PRASA's historical percentage of uncollectible accounts was approximately 4% of 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) settled at about 4% and 3%, respectively.

MPPR/ARCADIS finds PRASA's projected adjustment for uncollectible accounts reasonable. However, considering that the current economic environment and the high unemployment rate in Puerto Rico did not improve in FY2013, and that a rate increase was implemented, MPPR/ARCADIS cautions that the rate for uncollectible accounts could increase beyond the levels current assumed by PRASA. As such, PRASA should closely monitor its rate of uncollectible accounts throughout the fiscal year and the projections for the subsequent years.

6. Miscellaneous Income (Exhibit 1, line 8) – PRASA's FY2013 results from miscellaneous income amounts to \$6.5M. PRASA is projecting \$5M in FY2014 and about \$4M in each year of the Forecast thereafter. Miscellaneous income includes fines, reconnection charges, bulk water sales, other miscellaneous revenues, and interest income. Considering historical results, particularly those of FY2013, MPPR/ARCADIS finds this projection reasonable. However, considering the economic situation and the rate increase, fines should be monitored as the rate of collection may be lower than in previous years.
7. Special Assessments (Exhibit 1, line 9) – PRASA collects revenues from new service installations. This fee is collected from developers and applies to new water and sewer connections to the System. The FY2013 fees were about \$500 each for water and sewer connections (\$1,000 total per unit). 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 next few years.

PRASA's Special Assessments results for FY2013 amounts to approximately \$6.5M. Given the current economic situation and its impact on the local housing market, revenues from these fees have averaged about \$6.0M in recent years (FY2011-FY2013). PRASA is projecting \$4.5M in FY2014 and about \$4M in each year of the Forecast, which is lower than the FY2011-FY2013 average collected of \$6.0M.

Considering PRASA's assumptions, MPPR/ARCADIS finds this projection reasonable. Nevertheless, considering Puerto Rico's housing market recent performance, results should be closely monitored in case economic conditions further deteriorate new developments.

8. Other Income (HUD Transfer + New Sewer Service Collections) (Exhibit 1, line 10) – PRASA has projected to collect additional revenues of \$4.1M in each year of the Forecast from two other income sources. The first, which represents about \$1.6M annually, is the results of an



agreement between PRASA and Puerto Rico's Department of Housing that will grant PRASA an annual transfer of \$1.6M which represents the water subsidy amount provided by the U.S. Department of Housing and Urban Development (HUD) to clients in public housing. The agreement, once signed, will remain in effect indefinitely. As of December 2013, the agreement had not been signed. The second, which represents about \$2.5M annually, results from PRASA's efforts to incorporate and invoice customers that are currently receiving sewer service but are not being billed for it. As of December 2013, PRASA had collected about \$0.9M. Finally, starting in FY2017, PRASA is projecting additional revenues totaling \$8M to be generated from other NRW-related efforts identified during the rate revision process and which are currently in the planning phase.

MPPR/ARCADIS finds these projections reasonable. However, as with the Operational Initiatives described above, PRASA's assumptions for these incremental revenues rely on the effective and timely implementation of these initiatives. 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.

#### **7.4.2. Authority Revenues (Other Sources of Revenues)**

As per the 2012 MAT, the Authority Revenues include all the Operating Revenues (previously discussed) plus other sources of revenues which are not from the System. Other sources of revenue (Exhibit 1, line 16) include: Central Government Appropriations, transfers from non-operating reserves funds, among others.

Since FY2010 PRASA has required other sources of revenues to be able to meet its obligations. Because PRASA delayed implementing a rate increase until FY2014, PRASA has required support from the Central Government for the past three fiscal years. 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 \$95.0M draw from the Budgetary Reserve Fund which was initially funded in FY2012 with bond proceeds from PRASA's 2012 bond issuance.

In order to meet its FY2013 obligations and to comply with the requirements of Section 7.01 of the 2012 MAT, PRASA used \$145M (remaining balance) from the Budgetary Reserve Fund. While no additional transfers to or from the Budgetary Reserve Fund have been identified by PRASA from FY2014 through FY2017, as shown in Exhibit 1, PRASA is projecting an additional revenue need of \$10M in FY2018 from additional external support/other measures which may include, but are not limited to one, or a combination of the following: special assignments from the Central Government, rate increases, and additional revenues from Operational Initiatives.

### 7.4.3. Operating (Current) Expenses

As defined in the 2012 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 2012 MAT, Current Expenses will be calculated on an accrual basis. For all other purposes of the 2012 MAT, Current Expenses will be calculated on a cash basis. Notwithstanding any accounting treatment to the contrary, the amount of any termination or similar payment under any interest rate swap or similar hedge agreement shall, if payable by the Authority, not be taken into account in computing Current Expenses to the extent the same is paid by or on behalf of the Authority from the proceeds of any Indebtedness.”

PRASA’s projections for Operating (Current) Expenses, on an accrual basis, and associated assumptions are discussed below.

1. Payroll and Benefits (Exhibit 1, line 18) – Payroll and Benefits is PRASA’s largest expense category. Over the past five fiscal years, PRASA has averaged approximately \$308M annually for this expense category; with a high of \$336M in FY2008 and a low of \$281M in FY2011. Since FY2009, PRASA has implemented cost control methods to reduce its staff levels and, in turn, Payroll and Benefits costs. As previously discussed, over the past five fiscal years PRASA has reduced its staff levels by about 2.6% each year. While PRASA ended FY2013 with 4,888 employees, this low staff level was mainly due to the one-time increase in personnel retirements, many of which occupied positions that PRASA will need to replace. PRASA projects that staff levels will increase to about 5,373 during FY2014. This increase considers the replacement of certain retired personnel and additional hires to reduce overtime costs, which is expected to result in an annual saving for PRASA of about \$8M. PRASA projects that staff levels will remain at this level over the rest of the forecast period. As reported by PRASA, its staff levels as of December 2013 totaled 5,113 which is about 260 less employees than budgeted for FY2014.

PRASA’s FY2013 results for Payroll and Benefits amount to \$302.3M, which is \$1.9M higher than the budgeted amount. This negative deviation was due mostly to additional overtime expenses. In FY2014, PRASA is projecting Payroll and Benefits expenses in the amount of \$316.4M. Considering the increase in staff levels, the impact of the CBAs that were signed during FY2012 with the UIA-AAA and HIEPAAA, and the increase in the employer’s contributions to the Retirement System, PRASA is projecting an annual increase in Payroll and Benefits costs of about 2.5% per year in each year of the Forecast thereafter. Hence, PRASA is projecting Payroll and Benefits expenses of \$328.9M for FY2015, \$338.3M for FY2016, \$347.3M for FY2017, and \$356.3M for FY2018. Based on the historical results and the

assumptions made by PRASA in its projections, MPPR/ARCADIS believes these projections are reasonable. However, PRASA should closely monitor the overtime costs to assure that the expected reductions to be achieved through the new personnel to be hired are realized.

2. Electric Power (Exhibit 1, line 19) – Electric Power is PRASA’s second largest expense category. PRASA’s FY2013 results for Electric Power amounts to \$209.2M, which is about \$35.8M higher than the budgeted amount. This negative deviation is due to the high costs of energy provided by PREPA as the savings projected due to the conversion from oil to gas for electric generation were not reflected on PREPA invoices. The average cost during FY2013 was about \$0.28 per kWh, however, in future years, PRASA’s Electric Power costs will be significantly reduced considering the projected impact of the PRASA’s preferential electricity all-in-rate discussed in Section 4; and the projected results of the Comprehensive Energy Management Program.

For FY2014, PRASA is projecting Electric Power expenses at about \$175.4M. Although PRASA is committed to reducing its Electric Power consumption over the forecast period, PRASA has included in its projections an increase of about 1% per year in consumption (this assumption is lower than the FY2004-FY2013 historical Electric Power consumption CAGR of 2%). Also, PRASA is projecting that the cost per kWh will increase at a rate of 5% per year over the \$0.22 per kWh established by law (applicable only to the excess amount consumed over the allotted 750 million kWh under the preferential all-in-rate). Hence, for FY2015 and FY2016, PRASA has projected that Electric Power costs will amount to \$176.7M and \$186.4M, respectively. PRASA has included in its projection for FY2017 and FY2018 the second phase of the preferential all-in-rate which reduces the cost per kWh down to \$0.16 for the first 750 million kWh of consumption. Similarly, PRASA has assumed that consumption will continue to increase at a rate of 1% per year, and that cost per kWh of the excess consumption will also increase at a rate of about 5% per year. Hence, for FY2017 and FY2018, PRASA has projected that Electric Power costs will amount to \$125.4M and \$132.2M, respectively. The second phase of the preferential electricity all-in-rate is expected to save PRASA about \$45M; in turn, PRASA is projecting to deposit an equivalent amount into the Capital Improvement Fund to partially fund CIP projects.

MPPR/ARCADIS finds these projections reasonable considering the implementation of the preferential all-in-rate, which helps stabilize PRASA’s Electric Power costs going forward; PRASA’s relatively low historical annual consumption growth rate; and other key assumptions discussed above.

3. Maintenance and Repair (Exhibit 1, line 20) – PRASA’s FY2013 results for Maintenance and Repair expenses amount to \$45.2M, which is \$4M higher than the budgeted amount. PRASA is projecting \$51.2M for Maintenance and Repair expenses for FY2014. This increase is due to one-time costs related to the dredging of the Superaqueduct WTP sludge lagoons, estimates

provided by the Regional Operational Directors as to the amounts required to maintain and repair the System, and to conduct some additional maintenance and repairs and compliance monitoring at the Puerto Nuevo WWTP as part of primary treatment waiver requirements (301h waiver) granted by the USEPA. PRASA has included a 3% increase to account for inflation in each year thereafter of the Forecast. MPPR/ARCADIS believes these projections are reasonable.

4. Chemicals (Exhibit 1, line 21) – PRASA’s FY2013 results for Chemical expenses amount to \$28.9M. PRASA is projecting \$33.4M for Chemical expenses in FY2014. This projection represents an increase of approximately \$4.5M over the FY2013 projected result. It should be noted that this amount includes the Chemical costs for the Superaqueduct System facilities, which were previously included in the Superaqueduct O&M Contract Fee expense category. Chemical costs are usually affected by inflation and worldwide demand as they are mostly commodities. The CAGR for the past five fiscal years for chemical costs has been about 3% per year. PRASA has included a 3% annual increase starting on FY2015 and in each year thereafter. Based on results in previous years and considering that PRASA does not expect significant changes in its chemical usage pattern over the forecast period, MPPR/ARCADIS believes these projections are reasonable.
  
5. Superaqueduct O&M Contract Fee (Exhibit 1, line 22) – Over the past 10 years, and up until FY2011, the Superaqueduct had been managed and operated by Thames-Dick Superaqueduct Partners, PSC (Thames-Dick) under a contract agreement with PRASA (the Master Agreement). Thames-Dick’s compensation included two main components: a fixed fee for operation and management activities, which included Thames-Dick’s gross margin (approximately \$2M); and the pass-through of operation and maintenance expenses. These pass-through expenses included: power and fuel, chemical, insurance, contingencies, and lagoon cleaning costs. The Master Agreement between Thames-Dick and PRASA was resolved by the parties pursuant to a Resolution Agreement dated May 18, 2011. The decision was made based on business and policy reasons, mutually agreed by the parties, and not based on their respective performance or existing claims.

Since June 19, 2011, PRASA has continued to subcontract the Superaqueduct’s O&M services to a local private operator. PRASA has modified the Superaqueduct cost center and only the costs associated with the O&M contract fee are included in this expense category. All costs that were previously considered as pass-through costs (electricity, chemicals, spare parts, equipment, etc.) have been appropriately accounted for in the respective operational expense categories. FY2013 results amount to \$5.7M for the Superaqueduct O&M. Based on these results, in FY2014 PRASA budgeted \$5.7M for the Superaqueduct expense. In future years, PRASA projects that this amount will increase at a rate of 3% per year. In August of 2013 PRASA completed an RFP process for the O&M of the Superaqueduct System that yielded additional projected savings of at least \$1.5M in this expense category which are not accounted

for in PRASA's projections. The new contract operator commenced services on October 1, 2013. Considering this, MPPR/ARCADIS believes these projections to be reasonable.

6. Insurance (Exhibit 1, line 23) – Results for Insurance expenses in FY2013 totaled \$9.5M. PRASA is projecting \$9.5M for insurance expenses in FY2014 and has included a costs increase of 3% per year after FY2014. PRASA does not project major policy and coverage changes over the Forecast. MPPR/ARCADIS believes the projections for this expense category are reasonable; however, to the extent that PRASA elects to adopt some or all of the recommendations provided by AON (see Section 6), Insurance costs may vary in future years and projections may need to be adjusted.
  
7. Other Expenses (Exhibit 1, lines 24) – Other Expenses include several costs associated with the O&M of the System, including: materials and replacements, supplies, security, treatment of residuals and rentals, and water transport, among others. Over the past five fiscal years, PRASA has averaged approximately \$125M in Other Expenses per year. FY2013 results for Other Expenses total \$124.2M. PRASA is projecting \$146.4M for Other Expenses for FY2014, which represents an increase of almost 17.9% over FY2013 results. This increase in Other Expenses is a result of higher expected expenditures in: materials and replacements, professional services, technical assistance contracts, systems and information technology, security, and an increase in sludge disposal costs. Also, PRASA has included budget for its leak detection and reduction program (discussed in Section 4.5.2.4). For FY2015 and years thereafter, PRASA has assumed that this expense category will increase at a rate of 3% per year. MPPR/ARCADIS believes the projections for this expense category are reasonable considering historical results.
  
8. Capitalized Expenses (Exhibit 1, line 25) – Although PRASA had assumed a 5.7% of Operational Expenses would be capitalized in FY2013, PRASA's results were closer to a 5.1%. PRASA's external consultant completed the review of PRASA's capitalization rate and issued an update to the 2007 Asset Capitalization Report<sup>15</sup>. Based on the recommendations included in the report, PRASA should use a capitalization rate of 5.1%. Hence, for FY2014 and in each year of the Forecast thereafter, PRASA has projected 5.1% of Operational Expenses will be capitalized. MPPR/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. MPPR/ARCADIS has not reviewed this estimation in detail and, as such, is not providing an opinion on the reasonability of the recommended capitalization percentage.

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<sup>15</sup> Report prepared by PJ Sun, LLC



## 7.5. Funding of PRASA CIP

PRASA is projecting capital investment expenditures of \$1,423.1M from FY2014-FY2018. Projected sources of funds for the same period total \$1,450.1M. Table 7-17 provides a summary of the CIP uses of funds along with the anticipated sources of funding (as approved by PRASA's Governing Board).

**Table 7-17:  
CIP Projected Uses and Sources of Funds (\$, Thousands)**

	FY2014 Projection	FY2015 Projection	FY2016 Projection	FY2017 Projection	FY2018 Projection	TOTAL
<b><u>USES OF FUNDS<sup>1</sup></u></b>						
Repair & Replacement of Fixed Assets	\$27,758	\$51,598	\$46,437	\$47,040	\$51,180	\$224,013
CIP Infrastructure Projects	314,659	356,855	235,236	162,503	130,024	1,199,277
<b>Total Projected Capital Expenses (Uses)</b>	<b>\$342,237</b>	<b>\$408,453</b>	<b>\$281,673</b>	<b>\$209,543</b>	<b>\$181,204</b>	<b>\$1,423,146</b>
<b><u>SOURCES OF FUNDS</u></b>						
Surplus Cash Available from CIP	\$2,719	\$6,337	\$4,117	\$6,231	\$4,218	\$23,622
Federal Funds – Rural Development Funds	15,000	15,000	15,000	15,000	15,000	75,000
Federal Funds – State Revolving Funds	45,084	49,200	46,754	40,000	40,000	221,038
Deposit in CIP Fund (from \$2 Special Charge and \$50M EPC Funds)	25,771	27,033	27,033	27,530	28,112	135,479
Deposit in CIP Fund (from PREPA Preferential Rate Phase 2 Savings)	-	-	-	45,000	45,000	90,000
Bonds Proceeds / Interim Financing	260,000	315,000	195,000	80,000	55,000	905,000
<b>Total Sources of Funds</b>	<b>\$348,574</b>	<b>\$412,570</b>	<b>\$287,904</b>	<b>\$213,761</b>	<b>\$187,330</b>	<b>\$1,450,139</b>

<sup>1</sup> Includes the Expenses Capitalized to CIP costs; numbers may not add due to rounding.

As shown in Table 7-17 above, the distribution of CIP sources of funds projected in the forecast period are as follows: 62.4% from bond proceeds and/or interim financing; 20.4% from Federal Funds (State Revolving Fund, Rural Development bonds, American Recovery and Reinvestment Act, and other matching sources); 15.6% from special charges and the projected savings resulting from the second phase of the PREPA preferential rate; and the remaining 1.6% from surplus cash available from unused CIP funds. PRASA plans to satisfy the Capital Improvement Fund requirement for FY2014 with revenues generated from the \$2.00 Special Charge, federal funds, and a facility with a private bank. This facility will expire in FY2015; at such time it is expected that PRASA will either renew the facility or issue bonds to settle the facility. However, given current market conditions and PRASA's fiscal situation, it is possible that the projected future bond



issuances will not occur as projected. In such case, PRASA would likely have to work with the GDB or with private banks to secure the necessary interim financing to continue its CIP implementation.

## **7.6. Debt Service**

### **7.6.1. Master Agreement of Trust**

The 2012 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, PRASA has covenanted to establish and collect rates, fees and charges so that it meets the following four independent requirements<sup>16</sup> (which will be calculated annually no later than six months after the end of each fiscal year based on Operating Revenues and Authority Revenues set forth in PRASA's most recent audited financial statements):

- Operating Revenues shall be at least equal to 250% of annual debt service with respect to Senior Indebtedness for the current fiscal year;
- Operating Revenues shall 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 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 in each fiscal year 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 2012 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 2012 MAT is outstanding, the additional bonds test (ABT) requirements of the 2012 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

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<sup>16</sup> Capitalized terms as defined in the 2012 MAT.

bonds are issued. The modified ABT requirements which PRASA must meet (under the 2012 MAT) 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.

A summary of PRASA’s 2012 MAT DSC and ABT requirements is presented in Table 7-18 below.

**Table 7-18:  
Summary of 2012 MAT DSC Requirements**

Lien Level	Debt Secured	DSC for Additional Bonds Test (MADS)	DSC for Covenant Test	In Default if DSC not Achieved?
Senior	2008 & 2012 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

<sup>1</sup> 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 2012 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;
  - Current Expense Fund (a new fund under the 2012 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.

Exhibit 1 presents the PRASA-prepared Forecast and shows the calculation of the DSC, under the 2012 MAT, for the forecast period. The major assumptions used to develop the revenues and expenses included in the calculation of DSC were discussed in the preceding subsections and are reflected in Exhibit 1. Debt service requirements in PRASA’s Forecast include current debt and projected future bond issuances that are expected to be necessary to finance the CIP. PRASA has assumed a 9% interest rate (plus issuance costs) and a 30-year amortization period on projected (future) bond issuances. A summary of the projected debt service for the forecast period is presented in Table 7-19.

**Table 7-19:  
FY2013 – FY2018 Projected Debt Service (\$, Thousands)**

Debt Service Level	FY2013 Results	FY2014 Projection	FY2015 Projection	FY2016 Projection	FY2017 Projection	FY2018 Projection
Senior Debt	\$90,600	\$193,246 <sup>1</sup>	\$299,827	\$306,713	\$314,985	\$320,824
Senior Subordinate Debt	-	-	-	-	-	-
Subordinate Debt	-	-	-	-	-	-
Commonwealth Guaranteed Indebtedness	75,392	83,108	86,477	89,470	92,882	93,827
Commonwealth Supported Obligations	-	-	1,594	8,999	8,999	8,999
<b>Total</b>	<b>\$165,992</b>	<b>\$276,354</b>	<b>\$387,898</b>	<b>\$405,182</b>	<b>\$416,866</b>	<b>\$423,650</b>

<sup>1</sup>Projected debt service amount due of \$236.9M reduced by \$43.6M existing deposit (made in FY2013) in the Senior Bond Fund.

Table 7-20 summarizes PRASA's projected DSC over the forecast period (as shown in Exhibit 1). The projected DSC results for the forecast period have been calculated using the Rate Covenant requirements as per the 2012 MAT.

**Table 7-20:  
FY2013 – FY2018 Debt Service Coverage**

Debt Service Level	DSC Requirement	FY2013 Results	FY2014 Projection	FY2015 Projection	FY2016 Projection	FY2017 Projection	FY2018 Projection
Senior Debt <sup>1</sup>	2.50	8.38	5.15	3.79	3.84	3.79	3.78
Senior Subordinated Debt <sup>1</sup>	2.00	8.38	5.15	3.79	3.84	3.79	3.78
Subordinated Debt <sup>1</sup>	1.50	8.38	5.15	3.79	3.84	3.79	3.78
All Obligations <sup>2</sup>	1.00	1.05	1.00	1.00	1.00	1.00	1.00

<sup>1</sup>DSC calculated with respect to Operating Revenues.

<sup>2</sup>DSC calculated with respect to Authority Revenues.

As shown in Table 7-20 above, forecasted Operating and Authority Revenues should be sufficient to meet all DSC requirements through FY2018. The coverage ratios for Senior, Senior Subordinated, and Subordinated level debt are primarily driven by the projected higher Service Revenues which include the July 15, 2013 rate increase. It should also be noted that the difference in coverage ratios between FY2013 and FY2014 is a result of PRASA's interest capitalization of the 2012 bond debt. Starting in FY2014, PRASA will begin debt service payments on both principal and interests owed on these bonds; hence the projected increase in debt service obligations and the decrease in DSC.

## 7.7. Reserve Funds

### 7.7.1. Debt Service Reserve Funds

In accordance with the 2012 MAT, 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.

Requirements for debt service reserve funds for FY2014, as calculated by PRASA and reviewed by Banco Popular de Puerto Rico as Trustee, were provided to MPPR/ARCADIS. FY2014 budgeted debt service costs include the required contributions to the debt service reserves which were originally created and funded with 2008 bond proceeds. Similarly, PRASA projects to contribute the necessary additional funds in each of these reserves over the forecast period.

### **7.7.2. Operating Reserve Fund**

In accordance with the 2012 MAT, an Operating Reserve Fund must be established in the amount of \$150M until March 1, 2013; 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.

PRASA has established and continues to maintain a line of credit on deposit with the GDB to ensure the Operating Reserve Fund will be in compliance with the 2012 MAT requirements. In February of 2012, in connection with its bond issuance, PRASA renewed its line of credit with the GDB through June 30, 2016, and increased it from \$150M to \$180M in order to adequately meet requirement (i) above.

### **7.7.3. Capital Improvement Fund**

In accordance with the 2012 MAT, a Capital Improvement Fund must be established and funded for each fiscal year, for the purpose of partially or entirely funding the annual CIP, in an amount equal to the greater of:

- (i) The amount set forth in the annual budget for such fiscal year, or

- (ii) The amount recommended by the Consulting Engineer.

Equal monthly deposits over the fiscal year must be deposited to the Fund to make the balance of the Fund equal to the 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.

In FY2013 PRASA deposited \$300M of the proceeds from its 2012 bond issue in the Capital Improvement Fund. This amount was used to partially finance the CIP in FY2013. In FY2014, PRASA will fund its CIP with a private bank facility and with federal funds, as previously mentioned. PRASA's projections include additional deposits to the Capital Improvement Fund in each year of the Forecast. A summary of these deposits is provided in Table 7-21.

**Table 7-21:  
Projected Deposits to the Capital Improvement Fund (\$, Thousands)**

Fiscal Year	Deposit Amount	Funding Source
2014	\$18,000	Special Charge (\$2)
2015	\$25,000	Special Charge (\$2)
2016	\$25,000	Special Charge (\$2)
2017	\$70,000	\$25M Special Charge (\$2) \$45M in Savings from Electric Power Preferential Rate
2018	\$70,000	\$25M Special Charge (\$2) \$45M in Savings from Electric Power Preferential Rate

#### **7.7.4. 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 1<sup>st</sup> 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 (for example, in FY2013 the Commonwealth will request an appropriation or funding source sufficient to cover the estimated Budgetary Reserve Requirement for FY2014) 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 1<sup>st</sup>.

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, in order 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 in order to implement the necessary rate increase which would allow it to meet all its obligations over the forecast period.

## 7.8. Sensitivity Analysis

MPPR/ARCADIS performed a sensitivity analysis of PRASA's Forecast. The objective of the sensitivity analysis is to demonstrate the impact that a change in certain Forecast assumptions will have on PRASA's projected financial results and DSC. Any positive deviations from the Forecast will increase PRASA's DSC results presented in Table 7-20. Positive budget deviations could be achieved by reducing the projected rate of uncollectibles (increasing Operating Revenues) and/or reducing Operating Expenses, among others. However, any negative deviations from the Forecast will decrease PRASA's DSC and limit PRASA's ability to meet its obligations. Hence, the focus of this sensitivity analysis is to demonstrate the impact that negative deviations of PRASA's projections could have on its Forecast.

MPPR/ARCADIS evaluated the potential effects on PRASA's projected financial results of negative projection deviations in the following revenue and expense categories: Service Revenues, Rate of Uncollectibles, and Payroll and Benefits. MPPR/ARCADIS also evaluated the effect that higher interest rates in future debt issuances could have on PRASA's debt service obligations and DSC.

- *Lower Service Revenues* – Holding all other Forecast assumptions constant, a 1% reduction (equivalent to about \$11M) in Service Revenues in each year of the Forecast would result in an accumulated revenue shortfall of about \$51.7M by FY2018 after all obligations and projected deposits/transfers. This could reduce PRASA's ability to make the deposits into the Capital Improvement Fund and/or transfers to the Rate Stabilization Account as projected for the forecast period. Also, the DSC for Senior Lien Bonds would be slightly reduced by about 0.05x (5%) in FY2014 and 0.03x (3%) in FY2015 through FY2018.

- *Higher Adjustment for Uncollectibles (Rate of Uncollectibles)* – Holding all other assumptions constant, an increase of 1% (equivalent to about \$12M) each year in the rate of uncollectibles would result in an accumulated revenue shortfall of about \$59.5M by FY2018 after all obligations and projected deposits/transfers. This could reduce PRASA’s ability to make the deposits into the Capital Improvement Fund and/or transfers to the Rate Stabilization Account as projected for the forecast period. Also, the DSC for Senior Lien Bonds would be slightly reduced by about 0.06x (6%) in FY2014 and 0.04x (4%) in FY2015 through FY2018.
- *Higher Payroll and Benefits* – Holding all other assumptions constant, if PRASA hires the projected personnel in FY2014 and the overtime cost reductions (approximately \$8M) to be achieved through the hiring of this personnel are not realized, an accumulated net revenue shortfall of about \$38M (after all obligations and projected deposits/transfers ) could result by FY2018. Although this could not reduce the DSC for Senior Lien Bonds, it would decrease the revenues available to meet DSC on all of its Indebtedness, and/or it would limit PRASA’s ability to make the deposits into the Capital Improvement Fund and transfers to the Rate Stabilization Account as projected for the forecast period. The DSC for all Indebtedness would be reduced by about 0.01x (1%) in each year of the Forecast, starting on FY2014.
- *Higher Interest Rates on Future Bond Issuances* – Holding all other assumptions constant, a 12% interest rate (inclusive of issuance costs) for future bond issuances, instead of PRASA’s assumed 9%, could result in an increase in debt service obligations of about \$10M in FY2015 and up to \$16M in FY2018; which translate into an accumulated revenue shortfall of about \$55.7M by FY2018. This increase in debt service obligations would decrease the DSC by about 0.13x (13%) in FY2015 up to 0.18x (18%) in FY2018.

In the case that one, or a combination of these scenarios occurs, PRASA’s ability to meet the DSC on all of its Indebtedness or the projected deposits to the CIP Fund and Rate Stabilization Account over the Forecast period could be affected as noted above. Event though, as stated in the MAT, this would not cause an Event of Default, it would require PRASA to implement one or a combination of the following measures: 1) reduce the projected deposit amounts to the CIP Fund and/or Rate Stabilization Account, 2) identify and appropriate other sources of revenues, or 3) increase rates.

## 7.9. Conclusions

Overall, PRASA’s Forecast is reasonable based on recent historical performance. Also, PRASA’s approved rate structure is adequate. MPPR/ARCADIS conducted an analysis to stress PRASA’s Forecast and determine how sensitive it is to changes in certain critical assumptions including Service Revenues, Rate of Uncollectibles, Payroll and Benefits, and interest rates of future bond issuances.

PRASA's Forecast adequately meets all DSC requirements for each fiscal year. However, as shown in the sensitivity analysis, PRASA's Forecast is very sensible to deviations in the critical assumptions previously listed and projected deposits to certain accounts and/or DSC could be affected. Therefore, the probability of PRASA achieving its Forecast and meeting its DSC requirements throughout the forecast period is conditioned on the following key assumptions:

1. **PRASA's ability to maintain its Service Revenues in a very challenging economic environment** – Continued uncertainty and strain on the economy could cause a decline in the consumption patterns of PRASA customers and could affect PRASA's collections. Also, as a consequence of the rate increase, customers could assume water conservation measures and/or theft occurrences could increase, which could also result in a reduction in consumption and/or an increase in the rate of uncollectibles. Although PRASA's revised rate structure considers a projected reduction in consumption as a result of the increase in water and wastewater rates (elasticity effect), projected Operating Revenues could be materially affected if the projected population and/or consumption levels decrease at a higher rate than expected.
2. **PRASA's ability to continue to successfully implement all of its Operational Initiatives** – PRASA's Forecast includes results from select Operational Initiatives that are described throughout this report. The Forecast also includes certain revenue enhancing and cost reduction initiatives that are currently underway. MPPR/ARCADIS's conclusions regarding the Forecast assume the framework and execution of the Operational Initiatives will not materially change; any changes could significantly alter the findings contained and presented in this report. Although PRASA has made a dedicated 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 will not be achieved.
3. **PRASA's ability to secure future CIP financing sources (i.e., issues bonds) at an affordable cost** – PRASA's Forecast assumes that PRASA will be able to secure future financing from either interim sources or through bond issuances to finance its CIP. However, given Puerto Rico's current economic and fiscal situation there is a possibility that the projected bond issuances and, more specifically the timing of these, and/or the assumed issuance terms will not be achieved. In this case PRASA would need to implement one, or a combination of the following measures: a) reduce its CIP spending, b) increase Operating and/or Authority Revenues (seek additional support from the Central Government, increase rates, etc.), or c) decrease its Operating Expenses.

Considering the overall conclusions presented above, MPPR/ARCADIS recommends the following with regards to PRASA's Forecast:

1. PRASA must continue the implementation and monitoring of Operational Initiatives so that adjustments, if needed, are made on a timely basis to both the program's operational elements

and budget projections. If results are not achieved as projected over the course of each fiscal year, PRASA should consider:

- Re-assessing the implementation and performance of Operational Initiatives.
  - Enforcing additional cost reduction and cost control measures in O&M expense categories by administrative orders (if necessary) from PRASA's Executive President; these include Payroll and Benefits, Maintenance and Repair, and Chemical costs.
2. PRASA should also continue to focus on achieving, and accelerating to the extent possible, the implementation of all of its planned revenue enhancing and cost reducing initiatives on a timely manner to mitigate (reduce) any possible increases in the rate of uncollectibles or reduction in consumption as a result of the rate increase.
  3. PRASA should evaluate additional opportunities to reduce or differ the implementation of some of its current CIP commitments over a longer period of time so that its associated debt service requirements increase in a more gradual manner than as currently projected.
  4. PRASA should fast track the implementation of the organizational assessment recommendations in order to capitalize on the expected cost reductions in its Payroll and Benefits earlier on in the forecast period.

**FINAL**  
**Section 7**  
**System Assets and Financial Analysis**

**EXHIBIT 1**

<b>PRASA FINANCIAL FORECAST PRO FORMA*</b> <b>(\$, Thousands)</b>	<b>FY2013 RESULTS</b>	<b>FY2014 PROJECTION</b>	<b>FY2015 PROJECTION</b>	<b>FY2016 PROJECTION</b>	<b>FY2017 PROJECTION</b>	<b>FY2018 PROJECTION</b>
<b>OPERATING REVENUES</b>						
1. Service Revenues (Base Fee and Service Charges, Net of Subsidies) <sup>b</sup>	\$725,603	\$1,071,433	\$1,145,520	\$1,145,520	\$1,145,520	\$1,145,520
2. Transfer to Rate Stabilization Account	-	(63,697)	(11,146)	-	-	(4,549)
3. Transfer from the Rate Stabilization Account	-	-	-	15,153	17,838	41,852
4. Special Charges	-	18,000	25,000	25,000	25,000	25,000
5. Operational Initiatives - Additional Billings	41,955	50,470	54,781	59,775	64,579	65,909
6. Operational Initiatives - Collections from Prior Years	44,242	17,132	17,195	16,953	16,625	15,413
7. Adjustment for Uncollectibles	(65,430)	(112,190)	(108,027)	(96,424)	(96,808)	(96,914)
8. Miscellaneous Income	6,465	5,000	4,000	4,000	4,000	4,000
9. Special Assessments	6,537	4,500	4,000	4,000	4,000	4,000
10. Other Income (HUD Transfer + New Sewer Service Collections)	-	4,100	4,100	4,100	12,100	12,100
<b>11. Total Operating Revenues [Sum Lines 1-10]</b>	<b>\$759,372</b>	<b>\$994,748</b>	<b>\$1,135,423</b>	<b>\$1,178,077</b>	<b>\$1,192,854</b>	<b>\$1,212,331</b>
<b>OTHER REVENUES</b>						
12. Other Sources of Revenue	-	-	-	-	-	-
13. Transfer from Budgetary Reserve Fund	\$145,000	-	-	-	-	-
14. General Fund Contributions	-	-	-	-	-	-
15. Additional External Support/Other Measures	-	-	-	-	-	10,000
<b>16. Total Other Sources of Revenue [Sum Lines 13-15]</b>	<b>\$145,000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>\$10,000</b>
<b>17. Total Authority Revenues [Line 11+ Line 16]</b>	<b>\$904,372</b>	<b>\$994,748</b>	<b>\$1,135,423</b>	<b>\$1,178,077</b>	<b>\$1,192,854</b>	<b>\$1,222,331</b>
<b>OPERATING EXPENSES</b>						
18. Payroll and Benefits	\$302,272	\$316,383	\$328,932	\$338,268	\$347,263	\$356,258
19. Electric Power	209,168	175,395	176,721	186,436	125,382	132,160
20. Maintenance and Repair	45,214	51,217	52,754	54,336	55,966	57,645
21. Chemicals	28,872	33,412	34,414	35,447	36,510	37,606
22. Superaqueduct O&M Contract Fee	5,679	5,733	5,905	6,082	6,265	6,453
23. Insurance	9,493	9,495	9,780	10,073	10,375	10,687
24. Other Expenses	124,217	146,398	152,848	157,444	162,166	167,032
25. Capitalized Operating Expenses	(30,181)	(37,640)	(38,829)	(40,192)	(37,940)	(39,160)
<b>26. Total Operating Expenses [Sum Lines 18-25]</b>	<b>\$694,734</b>	<b>\$700,393</b>	<b>\$722,525</b>	<b>\$747,894</b>	<b>\$705,988</b>	<b>\$728,681</b>
<b>DEBT SERVICE</b>						
27. Senior Lien Debt Service (S, SSub,Sub)	\$90,600	\$193,246	\$299,827	\$306,713	\$314,985	\$320,824
28. Subordinated Debt Service (CGI & CSO)	75,392	83,108	88,071	98,469	101,881	102,826
<b>29. Total Debt Service [Line 27+Line 28]</b>	<b>\$165,992</b>	<b>\$276,354</b>	<b>\$387,898</b>	<b>\$405,182</b>	<b>\$416,866</b>	<b>\$423,650</b>
<b>DEPOSITS</b>						
30. Deposit to the Senior Bond Fund	(\$43,646) <sup>c</sup>	-	-	-	-	-
31. Deposit to the Senior Subordinate Bond Fund	-	-	-	-	-	-
32. Deposit to the Subordinate Bond Fund	-	-	-	-	-	-
33. Deposit to the Current Expense Fund	-	-	-	-	-	-
34. Deposit to the Operating Reserve Fund	-	-	-	-	-	-
35. Deposit to the Capital Improvement Fund	-	(18,000)	(25,000)	(25,000)	(70,000)	(70,000)
36. Deposit to the Commonwealth Payments Fund	-	-	-	-	-	-
37. Deposit to the Surplus Fund	-	-	-	-	-	-
<b>38. Total Deposits [Sum Lines 30-37]</b>	<b>(\$43,646)</b>	<b>(\$18,000)</b>	<b>(\$25,000)</b>	<b>(\$25,000)</b>	<b>(\$70,000)</b>	<b>(\$70,000)</b>
<b>39. Net Authority Revenues After Obligations and Deposits</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>DEBT SERVICE PAYMENTS DUE</b>						
40. Senior (S), Net of Deposits in Senior Bond Fund	\$90,600	\$193,246 <sup>c</sup>	\$299,827	\$306,713	\$314,985	\$320,824
41. Senior Subordinated (SSUB), Net of Deposits in Senior Subordinated Bond Fund	-	-	-	-	-	-
42. Subordinated (SUB), Net of Deposits in Subordinated Bond Fund	-	-	-	-	-	-
43. Commonwealth Guaranteed Indebtedness (CGI), Net of Deposits in the Commonwealth Payments Fund	75,392	83,108	86,477	89,470	92,882	93,827
44. Commonwealth Supported Obligations (CSO), Net of Deposits in the Commonwealth Payments Fund	-	-	1,594	8,999	8,999	8,999
<b>45. Total Debt Service, Net of Existing Deposits [Sum Lines 40-44]</b>	<b>\$165,992</b>	<b>\$276,354</b>	<b>\$387,898</b>	<b>\$405,182</b>	<b>\$416,866</b>	<b>\$423,650</b>

<sup>a</sup> Numbers may not add up due to rounding.

<sup>b</sup> Base Fee and Service Charges from FY2014 onward, reflect PRASA's July 15, 2013 rate increase.

<sup>c</sup> Debt Service Amount Due of \$236.8M reduced by \$43.6M deposit (made in FY2013) to the Senior Bond Fund (see Line 30).



**FINAL**  
Section 7  
System Assets and Financial Analysis

**EXHIBIT 1**

PRASA FINANCIAL FORECAST PRO FORMA DEBT SERVICE COVERAGE <sup>a</sup> (\$, Thousands)	FY2013 RESULTS	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION	FY2018 PROJECTION
1. Operating Revenues (Net of Transfers to Rate Stabilization Account) <sup>b</sup>	\$759,372	\$994,748	\$1,135,423	\$1,178,077	\$1,192,854	\$1,212,331
2. Other Sources of Revenue	145,000	-	-	-	-	10,000
3. Authority Revenues [Line 1 + Line 2] <sup>b</sup>	\$904,372	\$994,748	\$1,135,423	\$1,178,077	\$1,192,854	\$1,222,331
4. Senior Debt						
5. Annual Debt Service	\$90,600	\$193,246 <sup>c</sup>	\$299,827	\$306,713	\$314,985	\$320,824
6. <b>DS Coverage Required = 2.50</b>	<b>8.38</b>	<b>5.15</b>	<b>3.79</b>	<b>3.84</b>	<b>3.79</b>	<b>3.78</b>
7. Senior & Senior Subordinated Debt						
8. Annual Debt Service	\$90,600	\$193,246 <sup>c</sup>	\$299,827	\$306,713	\$314,985	\$320,824
9. <b>DS Coverage Required = 2.00</b>	<b>8.38</b>	<b>5.15</b>	<b>3.79</b>	<b>3.84</b>	<b>3.79</b>	<b>3.78</b>
10. Senior, Subordinated Subordinated & Subordinated Debt						
11. Annual Debt Service	\$90,600	\$193,246 <sup>c</sup>	\$299,827	\$306,713	\$314,985	\$320,824
12. <b>DS Coverage Required = 1.50</b>	<b>8.38</b>	<b>5.15</b>	<b>3.79</b>	<b>3.84</b>	<b>3.79</b>	<b>3.78</b>
13. Operating Expenses	\$694,734	\$700,393	\$722,525	\$747,894	\$705,988	\$728,681
14. Total Subordinated Debt	75,392	83,108	88,071	98,469	101,881	102,826
15. Total Deposits to Capital Improvement Fund	-	18,000	25,000	25,000	70,000	70,000
<b>Authority Revenues / All Obligations</b>						
16. <b>DS Coverage Required = 1.00</b>	<b>1.05</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>

<sup>a</sup> Numbers may not add up due to rounding.

<sup>b</sup> Operating and Authority Revenues from FY2014 onward, reflect PRASA's July 15, 2013 rate increase.

<sup>c</sup> Debt Service Amount Due of \$236.8M reduced by \$43.6M deposit (made in FY2013) to the Senior Bond Fund.



## 8. Conclusions and Recommendations

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### 8.1. Considerations and Assumptions

In preparation of this report and the conclusions contained herein, MPPR/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. MPPR/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 forecast.

In the preparation of this report, MPPR/ARCADIS has made a number of considerations and assumptions (as provided throughout this report); some of the most notable are as follows:

1. MPPR/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, MPPR/ARCADIS has assumed that all such contracts, agreements, laws, rules and regulations will be fully enforceable in accordance with their terms.
2. PRASA will generally 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, and the CIP will be largely implemented as planned and reflected in this report.

Set forth below are the most relevant opinions which MPPR/ARCADIS has reached regarding the review of PRASA's System, CIP and financial projections. For a complete understanding of the assumptions upon which these opinions are based, this report should be read in its entirety.

1. The condition of PRASA's System facilities has visited varied from new to those requiring capital upgrades. The condition of most facilities improved. However, a number of WTP and WWTP continue to operate out of compliance with drinking water standards and discharge permit limits. Findings show that in many cases these compliance shortcomings are a result of malfunctioning equipment, lack of proper process control implementation, or a combination thereof. Nevertheless, despite these compliance problems, the facilities are generally producing and delivering potable water and conveying and treating wastewater adequately.
2. PRASA's overall staff levels have been historically high compared to industry benchmarks, even though some individual facilities and PRASA departments have staffing shortages. It is expected that upon completion of the organizational assessment that PRASA is conducting,

PRASA will a) invest, to the extent possible, in re-training and re-allocating employees to address staffing needs; and b) re-initiate its staff reduction program.

3. The FY2014-FY2018 Strategic Plan should provide the necessary guidance for PRASA to continue its management, operational, and cultural transformation. Key performance metrics being measured, along with stronger management oversight should help PRASA in the improvement and optimization of its operations.
4. PRASA's Operational Initiatives are well developed and address critical aspects of PRASA's operation such as NRW and energy efficiency. The Revenue Optimization Program, in particular, has provided significant benefits to PRASA in the form of increased revenues. Also, the Electric Power preferential all-in-rate that will be in effect starting in FY2014, combined with PRASA's energy source diversification and consumption reduction initiatives, should help PRASA in the reduction and control of its Electric Power expenses over the next several years.
5. PRASA has significant opportunities to reduce its current volume of NRW and to continue to improve its billing procedures and collections. While initiatives such as the Revenue Optimization Program, the Geodatabase development, and the leak detection project that will be conducted in FY2014, will aid PRASA in its goal of reducing its high volumes of NRW; additional efforts and investments are necessary to accelerate the recovery of and make a significant impact in the reduction of NRW.
6. With the possible exception of buried infrastructure improvements, the planned CIP along with the O&M initiatives are generally in alignment with the System needs. Some additional needs at certain WTP and WWTP facilities have been identified and have been reported to PRASA as a result of the 2012 asset condition assessment conducted by MPPR/ARCADIS.
7. PRASA must continue a focused corrective maintenance and R&R program to improve leaks and overflow metrics, to maintain and improve the condition of the System, and to provide a program for the long-term preservation of the System assets. On average, PRASA has included in its CIP approximately \$70M in each year of the Forecast for R&R. While this is about \$20M more than what PRASA had budgeted in previous years, given PRASA's high rate of leaks and overflows, and continuing aging infrastructure, PRASA should consider increasing its annual R&R funding and accelerating its R&R program, to the extent that its financial situation allows. For this, as previously recommended, an analysis of PRASA's R&R needs and budget is recommended to develop a sound program that will allow PRASA to improve and extend the useful life of its System.
8. PRASA's proposed CIP adequately addresses all mandated requirements of existing consent decrees and agreements with Regulatory Agencies. 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. Although, the existing CIP includes a contingency to address future regulations and any other regulatory requirements that PRASA may need to comply with, the impact of these may require significant operational and capital investments currently not contemplated in PRASA's CIP. PRASA continues to make allowances in its new designs to improve capabilities to meet certain future regulations. As the impact of future regulations becomes more defined, CIP modifications will be required to adequately accommodate resulting needs. It is expected then, that the identified needs will be prioritized following the process discussed with and approved by the Regulatory Agencies.

9. 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:

- Review of the adequacy of the property insurance limit in relation to the 2010 Probable Maximum Loss Study.
- Review the downstream liability exposure for PRASA's dams.
- Consider adding underground storage tank coverage to the pollution liability policy.
- Consider amending the misrepresentation and fraud condition to limit its application only to the party committing the misrepresentation or fraud.

10. Overall, PRASA's current rate structure and the Forecast (included in Exhibit 1) are reasonable. PRASA's Forecast adequately meets all DSC requirements for each fiscal year. MPPR/ARCADIS conducted an analysis to stress certain critical assumptions of PRASA's Forecast, including Service Revenues, Rate of Uncollectibles, Payroll and Benefit costs (overtime costs), and interest rates of future debt. The sensitivity analysis shows that PRASA's Forecast is highly sensible to deviations in the critical assumptions previously listed. The probability of PRASA achieving its Forecast and meeting its DSC requirements throughout the forecast period is conditioned on the following key assumptions:

- **PRASA's ability to maintain its Service Revenues in a very challenging economic environment** – Continued uncertainty and strain on the economy could cause a decline in the consumption patterns of PRASA customers and could affect PRASA's collections. Also, as a consequence of the rate increase, customers could assume water conservation measures and/or theft occurrences could increase, which could also result in a reduction in consumption and/or an increase in the rate of uncollectibles. Although PRASA's revised rate structure considers a projected reduction in consumption as a result of the increase in

- water and wastewater rates (elasticity effect), projected Operating Revenues could be materially affected if the projected population and/or consumption levels decrease at a higher rate than expected.
- **PRASA’s ability to continue to successfully implement all of its Operational Initiatives** – PRASA’s Forecast includes results from select Operational Initiatives that are described throughout this report. The Forecast also includes certain revenue enhancing and cost reduction initiatives that are currently underway. MPPR/ARCADIS’s conclusions regarding the Forecast assume the framework and execution of the Operational Initiatives will not materially change; any changes could significantly alter the findings contained and presented in this report. Although PRASA has made a dedicated 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 will not be achieved.
  
  - **PRASA’s ability to secure future CIP financing sources (i.e., issues bonds) at an affordable cost** – PRASA’s Forecast assumes that PRASA will be able to secure future financing from either interim sources or through bond issuances to finance its CIP. However, given Puerto Rico’s current economic and fiscal situation there is a possibility that the projected bond issuances and, more specifically the timing of these, and/or the assumed issuance terms will not be achieved. In this case PRASA would need to implement one, or a combination of the following measures: a) reduce its CIP spending, b) increase Operating and/or Authority Revenues (seek additional support from the Central Government, increase rates, etc.), or c) decrease its Operating Expenses.



Puerto Rico  
Aqueduct and  
Sewer Authority

COMMONWEALTH OF PUERTO RICO

# Puerto Rico Aqueduct and Sewer Authority

