

2012 Consulting Engineer's Report

to satisfy the requirements of Section 3.5 of PRASA's 2012
amended and restated Fiscal Oversight and Support Agreement





Puerto Rico Aqueduct and Sewer Authority

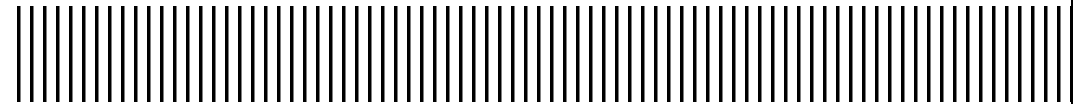
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FINAL REPORT

2012 Consulting Engineer's Report

to satisfy the requirements of Section 3.5
of PRASA's 2012 amended and restated
Fiscal Oversight and Support Agreement

December 2012



Report Prepared By:

**MP Engineers of Puerto Rico, PSC
and its subcontractor
Malcolm Pirnie**



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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.

Acronym	Definition
ABT	Additional Bonds Test
AMR/AMI	Automatic Meter Reading and/or Advanced Metering Infrastructure
AOP	Advanced Oxidation Processes
AWWA	American Water Works Association
CAA	Coefficient of Annual Adjustment
CAB	Annual Base Coefficient
CBA	Collective Bargaining Agreement
CD	Coefficient of Deficiency
CER	Consulting Engineer's Report
CFE	Combined Filter Effluent
CIP	Capital Improvements Program
CWA	Clean Water Act
DBP	Disinfection Byproduct
DBPR	Disinfection Byproducts Rule
DSC	Debt Service Coverage
EDC	Endocrine Disrupting Compounds
EPC	Energy Performance Contract
ESCO	Energy Service Companies
FOA	Fiscal Oversight and Support Agreement
FTE	Full Time Employee
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

Acronym	Definition
HAA	Haloacetic Acid
HIEPAAA	Hermanidad Independiente de Empleados Profesionales de la Autoridad de Acueductos y Alcantarillados
IGEA	Investment Grade Energy Audits
IPMP	Integrated Preventive Maintenance Program
kWh	Kilowatt-Hour
LOC	Line of Credit
LT2 ESWTR	Long Term 2 – Enhanced Surface Water Treatment Rule
M	Million
MAT	Master Agreement of Trust
MCL	Maximum Contaminant Level
MG	Million Gallons
MGD	Million Gallons per Day
MPPR	MP Engineers of Puerto Rico, PSC
NDMA	N-nitrosodimethylamine
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulations
NRW	Non-Revenue Water
NTU	Nephelometric Turbidity Units
OS	Official Statement
O&M	Operation and Maintenance
PAN	Programa de Asistencia Nutricional
PCC	Plant Control Center
PMC	Program Management Consultant
PPA	Power Purchase Agreement
ppb	Parts Per Billion
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
STS	Sludge Treatment System

Acronym	Definition
TANF	Programa de Asistencia Temporal para Familias Necesitadas
TOC	Total Organic Carbon
TTHM	Total Trihalomethane
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
YTD	Year-to-Date

Executive Summary

E.1. Introduction

MP Engineers of Puerto Rico, PSC and its subcontractor Malcolm Pirnie, the water division of ARCADIS (MPPR/Malcolm Pirnie) 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 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).

This report (the 2012 CER) documents changes in PRASA's water and wastewater system (the System) for fiscal year (FY) 2012 and, when possible, year-to-date (YTD) results through October 31, 2012 are also provided. As required by the 2012 FOA, in this CER MPPR/Malcolm Pirnie sets forth the following:

- the recommendations of the Consulting Engineer as to the proper maintenance, repair and operation of the water and wastewater systems (the System) during the ensuing fiscal year, and an estimate of the amounts of money necessary for such purposes;
- the recommendations of the Consulting Engineer as to renewals, replacements and improvements to the System which should be made during the ensuing fiscal year, and an estimate of the amounts of money necessary for such purposes;
- findings as to whether the properties of the System have been maintained in good repair and sound operating condition and in compliance with consent decrees and orders and their estimate of the amount, if any, required to be expended to place such properties in such condition and the details of such expenditures and the approximate time required therefore;
- summarizing the current water and wastewater rate structure of PRASA and reviewing the existing financial forecasting methods;
- confirming the projection of annual service charges and capacity fees and associated revenues for such period;
- assessing the need for near-term rate actions, if any, given anticipated Commonwealth support and the funding available in the Budgetary Reserve Fund;
- summarizing existing regulatory requirements and record of compliance with the 2006 United States Environmental Protection Agency (USEPA) Consent Decree, the 2006 Puerto Rico Department of Health (PRDOH) Settlement Agreement, the 2010 USEPA Sludge Treatment Systems (STS) Consent Decree and any other consent decrees, orders, etc.;

- examining and confirming that regulatory requirements (including the range of costs) will be sufficiently met in order to comply with mandates as required; and
- establishing a best practice policy for PRASA and developing benchmarks to measure such best practices.

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/Malcolm Pirnie 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/Malcolm Pirnie 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 2012 CER could affect the material presented to the extent of such changes. MPPR/Malcolm Pirnie has no responsibility for updating this report for changes that occur beyond the date of its issuance.

E.2. 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/Malcolm Pirnie 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. The assessment also provided an opportunity to verify PRASA's CIP alignment with System needs.

The evaluation criteria used in the facility inspections were: compliance, operations / process control, equipment / maintenance, and staffing / training. An overall facility rating was then determined based on the calculation of a weighted average of the ratings for each criterion. 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.

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 operations and maintenance (O&M) improvements and with the establishment of a planned Capital Improvements Program (CIP), among others, the overall conditions rating for these facilities continues to improve as shown in Table ES-1.

**Table ES-1:
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	-

Although buried infrastructure was not inspected, MPPR/Malcolm Pirnie 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 FY2012 PRASA improved its percent repaired and backlog days of pending repairs metrics for these incidences. In FY2012 PRASA reports that, on average, 94% of island-wide weekly reported leaks were repaired; this represents an improvement of 9% over FY2011 reported results. Also, PRASA managed to decrease its backlog days of pending leaks from 6.2 days (FY2011 result) down to 3.9 days. With regards to overflows, PRASA also reported improvements in FY2012; on average, 102% of island-wide weekly reported overflows were repaired which represents a 7% improvement over FY2011 results. This is a result of PRASA being able to not only address new incidences, but also the backlog of repairs pending at the beginning of the fiscal year. Also, PRASA managed to decrease its backlog days of pending overflows from 3.5 days (FY2011 result) down to 2.3 days.

PRASA's unaccounted-for water, or non-revenue water (NRW), percentage remained at 64% in FY2012. Based on a comparison to other utilities in the U.S. and Canada, PRASA's NRW is very high. The median benchmark value of NRW ranges between 10% and 20%¹. PRASA recognizes that its current levels of NRW are too high. As such, in FY2009 PRASA began implementing its NRW Reduction Program, focusing mostly on revenue optimization initiatives under its Revenue Optimization Program. Additionally, in FY2011 PRASA commissioned the preparation of a strategic NRW management and reduction plan to identify additional NRW reduction opportunities to be addressed by PRASA over the next 10 years. The report was completed by a world-renowned NRW consultant and submitted to PRASA in May of 2012. PRASA is looking closely at the potential costs and benefits of the recommended actions, as well as their estimated

¹ Sources: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2007 Annual Survey Data and Analyses Report, published by the AWWA (2008); Independent Survey of 61 Water Utilities (2011).

schedule for implementation, to initially address those that represent the highest return on investment within the shortest amount of time possible.

E.3. O&M Practices and Operational Initiatives

MPPR/Malcolm Pirnie 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/Malcolm Pirnie 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. Nevertheless, these were the exception and not the norm. 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. In overall, MPPR/Malcolm Pirnie observed that, throughout time, PRASA's O&M efforts have improved. MPPR/Malcolm Pirnie 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.

MPPR/Malcolm Pirnie 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 an average rate of less than 1% per year. PRASA has been able to implement cost reduction measures to counteract the higher electricity 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 median benchmark results.

Table ES-2 provides a comparison of PRASA's metrics to several key O&M benchmark performance indicators. As shown, based on the most recent benchmark data available to, and used by MPPR/Malcolm Pirnie, PRASA's metrics have generally improved. However, there are still additional improvements opportunities with respect to cost per million gallon (MG) of water processed and treated. These metrics could be improved by 1) reducing the high level of unaccounted-for-water in PRASA's water system; and 2) reducing infiltration and inflows into PRASA's wastewater system.

**Table ES-2:
PRASA Metrics vs. Water/Wastewater Utilities Benchmarks¹**

Benchmark Category	2007 Benchmarks ¹			2011 Benchmarks ²			PRASA ³
	Top Quartile	Median	Bottom Quartile	Top Quartile	Median	Bottom Quartile	
Water O&M Cost per Account	\$148	\$258	\$374	\$223	\$342	\$500	FY2009: \$294 FY2010: \$292 FY2011: \$309 FY2012: \$321
Water O&M Cost per MG Processed	\$942	\$1,459	\$2,114	\$1,516	\$2,002	\$2,596	FY2009: \$1,585 FY2010: \$1,555 FY2011: \$1,702 FY2012: \$1,777
Wastewater O&M Cost per Account	\$127	\$213	\$306	\$276	\$345	\$457	FY2009: \$216 FY2010: \$214 FY2011: \$225 FY2012: \$236
Wastewater O&M Cost per MG Processed	\$1,148	\$2,022	\$2,986	\$1,530	\$2,381	\$3,528	FY2009: \$1,984 FY2010: \$1,949 FY2011: \$2,067 FY2012: \$2,151

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

² Source: Independent survey of 83 water utilities and 52 wastewater utilities (2011).

³ 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 service contract, insurance and other expenses, less capitalized operating expenses.

PRASA is currently implementing five key operational initiatives that target O&M optimization, cost reductions and revenue enhancements. These operational initiatives include the following:

- Continuous Improvement Program
- Non-Revenue Water (NRW) Reduction Program
 - Revenue Optimization Program
 - Additional NRW Reduction Initiatives
 - Customer Geodatabase Development
 - AMR/AMI System for Large Meter Customers in Metro Region
- Comprehensive Energy Management Program
 - Demand Side Projects through Energy Performance Contracts
 - Supply Side Projects through Power Purchase Agreements
 - Acquisition of Hydroelectric Facilities (currently owned by the Puerto Rico Electric Power Authority, or “PREPA”)
- Integrated Preventive Maintenance Program
- Treatment Plant Automation Program

These operational initiatives represent significant operational and financial improvement opportunities for PRASA. The combined projected net impact of the cost savings and additional revenues that these operational initiatives are expected to generate are in the range of \$10 Million (M) to \$100M (assuming all initiatives are successfully implemented as currently planned). Also, in the way that PRASA is able to further expand its NRW Reduction Program and maximize the hydroelectric power generation, these amounts could be higher.

E.4. Capital Improvement Program and Regulatory Compliance

PRASA's CIP has a comprehensive listing of projects and budgets for the five fiscal years ending on June 30, 2017. From FY2006 through FY2012, PRASA invested about \$3,000M to improve and modernize the System, and bring the System's facilities (treatment plants, pump stations, etc.) to continuous and sustainable compliance. On average, PRASA annually invests about 54% of its CIP in compliance-related projects which include mandated requirements of existing consent decrees and agreements with Regulatory Agencies. In FY2012, PRASA's capital expenditures amounted to \$406.7M.

There are 663 projects currently included in the CIP for the FY2013–FY2017 period, which total projected expenditures of \$1,505.4M. Approximately \$595.1M of this amount corresponds to capital expenditures for mandatory projects. Projects included in the CIP 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.

As mentioned, PRASA's CIP addresses requirements of existing consent decrees and agreements with Regulatory Agencies. These include: 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/Malcolm Pirnie, PRASA has an adequate CIP implementation program that, if well managed, it is expected 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.

E.5. Financial Analysis

In the preparation of the 2012 CER, MPPR/Malcolm Pirnie reviewed the PRASA-prepared FY2013 through FY2017 financial forecast (the Forecast) shown in Exhibit 1 (enclosed at the end of this section). The purpose of MPPR/Malcolm Pirnie'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, 2013 through June 30, 2017 (the forecast period). MPPR/Malcolm Pirnie opined on the reasonableness of this Forecast and provided recommendations to PRASA. As part of its review, MPPR/Malcolm Pirnie also completed a sensitivity analysis and prepared an Alternate Case Forecast, shown in Exhibit 2, utilizing more conservative assumptions for certain budget components.

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 Board of Directors 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.

The Operating Revenues (presented on a cash basis) include service revenues (net of uncollectibles and subsidies), revenues from certain operational initiatives, as well as other sources of revenues such as interest income, developer fee contributions, and funds from the Rate Stabilization Account. Operating Revenues exclude funds from the Budgetary Reserve Fund or special assignments from the Central Government. Preliminary results for FY2012 show that PRASA's Operating Revenues were approximately \$737M, which is approximately \$28M less than FY2011 results. This reduction was mostly due to a higher amount of billings to collections adjustments. PRASA has continued to implement its operational initiatives, particularly its Revenue Optimization Program. In FY2012, this program yielded \$74.2M in additional revenues for PRASA.

PRASA has projected that Operating Revenues will increase, on average, at a rate of 0.5% per year over the forecast period, fluctuating from \$726M budgeted in FY2013 up to \$739M projected for FY2017.

PRASA has included in its Forecast additional revenue sources from the Budgetary Reserve Fund and other measures yet to be identified (also presented on a cash basis). These, combined with the Operating Revenues, make up the Authority Revenues. In FY2012, PRASA drew \$95M from the Budgetary Reserve Fund and has included \$145M in its Budgetary Reserve Fund for FY2013. These amounts were funded with 2012 bonds proceeds. The Forecast shows that PRASA projects funding deficits in the amount of \$342M, \$390M, \$430M, and \$460M for FY2014, FY2015, FY2016, and FY2017 respectively. PRASA is projecting that these deficits will be covered with additional transfers from the Budgetary Reserve Fund, from the implementation of changes in the rate structure (which may include rate increases), from other measures to increase revenues and/or reduce costs, or from a combination of these measures. MPPR/Malcolm Pirnie agrees that these projected deficits are accurate. While PRASA's financial forecast does not specify how the Budgetary Reserve Fund will be funded once its initial funding has been depleted, the 2012 FOA clearly states that PRASA shall be obligated to implement revenue enhancing and/or cost reducing measures, revise its rates and fees, or implement a combination of these actions, in the case the Commonwealth does not seek or receive an appropriation to satisfy the Budgetary Reserve Requirement.

The Operating (Current) Expenses projections (presented on an accrual basis), include payroll and benefits costs, as well as electricity, chemicals, materials, and supplies, among others. Payroll and benefits expenses take into consideration the conditions of PRASA's recently negotiated and approved collective bargaining agreement (CBA) with its unions, provides for additional salary increase in the future for certain employee categories, and assumes a reasonable cost per employee. Other expense projections such as electricity, chemicals, and maintenance and repair, include provisions to account for inflation over the forecast period. Conservatively, PRASA's Forecast does not include the potential additional cost savings resulting from PRASA's Comprehensive Energy Management Program, additional NRW reduction initiatives, and Treatment Plant Automation Program.

Preliminary results for FY2012 show that PRASA's Operating Expenses were approximately \$702M. PRASA has projected that Operating Expenses will increase, on average, at a rate of 3% per year over the forecast period, fluctuating from \$674M budgeted in FY2013 up to \$763M projected for FY2017.

Table ES-3 below, 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. These include the new definition for Operating Revenues and Authority Revenues, and assume that PRASA appropriately replenishes the Budgetary Reserve Fund and/or identifies other revenue sources, or implements the necessary rate increases to cover the projected annual deficits abovementioned. If the DSC requirements are not met, the 2012 MAT outlines specific actions, remedies, and timetables for PRASA to comply with its Rate Covenant.

**Table ES-3:
FY2013 – FY2017 Projected Debt Service Coverage**

Debt Service Level	DSC Requirement	FY2013 Budget	FY2014	FY2015	FY2016	FY2017
Senior Debt	2.50	7.16	2.59	2.61	2.62	2.64
Senior Subordinate Debt	2.00	7.16	2.59	2.44	2.33	2.27
Subordinate Debt	1.50	7.16	2.59	2.44	2.33	2.27
Commonwealth Guaranteed Indebtedness	1.00	1.17	1.00	1.11	1.15	1.09
Commonwealth Supported Obligations	1.00	1.17	1.00	1.11	1.05	1.12
Authority Revenues / All Expenses and Debt Service	1.00	1.17	1.00	1.01	1.00	1.00

Based on the anticipated debt service obligations and projected deficits, PRASA’s ability to meet its DSC requirements is contingent upon the following:

- Maintaining its billings and collections performance
- Continuing to implement its operational initiatives
- Identifying and securing the necessary additional revenues in each fiscal year (either from service rate increases, transfers from the Budgetary Reserve Fund, etc.)
- Controlling its Operating Expenses

Finally, MPPR/Malcolm Pirnie prepared a sensitivity analysis of PRASA’s Forecast. The objective of the sensitivity analysis is to demonstrate the impact that more conservative assumptions could have on PRASA’s financial projections. This sensitivity analysis is presented in Exhibit 2 as the Alternate Case Forecast. The Alternate Case Forecast incorporates adjustments to PRASA’s Revenue Optimization Program initiatives, payroll and benefits expenses, as well as to electrical and Superaqueduct expenses, based on historical and FY2013 YTD results. Also, because these three expense categories have been adjusted, the projected amount of capitalized expenses has also been adjusted. The Alternate Case Forecast does not include potential benefits from PRASA’s other operational initiatives such as the Comprehensive Energy Management Program and Treatment Automation Program.

In the event that these expense adjustments hold true, PRASA will need to identify and secure additional revenues in the range of \$366M in FY2014 up to \$504M in FY2017, to ensure that both Operating Revenues and Authority Revenues will be sufficient to meet all DSC requirements over the forecast period. Again, in the way that the potential net benefits from PRASA’s operational initiatives materialize, the Alternate Case Forecast adjustments could be mitigated and, in turn, the need for additional revenue sources could be reduced.

E.6. Conclusions

In preparation of this report and the conclusions contained herein, MPPR/Malcolm Pirnie 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/Malcolm Pirnie 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 to us by others, the actual results will vary from those forecasted.

Set forth below are the principal opinions which MPPR/Malcolm Pirnie 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 the facilities visited varied from new to those requiring capital upgrades. The condition of most facilities improved from FY2010 to FY2012. 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. Also, PRASA's O&M practices are deemed to be adequate.
2. 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.
3. MPPR/Malcolm Pirnie also recommends that PRASA continue to develop and implement all the operational initiatives presented in this report, in particular the additional NRW reduction initiatives, the Comprehensive Energy Management Program and acquisition of PREPA's hydroelectric facilities, and the Treatment Plant Automation Program. These operational initiatives will help minimize the need for additional revenues in future years. Should PRASA achieve the projected net benefits of these operational initiatives, PRASA could potentially reduce its additional revenue needs by as much as \$100M, assuming all initiatives presented in this report are successfully implemented as planned.
4. 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 by PRASA in recent months and have been reported to PRASA as a result of the 2012 asset condition assessment conducted by MPPR/Malcolm Pirnie.
5. 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 \$50M in each year of the Forecast for R&R. 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, an analysis of PRASA's R&R needs and budget is recommended to develop a sound R&R program that will allow PRASA to improve and extend the useful life of its System.

6. 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.
7. Considering PRASA's fiscal situation, PRASA should consider deferring the implementation of some of its current capital investment commitments over a longer period of time so that its associated debt service requirements increase in a more gradual manner than as currently projected. Hence, PRASA should accelerate discussions with Regulatory Agencies regarding the possibility of deferring some projects and/or implementing temporary, less capital intensive projects to remediate certain situations
8. Overall, PRASA's Forecast for FY2013 through FY2017 (included in Exhibit 1) is mostly reasonable based on recent historical performance. MPPR/Malcolm Pirnie conducted a sensitivity analysis and prepared an Alternate Case Forecast, reflecting more conservative projections for operational initiatives (Revenue Optimization Program), and payroll and benefits, electricity, and Superaqueduct expenses. The adjustments included in the Alternate Case Forecast (included in Exhibit 2) are based on historical and FY2013 YTD results. Under both PRASA's Forecast and the Alternate Case Forecast, PRASA meets the DSC requirements stipulated in the 2012 MAT assuming that additional revenue sources are identified as shown in Exhibits 1 and 2. The probability of PRASA achieving its Forecast and meeting its DSC requirements 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 further decline in the consumption patterns of PRASA customers and collections, resulting in

reductions in projected revenues. Hence, the YTD results for FY2013 should be closely monitored and projections for subsequent fiscal years shall be adjusted accordingly.

- **PRASA's ability to continue to successfully implement all of its operational initiatives** – PRASA's Forecast includes results from operational initiatives that have been described throughout this report. The Forecast also includes certain revenue enhancing and cost reduction initiatives that are currently underway. MPPR/Malcolm Pirnie'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 other sources of revenue beyond FY2013 (after the initial funding of the Budgetary Reserve Fund has been depleted)** – Starting in FY2014, compliance with the Rate Covenant and DSC requirements included in the 2012 MAT is contingent upon PRASA obtaining additional revenue sources from the Budgetary Reserve Fund, as a result of future replenishments from the Central Government Fund or other sources of funding, or from the implementation of changes in its rate structure. The additional revenue requirements projected in PRASA's Forecast for FY2014, FY2015, FY2016 and FY2017 amount to approximately \$342M, \$390M, \$430M, and \$460M respectively. However, if the adjustments included in the Alternate Case Forecast materialize the projected revenue requirements could be in the range of \$366M in FY2014 up to \$504M in FY2017. In the event the Budgetary Reserve Fund is depleted and not replenished with additional funding (i.e., with additional Central Government appropriations or other sources of funding), PRASA would be required to implement revenue enhancing and/or cost reduction measures, rate structure changes, or a combination of these actions, that would generate sufficient revenues to meet its DSC requirements. Under PRASA's Forecast, these additional measures would have to provide an equivalent percent increase in net revenues of approximately 48% in FY2014, with additional increases of, approximately, 4% in both FY2015 and FY2016, and 3% in FY2017. Under the Alternate Case Forecast, the equivalent percent increase in net revenues needed would be higher: 51% in FY2014, 4% in FY2015, 5% in FY2016, and 3% in FY2017.

PRASA FINANCIAL FORECAST PRO FORMA¹ (\$, Thousands)	FY2013 BUDGET	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION
OPERATING REVENUES					
1 Service Collections					
2 Base Fee and Service Charges	713,252	714,000	714,000	714,000	714,000
3 Operational Initiatives - Additional Billings	43,700	50,470	54,781	59,775	64,513
4 Operational Initiatives - Collections from Prior Years	27,500	17,132	17,195	16,953	16,625
5 Billings to Collections Adjustment	(65,194)	(61,158)	(61,502)	(61,902)	(62,281)
6 Miscellaneous Income	3,000	3,000	3,000	3,000	3,000
7 Special Assessments	4,000	4,000	4,000	4,000	4,000
8 Transfer from/(to) Rate Stabilization Account	-	-	-	-	-
9 Total Operating Revenues	\$726,258	\$727,444	\$731,474	\$735,826	\$739,857
Other Sources of Revenue					
10 Transfer from Budgetary Reserve Fund	\$145,000	-	-	-	-
11 General Fund Contributions	-	-	-	-	-
12 Additional External Support/Other Measures	-	-	-	-	-
13 Total Other Sources of Revenue	\$145,000	\$342,000	\$390,000	\$430,000	\$460,000
14 Total Authority Revenues (Line 11 + Line 15)	\$871,258	\$1,069,444	\$1,121,474	\$1,165,826	\$1,199,857
OPERATING EXPENSES					
15 Payroll and Related	\$300,439	\$309,708	\$318,632	\$327,640	\$336,804
16 Electric Power	173,449	185,862	191,438	197,181	203,097
17 Maintenance and Repair	41,156	42,391	43,662	44,972	46,321
18 Chemicals	29,947	30,845	31,771	32,724	33,706
19 Superaqueduct Service Contract	28,143	28,987	29,857	30,753	31,675
20 Insurance	11,495	11,840	12,195	12,561	12,938
21 Other Expenses	130,239	132,558	136,542	140,646	144,865
22 Capitalized Operating Expenses	(40,747)	(42,305)	(43,554)	(44,829)	(46,136)
23 Total Operating Expenses	\$674,121	\$699,886	\$720,544	\$741,648	\$763,270
24 Total Senior Debt Service (S + SSUB + SUB)	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
25 Revenues Available for Operating Expenses and Other Debt Service After Senior Debt Service	\$769,858	\$788,666	\$822,176	\$850,553	\$873,696
26 Total Commonwealth Debt Service (CGI & CSO)	\$81,692	\$88,604	\$93,560	\$103,940	\$107,340
27 Net Authority Revenues After Operating Expenses and All Debt Service Obligations	\$14,045	\$177	\$8,072	\$4,966	\$3,087
DEBT SERVICE					
28 Senior (S)	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
Senior Subordinated (SSUB)	-	-	18,526	34,508	45,405
Subordinated (SUB)	-	-	-	-	-
Commonwealth Guaranteed Indebtednes (CGI)	81,692	88,604	91,966	94,940	98,341
Commonwealth Supported Obligations (CSO)	-	-	1,594	8,999	8,999
Total Debt Service	\$183,092	\$369,381	\$392,858	\$419,213	\$433,501

¹Numbers may not add up due to rounding

**PRASA FINANCIAL FORECAST PRO FORMA
DEBT SERVICE COVERAGE¹
(\$, Thousands)**

	FY2013 BUDGET	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION
1 Operating Revenues	\$726,258	\$727,444	\$731,474	\$735,826	\$739,857
2 Other Sources of Revenue	145,000	342,000	390,000	430,000	460,000
3 Authority Revenues (Line 1 + Line 2)	<u>\$871,258</u>	<u>\$1,069,444</u>	<u>\$1,121,474</u>	<u>\$1,165,826</u>	<u>\$1,199,857</u>
4 Operating Expenses	\$674,121	\$699,886	\$720,544	\$741,648	\$763,270
Senior Debt					
5 Senior					
6 Annual Debt Service	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
7 DS Coverage Required = 2.50	7.16	2.59	2.61	2.62	2.64
8 Senior & Senior Subordinated					
9 Annual Debt Service	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
10 DS Coverage Required = 2.00	7.16	2.59	2.44	2.33	2.27
11 Senior, Subordinated Subordinated & Subordinated					
12 Annual Debt Service	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
13 DS Coverage Required = 1.50	7.16	2.59	2.44	2.33	2.27
14 Net Authority Revenues	\$769,858	\$788,666	\$822,176	\$850,553	\$873,696
15 Total Operating Expenses	674,121	699,886	720,544	741,648	763,270
16 Net Authority Revenues Available for Other Debt	<u>\$95,737</u>	<u>\$88,780</u>	<u>\$101,632</u>	<u>\$108,905</u>	<u>\$110,426</u>
Other Debt					
17 Commonwealth Guaranteed Indebtedness					
18 Annual Debt Service	81,692	88,604	91,966	94,940	98,341
19 DS Coverage Required = 1.00	1.17	1.00	1.11	1.15	1.12
20 Commonwealth Supported Obligations					
21 Annual Debt Service	-	-	1,594	8,999	8,999
22 DS Coverage Required = 1.00	1.17	1.00	1.09	1.05	1.03
23 Total Annual Debt Service	183,092	\$369,381	\$392,858	\$419,213	\$433,501
24 Net Authority Revenues After Operating Expenses and All Debt Service Obligations	\$14,045	\$177	\$8,072	\$4,966	\$3,087
25 Total Authority Revenues / All Obligations (Operating Expenses + Debt Service)	1.02	1.00	1.01	1.00	1.00

¹Numbers may not add up due to rounding

ALTERNATE CASE FORECAST PRO FORMA¹
(\$, Thousands)

Adjusted Category	FY2013 BUDGET	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION
OPERATING REVENUES					
1 Service Collections					
2 Base Fee and Service Charges	713,252	714,000	714,000	714,000	714,000
3 Operational Initiatives - Additional Billings	43,700	50,470	54,781	54,781	54,781
4 Operational Initiatives - Collections from Prior Years	27,500	17,132	17,195	17,195	17,195
5 Billings to Collections Adjustment	(65,194)	(61,158)	(61,502)	(61,902)	(62,281)
6 Miscellaneous Income	3,000	3,000	3,000	3,000	3,000
7 Special Assessments	4,000	4,000	4,000	4,000	4,000
8 Transfer from/(to) Rate Stabilization Account	-	-	-	-	-
9 Total Operating Revenues	\$726,258	\$727,444	\$731,474	\$731,074	\$730,695
10 Other Sources of Revenue					
11 Transfer from Budgetary Reserve Fund	\$145,000	-	-	-	-
12 General Fund Contributions	-	-	-	-	-
13 Additional External Support/Other Measures	-	-	-	-	-
14 Total Other Sources of Revenue	\$145,000	\$366,000	\$410,000	\$463,000	\$504,000
15 Total Authority Revenues (Line 11 + Line 15)	\$871,258	\$1,093,444	\$1,141,474	\$1,194,074	\$1,234,695
OPERATING EXPENSES					
16 Payroll and Related	\$300,439	\$315,358	\$324,282	\$333,290	\$342,454
17 Electric Power	173,449	204,000	214,200	224,910	236,156
18 Maintenance and Repair	41,156	42,391	43,662	44,972	46,321
19 Chemicals	29,947	30,845	31,771	32,724	33,706
20 Superaqueduct Service Contract	28,143	29,856	30,751	31,674	32,624
21 Insurance	11,495	11,840	12,195	12,561	12,938
22 Other Expenses	130,239	132,558	136,542	140,646	144,865
23 Capitalized Operating Expenses	(40,747)	(43,710)	(45,224)	(46,784)	(48,397)
24 Total Operating Expenses	\$674,121	\$723,137	\$748,180	\$773,993	\$800,667
25 Total Senior Debt Service (S + SSUB + SUB)	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
26 Revenues Available for Operating Expenses and Other Debt Service After Senior Debt Service	\$769,858	\$812,666	\$842,176	\$878,801	\$908,534
27 Total Commonwealth Debt Service (CGI & CSO)	\$81,692	\$88,604	\$93,560	\$103,940	\$107,340
28 Net Authority Revenues After Operating Expenses and All Debt Service Obligations	\$14,045	\$925	\$436	\$869	\$527
DEBT SERVICE					
Senior (S)	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
Senior Subordinated (SSUB)	-	-	18,526	34,508	45,405
Subordinated (SUB)	-	-	-	-	-
Commonwealth Guranteed Indebtednes (CGI)	81,692	88,604	91,966	94,940	98,341
Commonwealth Supported Obligations (CSO)	-	-	1,594	8,999	8,999
Total Debt Service	\$183,092	\$369,381	\$392,858	\$419,213	\$433,501

¹Numbers may not add up due to rounding

EXHIBIT 2

**ALTERNATE CASE FORECAST PRO FORMA
DEBT SERVICE COVERAGE¹
(\$, Thousands)**

	FY2013 BUDGET	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION
1 Operating Revenues	\$726,258	\$727,444	\$731,474	\$731,074	\$730,695
2 Other Sources of Revenue	\$145,000	\$366,000	\$410,000	\$463,000	\$504,000
3 Authority Revenues (Line 1 + Line 2)	\$871,258	\$1,093,444	\$1,141,474	\$1,194,074	\$1,234,695
4 Operating Expenses	\$674,121	\$723,137	\$748,180	\$773,993	\$800,667
Senior Debt					
5 Senior					
6 Annual Debt Service	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
7 DS Coverage Required = 2.50	7.16	2.59	2.61	2.60	2.60
8 Senior & Senior Subordinated					
9 Annual Debt Service	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
10 DS Coverage Required = 2.00	7.16	2.59	2.44	2.32	2.24
11 Senior, Subordinated Subordinated & Subordinated					
12 Annual Debt Service	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
13 DS Coverage Required = 1.50	7.16	2.59	2.44	2.32	2.24
14 Net Authority Revenues	\$769,858	\$812,666	\$842,176	\$878,801	\$908,534
15 Total Operating Expenses	674,121	723,137	748,180	773,993	800,667
16 Net Authority Revenues Available for Other Debt	\$95,737	\$89,529	\$93,996	\$104,808	\$107,867
Other Debt					
17 Commonwealth Guaranteed Indebtedness					
18 Annual Debt Service	81,692	88,604	91,966	94,940	98,341
19 DS Coverage Required = 1.00	1.17	1.01	1.02	1.10	1.10
20 Commonwealth Supported Obligations					
21 Annual Debt Service	-	-	1,594	8,999	8,999
22 DS Coverage Required = 1.00	1.17	1.01	1.00	1.01	1.00
23 Total Annual Debt Service	183,092	\$369,381	\$392,858	\$419,213	\$433,501
24 Net Authority Revenues After Operating Expenses and All Debt Service Obligations	\$14,045	\$925	\$436	\$869	\$527
25 Total Authority Revenues / All Obligations (Operating Expenses + Debt Service)	1.02	1.00	1.00	1.00	1.00

¹Numbers may not add up due to rounding

1. Introduction

1.1. Introduction

Since 2008, MP Engineers of Puerto Rico, PSC and its subcontractor Malcolm Pirnie, the water division of Arcadis (MPPR/Malcolm Pirnie), 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/Malcolm Pirnie 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. 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 \$2,096 million (M) 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 this bond issue, on January 24, 2012 PRASA's Board of Directors authorized the execution of an amended and restated MAT (2012 MAT) by and between PRASA and Banco Popular de Puerto Rico as Trustee; and an amended and restated FOA (2012 FOA) by and between PRASA, the Commonwealth of Puerto Rico and the GDB.

The 2012 FOA requires that PRASA 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, to be submitted no later than 90 days after receipt of PRASA's final Annual Budget and Disbursement Schedule that sets forth the following:

- the recommendations of the Consulting Engineer as to the proper maintenance, repair and operation of the water and wastewater systems (the System) during the ensuing fiscal year, and an estimate of the amounts of money necessary for such purposes;
- the recommendations of the Consulting Engineer as to renewals, replacements and improvements to the System which should be made during the ensuing fiscal year, and an estimate of the amounts of money necessary for such purposes;

- findings as to whether the properties of the System have been maintained in good repair and sound operating condition and in compliance with consent decrees and orders and their estimate of the amount, if any, required to be expended to place such properties in such condition and the details of such expenditures and the approximate time required therefore;
- summarizing the current water and wastewater rate structure of PRASA and reviewing the existing financial forecasting methods;
- confirming the projection of annual service charges and capacity fees and associated revenues for such period;
- assessing the need for near-term rate actions, if any, given anticipated Commonwealth support and the funding available in the Budgetary Reserve Fund;
- summarizing existing regulatory requirements and record of compliance with the 2006 United States Environmental Protection Agency (USEPA) Consent Decree, the 2006 Puerto Rico Department of Health (PRDOH) Settlement Agreement, the 2010 USEPA Sludge Treatment Systems (STS) Consent Decree and any other consent decrees, orders, etc.;
- examining and confirming that regulatory requirements (including the range of costs) will be sufficiently met in order to comply with mandates as required; and
- establishing a best practice policy for PRASA and developing benchmarks to measure such best practices.

MPPR/Malcolm Pirnie has been retained to satisfy the reporting requirements specified in Section 3.5 of the 2012 FOA, described above. This report, henceforth referred to as the 2012 Consulting Engineer's Report (2012 CER), presents MPPR/Malcolm Pirnie's opinion with respect to the technical, operational and financial issues and related matters of PRASA's System as of October 31, 2012. 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/Malcolm Pirnie 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/Malcolm Pirnie 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 2012 CER could affect the material presented to the extent of such changes. MPPR/Malcolm Pirnie has no responsibility for updating this report for changes that occur beyond the date of its issuance.

1.2. Previous Reports

MPPR/Malcolm Pirnie has prepared four reports to document and assess technical, operational and financial issues, and related matters of PRASA's System. The first (2008 CER) was submitted in January of 2008 and was included in PRASA's Official Statement (OS) related to its March 2008 bond issuance. The second (2009 CER) and third (2010 CER) were completed and

submitted in March of 2010 and February of 2011, respectively; and document the condition and changes, if any, in PRASA's operation and the performance of the System. The fourth and most recent report (Supplemental Report to the 2010 CER, or the Supplemental Report) was prepared and submitted in January of 2012. Both the 2010 CER and the Supplemental Report were included in PRASA's OS related to its February 2012 bond issuance.

1.3. Conventions

PRASA's fiscal year begins on July 1st and ends June 30th. Throughout this 2012 CER, fiscal year is identified as "FY" followed by the calendar year in which the fiscal year ends, i.e., FY2012 is the fiscal year from July 1, 2011 through June 30, 2012.

1.4. Acronyms

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

2. Condition of System

2.1. 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 residents² 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 operation and maintenance (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 FY2012 PRASA owns and operates 8 regulated dams, 126 water treatment plants (WTPs), 54 wastewater treatment plants (WWTPs), 1,182 water pump stations (WPSs), 1,004 wastewater pump stations (WWPSs), 299 wells, 1,723 water storage tanks, and almost 20,000 miles of pipelines island wide.

In FY2012, MPPR/Malcolm Pirnie assessed the condition of PRASA's System through an inspection program of a sample that included the major elements of the System. The purpose of these inspections was to identify the overall condition of the facilities to determine if they are being operated and maintained in a manner to achieve their operating goals, and to evaluate if PRASA's CIP is aligned with identified needs. These inspections were performed between March and June of 2012.

² 2010 United States Census

A summary of the facilities inspected during FY2012 is presented in Table 2-1. In total, 170 facility inspections were performed out of a total of 4,396 facilities that comprise the System. Inspected facilities include: dams, WTPs, WWTPs, WPSs, WWPSs, wells and water storage tanks. As shown in Table 2-1, all regulated dams (100%) were inspected, due to the value of these individual assets, and approximately 37% of the WTPs and 52% of the WWTPs were inspected. The WTP and WWTP facilities to be 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 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.

**Table 2-1:
Percent of Assets Inspected by Asset Category**

Asset Category	Total PRASA Facilities ¹	Inspections Performed	
		Quantity	Percent
Regulated Dams	8	8	100
Water Treatment Plants	126	47	37
Wastewater Treatment Plants	54	28	52
Wells	299	14	5
Water Pump Stations	1,182	26	2
Water Storage Tanks	1,723	24	1
Wastewater Pump Stations	1,004	23	2
Total	4,396	170	4

¹Data obtained from PRASA's GIS, which is in the process of being updated.

2.2. Inspections Methodology

Inspections were performed throughout PRASA's five Operational Regions: North, South, East, West, and Metro. Table 2-2 shows the number of facilities inspected within each Region. It should be noted that the total number of inspections performed in the Metro Region is lower than those performed in the other Regions because it has fewer, but larger WTPs and WWTPs and no wells. Nevertheless, it was inspected in a manner consistent with the other Regions.

**Table 2-2:
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
Total	32	29	54	34	20	170

As in previous CERs each facility was inspected using an inspection form developed by MPPR/Malcolm Pirnie, 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.

2.3. 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.

2.3.1. 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 FY 2010), creating summary reports addressing the dam structure, appurtenant works, operations and safety for each facility. MPPR/Malcolm Pirnie utilized these reports as a baseline from which to perform independent visual inspections and evaluations of the dam structures.

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

Criteria	2008 ¹	2009 ²	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
Overall	2.3	2.1	2.3	2.3	0.0	0.0

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

² 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 geomembrane 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.

2.3.2. Water Treatment Plants

Forty-seven (47) WTPs (37% of total 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 2-4 presents the comparison of the average rating results of the facilities inspected by each category evaluated. The overall average rating of each evaluation criteria for 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 2-4:
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
Overall	2.2	2.4	2.3	2.6	0.3	0.4

In general, the WTPs are in good condition. However, five (11%) of the WTPs inspected are considered poor in terms of compliance, due to non-recurring violations of total coliforms, combined filter effluent (CFE) turbidity limits and/or DBPs; however, these facilities are currently being addressed either in measures identified in the 2006 PRDOH Agreement, in PRASA’s CIP, or by some remedial action taken by the Regions.

In comparison with the 2010 inspection results, with the exception of the equipment/maintenance criterion which remained unchanged, all other criteria improved. In comparison to the 2008 inspections, all scores have increased and, in overall, the condition of the facilities has improved. It is important to note that the results show a good standing of PRASA’s WTPs and demonstrates a positive result of the CIP and other programs related to the improvement, compliance, maintenance and operations of the WTPs.

The facilities with the lowest overall score of the 47 WTPs inspected are summarized in Table 2-5. 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. Also, PRASA has reported that it is conducting evaluations, developing action plans, and implementing

remedial actions to minimize non-compliance events and improve operational results at these facilities.

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 USEPA STS Consent Decree addresses issues identified in the WTP STSs.

**Table 2-5:
WTP Lowest Rated Facilities and Observations**

WTP	2012 Score	Observations	CIP Identified
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
Coto Laurel (South Region)	2.1	The WTP reported exceedances related to DBPs during the evaluated period. Some equipment needs upgrades.	Yes
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
La Virgencita (North Region)	2.1	The WTP reported exceedances related to DBPs during the evaluated period. Facility is currently undergoing repairs.	Yes
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
Sergio Cuevas (Metro Region)	2.1	The WTP reported exceedances related to CFE turbidity, DBPs, and total coliforms during evaluated period.	Yes

2.3.3. Wastewater Treatment Plants

Twenty-eight (28) WWTPs (52% of total WWTPs currently in operation) were inspected as part of this evaluation. 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 2-6 presents the comparison of the average rating results of the facilities inspected by each category evaluated. The overall average rating of each evaluation criteria for 2008 through 2012 is also presented. Overall, WWTP facilities were rated as adequate with a score of 2.0.

**Table 2-6:
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 ¹	1.5 ¹	1.5 ²	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
Overall	1.9	2.0	2.0	2.0	0.0	0.1

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

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

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 2-7. 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. 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.

**Table 2-7:
WWTP Lowest Rated Facilities and Observations**

WWTP	2012 Score	Observations	CIP Identified
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
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
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 controls which have proven effective to improve the plant's operational results.	Yes
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
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
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
Utua (North Region)	1.5	Compliance data reports multiple exceedances to the 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.	New plant completed within last five years

WWTP	2012 Score	Observations	CIP Identified
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
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)
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 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.	Yes

2.3.4. Wells

PRASA has reported that it owns and operates 299 water wells, most of which deliver water directly into a distribution system with little or no treatment, except chlorination. A total of 14 wells (5% of total wells) were inspected as part of this assessment.

The inspection results for previous years were compared to the inspection results from this inspection to analyze condition changes. Table 2-8 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. 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 2-8:
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
Overall	2.0	1.9	2.1	2.2	0.1	0.2

As shown in Table 2-8, 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.

The sample of wells that were inspected is generally in adequate condition; these wells are expected to continue to serve their intended function of supplemental water supply. 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, future regulatory requirements such as the Groundwater Under the Direct Influence of Surface Water (GWUDI) 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.

2.3.5. Water Pump Stations

PRASA has reported that it owns and operates 1,182 WPSs. WPSs consist of two major categories: 1) above ground pumps and 2) below ground pumps in vaults with heavy covers that cannot be readily removed by field inspectors (underground booster stations) – not inspected. Twenty-six (26) above ground WPSs (2% of total WPSs) were fully inspected and the results of the assessments of those stations are described below.

The inspection results for previous years were compared to the inspection results from this inspection to analyze performance changes since the previous inspections. Table 2-9 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 2-9:
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
Overall	2.2	2.2	2.3	2.4	0.1	0.2

As shown in Table 2-9, 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.

2.3.6. Wastewater Pump Stations

PRASA has reported that it owns and operates 1,004 WWPSs. A total of 23 WWPSs (2% of total WWPSs) were inspected. In general, the inspected facilities predominantly use wet pit type using submersible pumps, although several dry pit type stations were also inspected.

The inspection results for previous years were compared to the inspection results from this year to analyze performance changes since the previous inspections. Table 2-10 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 2-10:
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
Overall	1.7	2.0	2.0	2.1	0.1	0.4

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 (IPMP) 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.

2.3.7. Water Storage Tanks

PRASA has reported that it owns and operates 1,723 water storage tanks throughout the island, with an approximate total storage capacity of 375 million gallons (MG). A total of 24 water storage tanks (1% of total tanks) were inspected.

The inspection results for previous years were compared to the inspection results from this inspection to analyze performance changes since the previous inspections. Table 2-11 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 2-11:
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
Overall	1.9	1.6	1.6	1.9	0.3	0.0

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).

2.4. Buried Infrastructure

Although buried infrastructure (i.e. water meters, water mains and distribution pipes, buried valves, sewer trunks and collection pipes, and manholes) was not inspected, the following sections provide some discussion regarding indirect indicators of the condition of these assets and the steps PRASA is taking to improve them. Historically, PRASA had not kept a detailed database of its buried infrastructure. Nevertheless, in recent years PRASA has invested in and continues to develop and update its GIS database to allow for a better control, record and management of buried assets. 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.

2.4.1. 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, over 416,000 small meters (1-inch in diameter or less) have been replaced between FY2009 and FY2012. Also, during this period PRASA replaced approximately 2,300 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.

2.4.2. Water Distribution System

Based on the latest GIS database information, PRASA owns over 14,031 miles of water pipelines, which include both transmission and distribution pipes with sizes ranging from two inches to 72 inches in diameter. As previously mentioned, MPPR/Malcolm Pirnie did not inspect the water transmission and distribution system. However, it is reasonable to assume that a portion of the water distribution system will require some structural repairs, as well as rehabilitation to reduce leakage, considering the volume of NRW reported by PRASA which amounts to 64% of total water production.

This high level of NRW is much higher than the average utility benchmarks results; U.S. and Canada average percent of NRW ranges from 10% to 20%³. PRASA 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 to address the primary contributors of these water losses. These initiatives are discussed in detail in a later section of this report.

2.4.2.1. Leak Monitoring and Control

As shown in Table 2-12, in FY2012 PRASA indicates that a total of 42,868 leaks were reported. Table 2-12 also shows the average annual leaks occurrence per 100 miles of water piping. The total number of leaks reported annually has been considerably reduced over the past five fiscal years. Particularly, total annual reported leaks were reduced by 18% from FY2011 to FY2012. However, PRASA's reported rate of leak occurrence continues to be very high compared to other utilities in the U.S. and Canada (benchmark metrics for average annual leak and breaks per 100 miles are between 42 and 49⁴). 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.

**Table 2-12:
Reported Leaks from FY2008 to FY2012**

Fiscal Year	Total Annual Reported Leaks	Annual Leaks per 100 miles Using 14,031 miles of Water Pipeline
2008	83,508	595
2009	58,875	420
2010	55,897	398
2011	52,817	376
2012	42,868	306

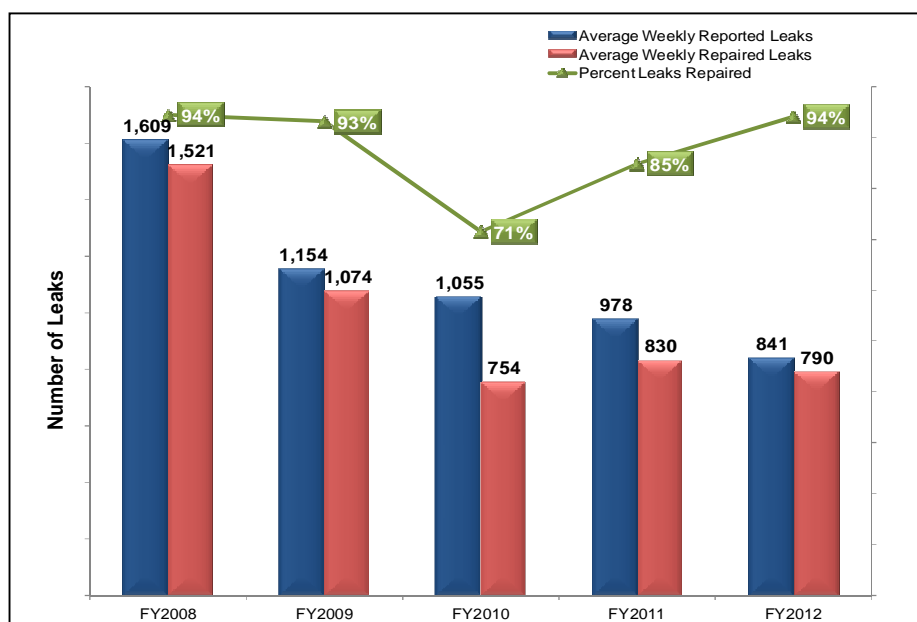
Source: PRASA SAP (Commercial) Database

³ Sources: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2007 Annual Survey Data and Analyses Report, published by the AWWA (2008); Independent Survey of 61 Water Utilities (2011).

⁴ Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2007 Annual Survey Data and Analyses Report, published by the AWWA (2008); Independent Survey of 84 Utilities (2011).

The average weekly reported and repaired leaks per fiscal year are shown in Figure 2-1. For FY2012, PRASA reports an average of approximately 841 leaks per week. As shown, the reported leaks have been decreasing since FY2008. Also shown in Figure 2-1 is the percentage of repaired leaks with respect to the number of leaks reported in each fiscal year. The current percent of repaired leaks is at the same level achieved in FY2008, despite a reduction experienced in FY2010 and FY2011. It should be noted that the reduction in average leaks repaired during FY2010 and FY2011 was a result of staff reductions and reallocations which temporarily affected PRASA’s efficiency in addressing and repairing leaks.

Figure 2-1: Island-Wide Weekly Average Leaks Reported and Repaired



Source: PRASA SAP (Commercial) Database

Table 2-13 provides a summary of the average repaired leaks per working day and average backlog. In FY2012, the number of leaks with duration greater than seven days was significantly reduced. These results are comparable, and in fact slightly lower, than FY2008 results. PRASA reports to have ended the fiscal year with 467 pending leaks and 176 pending leaks with duration greater than seven days, which is a vast improvement from previous fiscal years. Based on these results, it can be observed that in FY2012 PRASA averaged a backlog of approximately 3.9 days of pending leaks and a backlog of approximately 1.4 days of pending leaks with duration greater than seven days. PRASA’s effectiveness in repairing pending leaks in a timely manner has once again improved after experiencing a decline in FY2010.

**Table 2-13:
Annual Average Backlog of Pending Leaks**

Fiscal Year	Average Weekly Pending Leaks	Average Weekly Pending Leaks >7 Days	Average Repaired Leaks per Working Day ¹	Average Backlog Days for Pending Leaks	Average Backlog Days for Pending Leaks >7 Days
2008	1,337	309	304	4.4	1.0
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

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

2.4.3. Wastewater Collection System

Based on the PRASA's GIS database information, PRASA owns over 5,325 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.

2.4.3.1. Overflow Monitoring and Control

As shown in Table 2-14, PRASA indicates that in FY2012 26,903 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 2-14 also shows the average annual overflows occurrence per 100 miles of sewer. In FY2012, an average of 505 overflows per 100 miles of sewer was reported. After achieving a reduction in number of overflows reported during FY2009, reported overflows once again increased over the next two fiscal years. However, in FY2012 the number of overflows reported reduced by about 5% from FY2011 results. 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 3 and 15 overflows⁵); however, this high rate is not surprising given the size and complexity of the System.

⁵ Source: Benchmarking Performance Indicators for Water and Wastewater Utilities: 2007 Annual Survey Data and Analyses Report, published by the AWWA (2008); Independent Survey of 45 Utilities (2011).

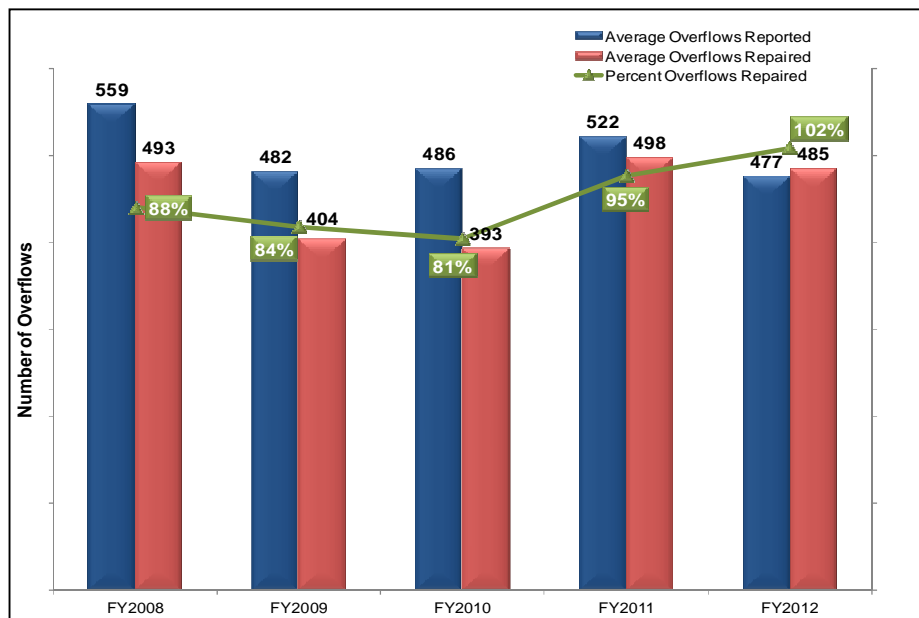
**Table 2-14:
Reported Overflows from FY2008 to FY2012**

Fiscal Year	Reported Overflows	Annual Overflows per 100 miles Using 5,325 miles of Wastewater Pipeline
2008	29,080	546
2009	24,592	462
2010	25,735	483
2011	28,185	529
2012	26,903	505

Source: PRASA SAP (Commercial) Database

PRASA’s average weekly reported and repaired overflows per fiscal year are shown in Figure 2-2. For FY2012, PRASA reports an average of approximately 477 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. Also shown in Figure 2-2 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.

Figure 2-2: Island-Wide Weekly Average Overflows Reported and Repaired



Source: PRASA SAP (Commercial) Database

Table 2-15 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. PRASA reports to have ended the fiscal year with 122 pending overflows, and 39 pending overflows with duration greater than seven days, which is a vast

improvement from previous fiscal years. Based on the average pending overflows and average pending overflows with duration greater than seven days, it can be observed that in FY2012 PRASA averaged a backlog of approximately 2.3 days of pending overflows and a backlog of 0.5 days of pending overflows with duration greater than seven days. PRASA's effectiveness in repairing pending overflows in a timely manner has once again improved after experiencing a decline in FY2010.

**Table 2-15:
Annual Average Backlog of Pending Overflows**

Fiscal Year	Average Weekly Pending Overflows	Average Weekly Pending Overflows >7 Days	Average Repaired Overflows per Working Day ¹	Average Backlog Days for Pending Overflows	Average Backlog Days for Pending Overflows >7 Days
2008	265	8	99	2.7	0.1
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

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

2.5. Conclusions

In general, the condition of the facilities visited varied from those recently upgraded/rehabilitated to those requiring capital upgrades. Table 2-16 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 2-16:
FY2012 Asset Condition Inspection Results Summary**

Asset Category	Unacceptable	Poor	Adequate	Good	Total
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
Total	0	9	92	69	170
Percent of Total	0%	5%	54%	41%	-

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 2007 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.

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. This is a cause for concern which 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 should also assess its buried infrastructure (i.e. water and sewer pipelines) needs to better identify measures to improve performance. Annual results for leaks and overflows, as reported by PRASA, show that PRASA has improved its metrics over the past two fiscal years, particularly during FY2012. However, PRASA should continue to address the high frequency of incidents and duration of these events so that corrective measures can be implemented and performance is further improved. Possible 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. Also, PRASA should evaluate and revise its data processing and collection practices regarding reported and repaired leaks and overflows. 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.

3. O&M Practices and Operational Initiatives

3.1. Introduction

MPPR/Malcolm Pirnie 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 2. Overall, MPPR/Malcolm Pirnie 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 2, 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. 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/Malcolm Pirnie has observed that, throughout time, PRASA's operational and maintenance efforts, as well as its capital investments, have improved. However there is still room for further improvement with respect to prioritization, scheduling, and execution of corrective and routine maintenance activities.

3.2. System O&M Expenditures

Over the past five fiscal years, PRASA's O&M budgets have fluctuated from \$648M in FY2008 to \$668M in FY2012. PRASA has made an effort to become more efficient and to reduce its O&M costs through various initiatives including: staff reallocations and hiring controls, and the development and implementation of an energy management program, among others. However, these cost reductions have been offset by increases in electricity costs; higher payroll and benefits costs as a result of PRASA's recently negotiated collective bargaining agreements (CBAs) with its unions; higher maintenance and repair costs; and higher chemicals and miscellaneous expenses. For FY2012, PRASA's O&M expenses for the water and wastewater system (combined) amounted to \$598M⁶. PRASA estimates that approximately 70% of its O&M budget (\$419M) is allocated for the water system and the remaining 30% (\$179M) for the wastewater system. Estimated costs per million gallons (MG) and per customer account are summarized in the Table 3-1.

⁶ Excludes approximately \$70M 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.

**Table 3-1:
PRASA FY2012 O&M Budget Metrics**

Metric	Water System			Wastewater System		
	PRASA	2007 Survey Benchmark ¹	2011 Benchmark ²	PRASA	2007 Survey Benchmark ¹	2011 Benchmark ³
Total FY2012 Budget	\$419M	-	-	\$179M	-	-
Cost per Account ⁴	\$320.47	\$258.00	\$342.00	\$235.78	\$213.00	\$344.50
Cost per MG produced ⁵ /treated ⁶	\$1,777.00	\$1,459.00	\$2,002.00	\$2,150.93	\$2,022.00	\$2,381.00

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

² Source: Independent Survey of 83 Utilities (median value).

³ Source: Independent Survey of 52 Utilities (median value).

⁴ Based on number of accounts at the end of FY2012 of 1,307,436 (water) and 759,182 (wastewater).

⁵ Based on FY2012 total production and distribution of approximately 646 million gallons per day (MGD) of potable water.

⁶ Based on FY2012 total treatment of approximately 228 MGD of wastewater.

When compared to the 2007 benchmark median values for utilities in the U.S., PRASA’s operational and cost metrics are higher than average. However, given the economic crisis that has affected the U.S. over the past few years, benchmark values have varied. Even though the American Water Works Association (AWWA) has not published an updated version of its annual survey data and analyses report, independent utility surveys have been conducted over the past three years to track utility operational and cost metrics. The most recent data, from 2011, has been included in Table 3-1 above. As shown, there has been a significant change in the cost per account and cost per MG produced/treated. This is not a surprising result considering the budget cuts and economic hardships that both utilities and customers may have experienced during the recent recessionary period. PRASA’s operational and cost metrics are within the range of the 2011 benchmark median values presented above.

In FY2013, PRASA has budgeted approximately \$604M for the O&M for the System (excluding costs related to commercial activities), which is in line with FY2012 results. Also, PRASA has continued to implement numerous operational initiatives designed to enhance revenues and reduce O&M costs. MPPR/Malcolm Pirnie has reviewed these initiatives to understand their current status and validate how their corresponding results could impact PRASA’s financial projections through FY2017, later discussed in this report. A description of these operational initiatives is presented below.

3.3. Continuous Improvement Program

PRASA is currently implementing a Continuous Improvement Program that focuses on 1) tracking and analyzing operational metrics, 2) identifying opportunities for operations and process improvements, and 3) developing and implementing optimized processes. Currently, the Continuous Improvement Program is managed by PRASA’s *Kaizen* team, lead by PRASA’s

Vice-President of operations. Specific initiatives currently being implemented under this program include the following:

- **Ideal Plant Initiative** – With the objective of developing a model operating standard for its plant facilities, PRASA began the development of the “Ideal Plant” initiative in FY2012. Based on the results of comprehensive audits at each facility intervened through this initiative, PRASA looks to identify and cost-effectively address facility-specific shortcomings in infrastructure, compliance, staff/training, operations/process controls, risk management/safety, and documentation, among others.
- **Ideal Warehouse** – With the objective of developing a model operating standard for equipment warehouses, and logistics and supply chain practices, PRASA is currently implementing an “Ideal Warehouse” initiative. PRASA looks to optimize its purchasing and logistics operations to minimize lead times, excessive inventory, and avoid stock outs that could cause operational and/or maintenance problems at a Regional and Operational Service Area level.
- **Ideal Commercial Office** – With the objective of developing a model operating standard for commercial offices, PRASA is currently implementing an “Ideal Commercial Office” initiative. PRASA looks to optimize commercial processes including front office activities (i.e., customer attention time) and back office activities (i.e., investigations and case resolution).
- **Improvement of Commercial Operational Activities** – With the objective of developing standardized and optimized processes for commercial operational activities, PRASA is currently identifying, testing, and implementing improved procedures for meter reading, meter replacements, and meter disconnections, among others. Under this initiative, PRASA has begun to update the meter reading equipment (handhelds) used by PRASA employees. PRASA has indicated that the new equipment will be used starting in December of 2012 with a projected island-wide roll out during FY2013. PRASA expects that the new equipment will facilitate supervision and management of meter reading staff and also of reporting meter reads and field incidences (i.e., leaks, theft, and missing equipment). PRASA has also developed optimized meter reading processes that are currently being tested in the Metro Region.

3.4. 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. The specific initiatives being implemented under this program are described below.

3.4.1. 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 four fiscal years.

As shown in the figure below, in FY2010, FY2011 and FY2012 PRASA exceeded its budgeted amount for operational initiatives. In FY2012, PRASA collected approximately \$74.2M through its Revenue Optimization Program, which is 23% higher than the FY2012 approved budget amount of \$60.3M.

**Figure 3-1: Revenue Optimization Program Results
FY2009-FY2012 (\$, Millions)**

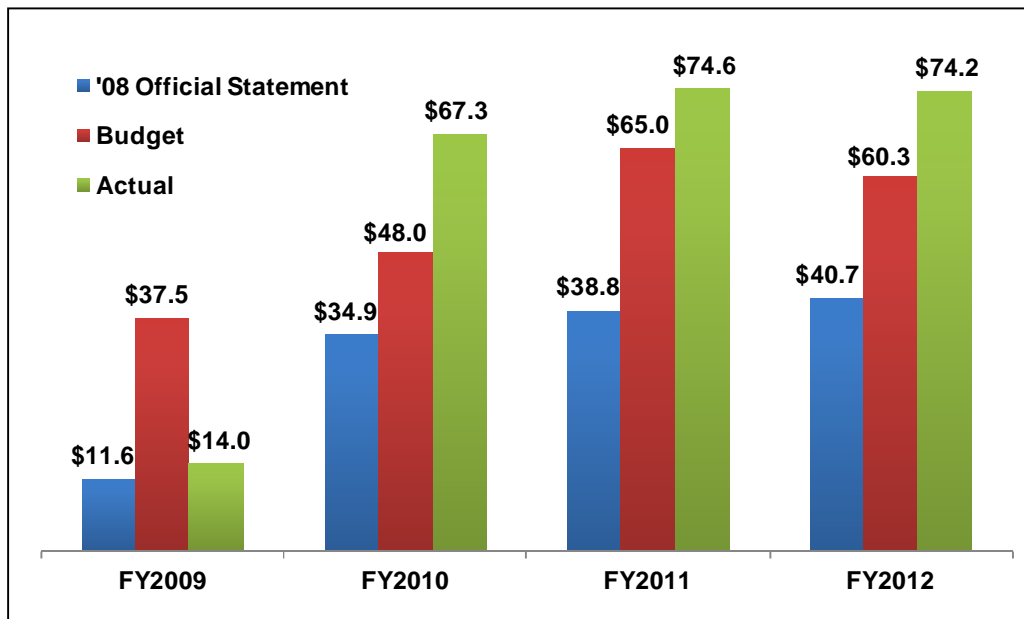


Table 3-2 presents a breakdown of the Revenue Optimization Program initiatives, their respective revenue impact budgeted for FY2013 and estimated annual benefits for FY2014 through FY2017.

**Table 3-2:
Revenue Optimization Program Initiatives –
FY2012 – FY2017 (\$, Thousands)**

Initiative	FY2012 Results	FY2013 Budget	FY2014 Projection	FY2015 Projection	FY2016 Projection	FY2017 Projection
Small Meters	\$23,178	\$33,732	\$39,416	\$43,442	\$47,249	\$50,052
Degradation	(7,000)	(7,000)	(7,000)	(7,000)	(7,000)	(7,000)
Large Meters	19,398	9,814	10,245	10,010	10,783	12,388
Theft and Tx ¹ Accounts	17,016	8,715	11,489	12,216	12,773	13,161
Sprinklers	1,710	1,316	1,091	1,233	1,375	1,517
Disconnections	15,353	17,332	10,000	9,600	9,000	8,400
Inactive Accounts	419	320	-	-	-	-
Class Correction	543	564	408	522	594	666
Condominiums	456	600	600	600	600	600
Collection Management and Miscellaneous	3,146	1,200	1,353	1,353	1,353	1,353
Total	\$74,219	\$66,593	\$67,602	\$71,976	\$76,728	\$81,138

¹ 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 staff informed the Consulting Engineer that approximately 120,000 meters were replaced in FY2009, 138,000 in FY2010, 48,000 in FY2011, and approximately 110,000 in FY2012. The FY2012 revenues (minus adjustment for degradation) collected from this initiative were \$16.2M. PRASA estimates 100,000 small meters will be replaced in FY2013 at a capital cost of approximately \$12.8M. Additional combined revenues expected from the meter replacements initiative (minus adjustment for degradation) for FY2013 is estimated at \$26.7M, including additional revenue generated from the over 400,000 meters previously replaced from FY2009 through FY2012. PRASA estimates that an additional 400,000 meters will be replaced between FY2014 and FY2017, with projected additional revenue results (minus adjustment for degradation) that range from \$32.4M in FY2014 to \$43.1M in FY2017.

- 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.

Over the last four fiscal years PRASA has replaced over 2,800 large meters: 908 in FY2009, 517 in FY2010, 845 in FY2011 and approximately 600 in FY2012. In FY2012, PRASA had additional billed revenues from this initiative of \$19.4M. In FY2013, PRASA estimates 650 large meters will be replaced. The total projected additional revenue from these meter replacements, combined with the revenues from the meter replacements performed in FY2009 through FY2012 amounts to \$9.8M. PRASA estimates that an additional 2,000 large meters will be replaced between FY2014 and FY2017, with projected additional revenue results that range from \$10.2M in FY2014 to \$12.4M in FY2017.

- 3) **Theft:** 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.

Under this initiative, from FY2010 through FY2012, PRASA has collected about \$45M related to theft of water. In FY2013, PRASA has included in its budget additional revenues from this initiative in the amount of \$8.7M. PRASA has estimated that future collections will range from \$11.5M in FY2014 to \$13.2M in FY2017.

- 4) **Fire Protection and Sprinkler Initiative:** 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. PRASA visited 264 additional targeted customers in FY2011, which represent additional revenues in the amount of \$1.6M. In FY2012, PRASA visited around 253 customers and collected approximately \$1.7M in additional revenue both from the accounts intervened in FY2012, as well as the accounts activated and normalized in previous years. In FY2013, PRASA will not visit additional accounts under this initiative in order to focus its efforts on higher investment-return initiatives. Nevertheless, the normalized accounts should continue to generate additional revenues for PRASA. As such, PRASA has projected that from FY2013 through FY2017, on average, it will collect \$1.3M each year in additional revenue from the activated and normalized accounts.

- 5) **Disconnections:** Since FY2010, PRASA has been proactively performing service disconnections island-wide. Service disconnections are made to customers who do not pay their bill on time, who are found to be stealing water, among other irregularities. Through this initiative, PRASA has collected approximately \$73M in additional revenue from FY2010 through FY2012. PRASA is projecting \$17.3M in additional revenues for FY2013 for this initiative and for FY2014 through FY2017, it projects that on average it will collect an additional \$10M in revenues in each year.
- 6) **Miscellaneous:** This category includes other revenue optimization initiatives such as rate classification/categorization (class and meter size) corrections, condominium service connection fees and charges, collections management (previously included as a separate category), and other miscellaneous efforts. In FY2011, PRASA collected \$4.5M of the \$7.8M budgeted. In FY2012 PRASA collected \$3.1M in additional revenues from this initiative, and is budgeting \$2.4M for FY2013. Also, PRASA projects that, on average, it will collect an additional \$2.4M in each year from FY2014 through FY2017.

3.4.2. Additional NRW Reduction Initiatives

PRASA has initiated the development of a strategic NRW management and reduction plan. For this, PRASA retained the services of Miya Puerto Rico LLC (Miya) a local subsidiary of Miya Luxemburg Holdings S.a.r.l., a world-renowned NRW consultant in late 2011. The objective of this strategic NRW management and reduction plan is to provide PRASA with the necessary information to implement a comprehensive and cost-effective long-term NRW management program that focuses on the following two main components:

- Reduction of commercial losses, generating additional revenues
- Reduction of physical losses, generating expense savings

In May of 2012, Miya submitted the *Strategic Plan for Water Loss Reduction and Control*. The plan includes the following:

- A NRW assessment, water balance analysis and calculation of water loss performance indicators
- A comprehensive NRW management strategy and preliminary implementation cost/benefit estimates
- Recommendation of changes necessary to PRASA's organization for successful long-term NRW management, including staff necessary to lead PRASA's NRW reduction and control measures

The plan recommends that PRASA continue to address and reduce its commercial (apparent) losses since this represents the highest economic opportunities for PRASA. A set of specific

initiatives are recommended for implementation, in addition to those being addressed in PRASA's Revenue Optimization Program. PRASA estimates that the net economic impact of these additional commercial loss reduction initiatives could be in the range of \$1M (year 1) and \$20M (year when implementation is completed).

Additionally, the plan recommends that PRASA address its physical (real) losses, its other NRW reduction opportunity area, focusing on:

- Improving the accountability of water production through audits and meters installation
- Identifying and repairing visible and hidden leaks in pipelines and service connections points
- Optimizing and managing water pressures in the System to reduce pipelines breakages through sectorization, dynamic controllers and variable frequency drives (VFDs)
- Replacing aging pipeline
- Reducing or eliminating water tanks overflows and valve leaks

To address these initiatives, considerable expense and capital investments will be required in the initial implementation years. However, in later years these investments would represent significant cost reductions in water treatment and distribution costs. PRASA estimates that the net economic impact of these physical loss reduction initiatives could be in the range of \$1M (year 1) and \$30M (year when implementation is completed).

PRASA indicates that they have analyzed Miya's findings and recommendations, and have identified certain activities to be implemented on a short-term basis (mostly related to commercial losses) and others that are in the planning stages for future implementation (mostly related to physical losses). PRASA is looking closely at the potential costs and benefits of the recommended actions, as well as their estimated schedule for implementation, to initially address those that represent the highest return on investment within the shortest amount of time possible.

3.4.3. Select Initiatives from the Postponed Public-Private Partnership (PPP) Project

Notwithstanding the cancellation of PRASA's PPP project procurement process and postponement of its implementation back in early 2011, PRASA continues to transform and optimize its commercial processes. Recognizing the need for increased accuracy in its meter reading practices, PRASA has embarked on two key projects that had been included in the PPP project. These are: 1) the development of a customer geodatabase (cadaster); and 2) the development and installation of automated meter reading technology for large meter customers in the Metro Region. A brief description of these two select initiatives is presented below.

3.4.3.1. 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 SAP⁷ 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 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

Procured services include, but are not limited to, the following:

- 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
- Field investigations to collect and validate customer data for those customers not identified through the integration of the databases
- Development of the geodatabase using GIS software
- Standardizing customers' physical and postal addresses in both the geodatabase and PRASA's SAP customer database
- Linking the geodatabase with PRASA's SAP customer database
- Training PRASA employees in the O&M, updating, and troubleshooting of the geodatabase

The Contractor began work in this project in July of 2012. The estimated implementation time is approximately 12 months; however, the project is currently running behind schedule as a result of a delay in the development and acceptance of the project implementation protocols. PRASA projects that the work will be completed in FY2014.

⁷ SAP = Systems, Applications, and Products in Data Processing

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

This project consists in the installation and operation of an Automatic Meter Reading and/or Advanced Metering Infrastructure (AMR/AMI) system for 3,305 large meter customers in the Metro Region. The project objectives include:

- Increasing efficiency and accuracy of the meter reading and billing process: PRASA seeks to reduce the time it takes to read meters, increase the frequency of meter reads while reducing the number of estimated bills, and reduce the errors in customer bills associated with manual meter reads.
- Improving customer service: PRASA seeks to improve customer service by reducing estimated and erroneous bills, and allowing customers to access their consumption data over the Internet.

Services to be procured include, but are not limited to:

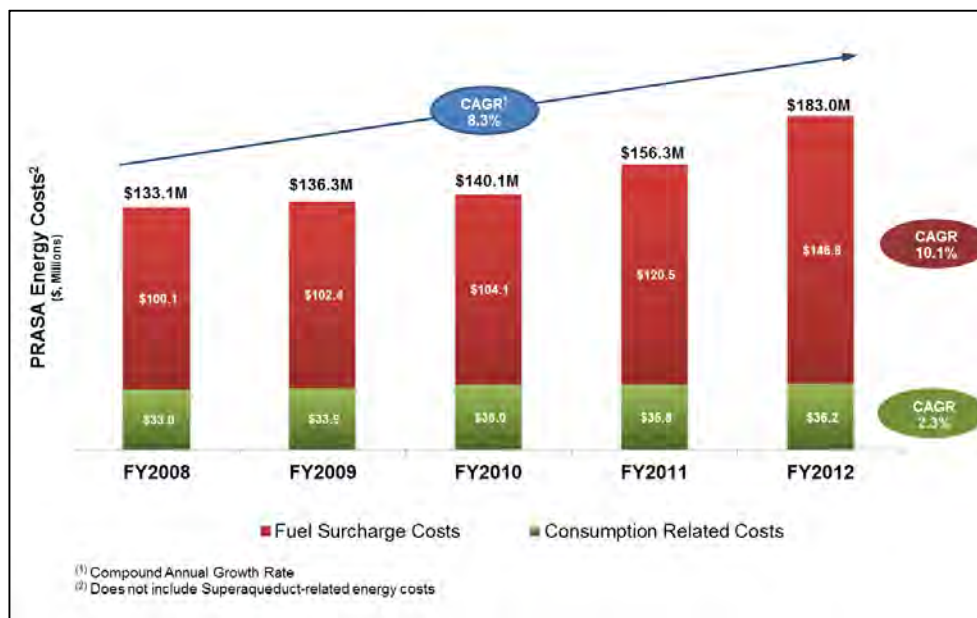
- Supply and installation of an AMR/AMI system
- Integration of the AMR/AMI system with PRASA's SAP customer database
- Provision of an interactive web application for customers to access their consumption data over the Internet
- O&M of the system, including reading and maintaining the meters and associated equipment

PRASA opted to delay the procurement process for this project in order to allow for the necessary internal due diligence and identification of the large meter customers to be impacted. The request for proposals (RFP) document has been finalized and procurement is projected to be completed in FY2013. In turn, project implementation is projected to commence in FY2014. The implementation time for this initiative, although originally estimated at 18 months, has been revised to 24 months.

3.5. Comprehensive Energy Management Program

PRASA's energy costs have increased in the last five fiscal years at an average rate of 8.3% per year as shown in Figure 3-2. PRASA's energy cost is the second largest cost behind payroll and makes up approximately 26% of its total operational costs. As shown in Figure 3-2, PRASA's consumption costs have stayed more or less steady since FY2008. The increase in electricity costs is mainly due to increases of the PREPA fuel surcharges and adjustments costs which are passed through to its customers. These fuel surcharge costs have continued to increase at an annual rate of approximately 10.1% per year. Since FY2005 up until the present, PRASA has experienced an average energy cost increase of about 11.4% per year.

Figure 3-2: PRASA Annual Energy Costs FY2008-FY2012



The average price per barrel of oil for the last six months of FY2012 (January 2012 to June 2012) was \$108⁸. Compared to the average of the last six months of FY2011 (\$107), the average price per barrel of oil increased only about 1%. PRASA’s average monthly cost of electric power for the last six months of FY2012 was \$15.5M, compared to \$14M in the same period for FY2011.

In order to reduce its electricity costs and reduce its dependency on PREPA, PRASA has undertaken two separate procurement processes to engage the private sector in investing in energy related projects, discussed below. These are: 1) Demand Side Projects through Energy Performance Contracts (EPCs); and 2) Supply Side Projects through Power Purchase Agreements (PPAs). Also, PRASA and PREPA are currently in negotiations to transfer all hydroelectric facilities currently owned and operated by PREPA to PRASA. Once the transfer and transition phases are completed, this effort could represent significant additional net cost savings to PRASA. Conservatively, PRASA has not included benefits from its Comprehensive Energy Management Program efforts in its financial projections, later discussed.

3.5.1. Demand Side Projects through Energy Performance Contracts

PRASA has already completed 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

⁸ Source: U.S. Energy Information Administration
 (<http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=rwtc&f=m>)

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; as such, it does not have to place additional burden to its CIP. 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.

The procurement process included a Request for Qualifications (RFQ) phase, followed by a RFP phase. 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. Seventeen (17) companies were qualified through the qualification process. Five of these companies presented proposals. A total of 15 proposals were received and evaluated. The proposed projects varied in complexity, investment, and projected savings.

To date, PRASA has already begun the implementation/construction phase for one facility, has completed six Investment Grade Energy Audits (IGEAs), and is in the development phase of five additional IGEAs. Expected annual savings (compared to current costs) are estimated at \$5M. Table 3-3 below provides a status summary of this initiative.

**Table 3-3:
PRASA EPCs**

Proponent	Facility Type	Number of Facilities to be Intervened	Status
Omega-Wendell	Buildings ¹	8	IGEA Completed In Contract Development
Omega-Wendell	Plants ²	4	IGEAs In Development
Honeywell	Plants ²	6	IGEA Completed In Contract Development
Honeywell	Superaqueduct ³	10	IGEA In Development

¹ Includes Headquarters (central office), six operations offices, and one laboratory.

² Includes top four water and top six WWTP facilities.

³ Includes the WTP and nine WPSs.

3.5.2. Supply Side Projects through Power Purchase Agreements

PRASA is also undertaking 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 kilowatt-hour (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, thus far only three of the seven negotiations carried out by PRASA resulted in a successful agreement between the parties. Table 3-4 provides a status summary of the signed PPAs.

**Table 3-4:
PRASA PPAs**

Proponent	Technology	Status
Aspenall Energies	Wind	Contract Signed
Renewable Power Development	Waste-to-Energy	Contract Signed
Windmar Renewable Energy (PVP)	Solar	Contract Signed

If successfully implemented, these supply side initiatives should be able to provide larger savings to PRASA than the demand side initiatives; projected savings are in the order of approximately \$15M annually (after all are implemented). Additionally, there are other proposals still under evaluation (including non-solicited proposals received by PRASA), which may provide further benefits through this initiative. 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.

3.5.3. Acquisition of PREPA’s Hydroelectric Assets

PRASA and PREPA are currently finalizing an asset purchase transaction in which PRASA will acquire certain hydroelectric power generation assets currently owned and operated by PREPA. Specifically, PRASA intends to acquire the generation units of 10 hydroelectric systems of which six are currently active. PREPA’s reservoirs and irrigation systems are not included in the transaction at this time. The objective of this transaction is for PRASA to maximize the production of hydroelectric energy of these assets to reduce its energy costs.

PRASA estimates that it can realize average annual net savings, after O&M expenses, in the order of \$30M⁹. These annual cost savings may vary from \$18M to \$40M and will depend on the energy production levels that are achieved. PRASA expects to produce an aggregate total of

⁹ Savings and capital investment estimates do not include potential additional costs related to the dredging of certain water reservoirs, which may be required to increase water capacity and availability for the operation of the hydroelectric facilities.

hydroelectric energy between 140 and 200 million of kWh per year. These preliminary savings estimates assume that PREPA will award PRASA full credit for all of the energy produced by the hydroelectric assets and that PRASA will compensate PREPA for administrative and transmission costs at a rate that will begin at \$0.02 per kWh and may escalate in the future. It should be noted that PRASA plans to initially contract with PREPA to provide O&M services of all the facilities for at least the first three years after the execution of the transaction in order to ensure a smooth transition.

PRASA has retained an engineering consultant, the CSA Group, to prepare a Hydroelectric System Evaluation Summary to determine: 1) the current asset condition and the corresponding capital improvements needed, 2) the potential maximum production level of each facility given its water availability conditions, and 3) the operational improvement opportunities that could be implemented to maximize and optimize the operation of each facility. CSA Group is expected to complete the study by June 2013; however, it has already provided PRASA some preliminary results that suggest that PRASA would need to implement a capital improvement and upgrade program of approximately \$25M during the first five years after the transaction is executed. PRASA believes that the eventual implementation of these capital investments combined with operational improvements could result in even higher energy production levels in the future. However, these optimistic expectations must be validated with the findings to be included in CSA Group's final report. MPPR/Malcolm Pirnie has not validated PRASA's additional generation estimations at this time.

As of the date of this report, resolutions have been approved by both the PRASA¹⁰ and PREPA¹¹ governing boards, authorizing the agencies to move forward and complete the transaction. Additionally, all key terms have been negotiated and agreed by both parties and several agreements have been drafted and are ready for execution. PRASA expects the transaction to be executed during FY2013.

3.6. Integrated Preventive Maintenance Program (IPMP) Progress

The 2006 and 2010 Consent Decrees with USEPA and the 2006 Transactional Agreement with PRDOH require that PRASA implement and continue to develop a comprehensive IPMP to ensure the proper O&M of its plants and other critical facilities, including WWPSs. Through the IPMP, PRASA is establishing 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 currently finances part of the IPMP through its CIP (costs associated with the necessary

¹⁰ Board Resolution No. 2370 as amended

¹¹ Board Resolution No. 3973

R&R prior to the integration of the facilities into the IPMP) and the rest (the actual maintenance costs) through its O&M budget.

To date, PRASA has expended approximately \$120M in the development and implementation of the IPMP. Additionally, PRASA plans to spend an additional \$38M of R&R in the FY2013-FY2016 period to complete the development and implementation of the program. In FY2014 and beyond, all the operating costs associated to the preventive maintenance will continue to be included in PRASA's annual O&M budget as a regular operational expense.

Some of the benefits highlighted by PRASA regarding the IPMP include the following:

- Creation of PRASA's first centralized inventory of assets (equipment and instruments), which includes historical information regarding maintenance.
- Implementation of a robust maintenance program that integrates and centralizes procedures, systems, documentation, metrics, and technical and cost information of PRASA's fixed assets.
- Improved planning and management of fixed assets maintenance.
- Compliance with regulatory agency consent decrees and agreements.

Because the IPMP is a dynamic and flexible program, it has allowed PRASA to make adjustments throughout its development and implementation to optimize it and further reduce costs associated with its implementation. PRASA projects that by FY2013 all WTPs, WWTPs, WWPS, and Dams, and select water ancillary facilities will be included in the IPMP. Approximately 3,332 facilities are projected to be included in the IPMP by FY2013. Furthermore, PRASA has coordinated the IPMP implementation with the Treatment Plant Automation Program (discussed in the following section), in order to better align and optimize its program implementation efforts for both initiatives.

3.7. 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). A total of 119 WTPs¹² will be integrated under the program (the remaining five facilities are either scheduled for closure in the next few years or it is not feasible/cost effective to automate). In turn, these 119 WTPs will be

¹² In previous reports, 121 WTP had been mentioned to be in the program. However, two of the facilities are scheduled for closure and have been removed from the program.

organized in clusters (a total of 24) that will be operated and monitored from a Regional Operational Center (ROC).

Due to PRASA's fiscal situation, the implementation phase of the program has been delayed. Also, during FY2012, PRASA and its consultant modified the development plan for the initiative. The program implementation was divided into phases:

- Phase I: Interim automation focused on reducing one operational shift (also called 8-4-8-4 operations) per plant per day resulting in overtime reduction. 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. Also includes delivering remote monitoring and automatic shutdown capabilities at the WTPs island-wide.
 - Maturity Period (FY2013-FY2014): One year period to allow for organizational integration of all support functions into the new cluster organization
- Phase II: Full automation focused on unattended, remote plant operations resulting in reduction in energy, chemicals and labor.

The Phase I rehabilitation scope for all the WTP facilities has been defined and is now under construction and/or procurement. During October 2012, accelerated delivery of plant migration and remote monitoring metrics was continued. The startup works have focused on the delivery of software migration to achieve remote monitoring metrics. As of this date, the program already has five full clusters with remote monitoring capabilities, with another three expected by the end of the year. Three more clusters have begun the startup phase, but remain in the process of completing such migration.

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 ROC has already been completed as of FY2012. Five PCCs and one ROC are expected to be completed by the end of this year (2012); 10 PCCs and two ROCs by the end of 2013; and six PCCs and the last ROC by mid-2014.

Eight-four (8-4) operations endorsements have been approved by the PRDOH for the following four WTPs: Esperanza WTP, Arecibo WTP, Guzmán Arriba WTP, and Cubuy WTP.

Table 3-5 summarizes the projected program development schedule over the next five fiscal years. Once all facilities are automated and the clusters are formed, PRASA estimates that the annual cost savings could be as much as \$21M, as a result primarily of payroll (overtime) cost reductions.

**Table 3-5:
Plant Automation Implementation Schedule**

Fiscal Year	Program Phase	Cumulative Plants in Program (Phase I Completed¹)	Cumulative Plants in Program (Phase II Completed²)
2013	I	34	6
2014	I	116	6
2015	I & II (Maturity Period)	119	6
2016	II	N/A	60
2017	II	N/A	119
Total Plants Automated 2013-2017			119

¹ Phase I: Interim Automation (8-4-8-4)

² Phase II: Full Automation

3.8. 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 more recent 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 opportunities to optimize and further reduce its expenses if possible. Opportunity areas include, but are not limited to, payroll and benefits, overtime and chemical costs. Also, benchmark comparisons show that PRASA has areas that could be improved and that represent large opportunities with regards to the reduction of its NRW and increasing its billings and collections.

PRASA continues to develop and implement operational initiatives with the goal of improving and optimizing its operations. 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. This, in turn, could help to partially offset or minimize the need for rate increases or other revenues sources in the future.

4. Capital Improvement Program and Regulatory Compliance Status

4.1. 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 PRASA's infrastructure 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. PRASA's five-year CIP has a comprehensive listing of projects and budgets through June 30, 2017. A total of 663 projects are scheduled for implementation during this period. As required by PRASA's Board of Directors, PRASA's Infrastructure Department must annually submit for its approval an updated five-year CIP plan. PRASA's Board-approved CIP includes \$1,505.4M in capital expenditures over fiscal years 2013 through 2017¹³. In FY2012, PRASA's capital expenditures amounted to \$406.7M. 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. In addition, 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.

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.

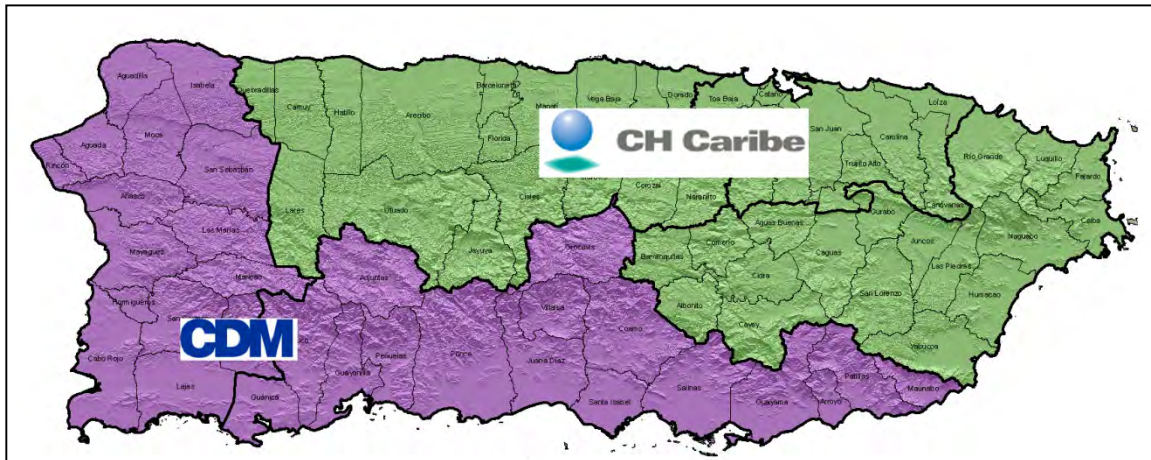
4.2. CIP Development and Management

PRASA continues to engage world renowned engineering and consulting companies (Program Management Consultants, or PMCs) in the development, implementation, and evolution of the CIP. Since July of 2009, there are two PMCs (shown in Figure 4-1) that provide support to

¹³ Approved under Board Resolution 2712

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.

Figure 4-1: Current Program Management Consultants and their Respective Regions



PRASA also continues to engage other engineering and consulting companies, including CSA Group, Caribbean Project Management, MPPR/Malcolm Pirnie, and Black & Veatch of Puerto Rico, in areas such as planning, design, land acquisition and other special assignments.

4.3. CIP: Project Distribution and Costs

There are 663 projects currently included in the FY2013–FY2017 CIP. 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 Board of Directors for their 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)

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.

4.3.1. 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, listed below:

- Mandatory (USEPA, PRDOH, Civil Action, Administrative Orders)
- Non-Mandatory Compliance (Health and Safety)
- 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 and grow the System. As for the new structure category, this one 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.

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.

4.3.2. CIP Programming: FY2013-2017

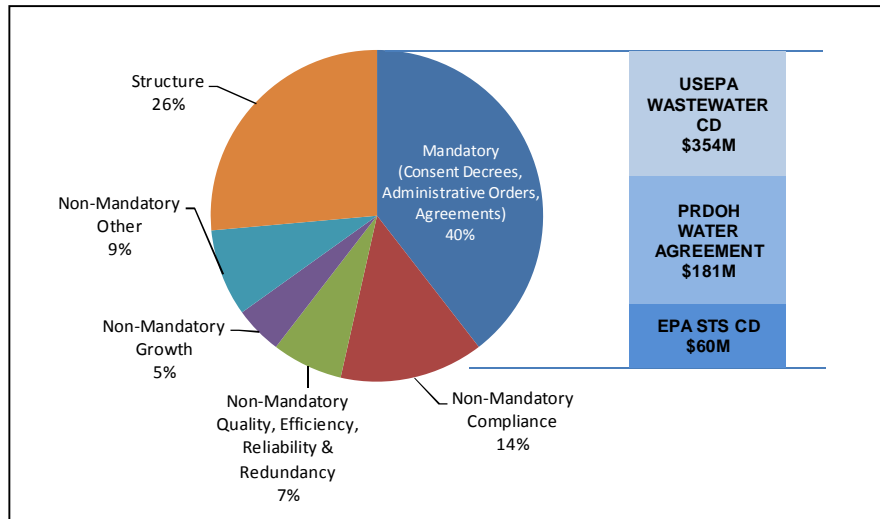
The CIP budget for FY2013 through FY2017 amounts to \$1,505.4M and includes \$595.1M for mandatory projects, as shown in Table 4-1. Figure 4-2 shows the total capital expenditures by category for FY2013 through FY2017.

**Table 4-1:
Capital Improvement Program FY2013-2017 by Category (\$, Millions)**

Project Category	Fiscal Year Ending June 30,					Total ¹
	2013	2014	2015	2016	2017	2013-2017
Mandatory (Consent Decrees, Agreements etc.)	\$127.60	\$117.30	\$126.60	\$125.30	\$98.20	\$595.1
Non-Mandatory Compliance	61.4	61.4	38.4	26.2	23.2	\$210.6
Non-Mandatory Quality, Efficiency, Reliability & Redundancy	43.8	31.6	17.5	6.1	5.0	\$104.0
Non-Mandatory Growth	13.6	16.9	11.4	8.3	19.4	\$69.6
Non-Mandatory Other	41.5	35.1	22.8	9.8	19.3	\$128.5
Structure	105.6	100.3	80.7	83.6	27.3	\$397.6
TOTAL	\$393.7	\$362.7	\$297.4	\$259.3	\$192.4	\$1,505.40

¹Numbers may not add due to rounding.

Figure 4-2: FY2013-FY2017 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 FY2013–FY2017 are estimated at approximately \$496M, of which approximately \$271M 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 FY2013–FY2017 are estimated at \$438M, of which approximately \$286M 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 \$572M for FY2013–FY2017. 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 IPMP and certain minor repair projects are categorized as mandatory-driven, with an estimated FY2013–FY2017 capital expenditure of \$38M.

Table 4-2 shows the project distribution and capital expenditure by group and type classification for FY2013 through FY2017.

**Table 4-2:
Capital Improvement Program 2013-2017 by Project Type (\$, Millions)¹**

Category Type	Sub-Category	Fiscal Year Ending on June 30,					Total ¹
		2013	2014	2015	2016	2017	2013-2017
Water System	Water Supply	\$11.2	\$20.0	\$20.4	\$23.1	\$23.3	\$98.1
	STS	\$7.9	\$12.1	\$6.6	\$0.7	\$0.7	\$28.0
	Water Pump Stations	\$1.1	\$0.6	\$3.0	\$1.2	\$0.7	\$6.6
	WTP Capacity Increase	\$2.4	\$3.3	\$2.7	\$5.8	\$6.1	\$20.2
	WTP Improvements	\$33.1	\$24.1	\$27.5	\$38.9	\$32.4	\$155.9
	WTP New	\$29.3	\$19.9	\$12.5	\$16.6	\$7.9	\$86.2
	Water Distribution	\$47.9	\$31.0	\$15.7	\$4.4	\$1.6	\$100.6
	SUBTOTAL	\$132.8	\$111.0	\$88.5	\$90.7	\$72.7	\$495.6
Wastewater System	Wastewater Pump Stations	\$9.0	\$3.4	\$4.4	\$0.7	\$0.8	\$18.3
	WWTP Capacity Increase	\$10.6	\$19.1	\$33.3	\$24.0	\$29.0	\$116.0
	WWTP Improvements	\$4.6	\$12.4	\$20.3	\$22.5	\$26.0	\$85.9
	WWTP New	\$5.5	\$0.4	\$0.0	\$0.0	\$4.9	\$10.8
	Wastewater Collection	\$65.0	\$61.4	\$37.6	\$21.7	\$21.3	\$207.1
	SUBTOTAL	\$94.8	\$96.6	\$95.6	\$68.9	\$82.0	\$438.0
Meters	Water Meters	\$27.8	\$26.4	\$18.8	\$22.5	\$2.0	\$97.6
Buildings	Buildings	\$3.0	\$0.5	-	-	-	\$3.6
Fleet	Fleet	\$4.5	\$4.9	\$5.0	\$3.6	\$0.9	\$18.9
IPMP (R&R component only) ²	Water & Wastewater	\$8.6	\$15.1	\$11.2	\$3.3	-	\$38.2
Minor Repairs	Water & Wastewater	\$23.6	\$14.2	\$3.3	\$0.2	\$2.0	\$43.2
Renovation & Replacement	Water & Wastewater	\$40.6	\$59.6	\$63.0	\$66.2	\$25.0	\$254.4
Technology	Water & Wastewater	\$58.0	\$34.4	\$12.0	\$3.9	\$7.7	\$116.0
	SUBTOTAL	\$166.1	\$155.0	\$113.3	\$99.7	\$37.6	\$571.8
TOTAL¹		\$393.7	\$362.7	\$297.4	\$259.3	\$192.4	\$1,505.4

¹ Numbers may not add due to rounding.

² Does not include actual maintenance costs related to the IPMP; these are included in PRASA's O&M budget.

4.4. Current Regulatory Compliance and the CIP

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 2006-085814– 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, and develop and implement CIP projects to bring the System into compliance with regulatory requirements. 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/Malcolm Pirnie reviewed the following reports, submitted to regulatory agencies in compliance with consent decree and agreement requirements:

- PRASA IV Triannual Progress Report No. 28 that covers the period from May 1 to August 30, 2012

¹⁴ 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.

- 2006 USEPA Consent Decree Triannual Progress Report No.19, covering the period from June 1, 2012 through September 30, 2012
- 2006 PRDOH Agreement Quarterly Progress Report No. 18, covering the period from July 1 to September 30, 2012
- 2010 USEPA STS Consent Decree Triannual Progress Report No. 7, covering the period from May 1 to August 31, 2012

MPPR/Malcolm Pirnie found that PRASA continues to adequately comply with consent decree and agreement requirements, and continues to foster an open communication policy with USEPA and PRDOH. PRASA's five-year CIP, previously described, was compared with existing consent decrees and agreements to determine the adequacy of the identified projects in the CIP with regulatory requirements. All project requirements have been included in PRASA's CIP; and, with the exception of a few projects which have required time extension approvals from USEPA or PRDOH, PRASA continues to implement these projects by the stipulated deadlines.

In general, the CIP is structured to modernize and help bring the systems into compliance with applicable environmental laws, and adequately addresses the requirements of these 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

4.5. 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.

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

- Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR).
- Long Term 2 Enhanced Surface Water Treatment Rule (LT2 ESWTR).
- Groundwater Rule (GWR).
- Future contaminants of concern based on current scientific knowledge.

Also, 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. PRASA is currently in the process of conducting the necessary facility evaluations to determine the improvement needs and develop the well remediation program.

PRASA has included some capital investments in its FY2013–FY2017 CIP projections in preparation of the following future regulations. However, additional capital improvements may be required. At this time it is not possible for PRASA to determine the magnitude of such expenditures, but it is likely that these may be significant. As evaluations are completed and CIP project needs are identified, the CIP projections will need to be modified.

Also, it should be noted that PRASA and the Regulatory Agencies are currently in discussions to potentially modify certain requirements of the existing consent decrees and agreements to re-align compliance priorities and, in turn, help lower PRASA's financial burden. These modifications could result in the delay or advancement of the implementation of certain projects currently included in the CIP, and/or the modification of their scope of work. At this time it is not possible for PRASA to determine the results of these discussions and the effects these may have on its CIP; nonetheless PRASA expects that these discussions will be beneficial for PRASA from a financial standpoint.

4.6. Master Plan Updating

The 2010–2030 PRASA Master Plan Update was completed in April of 2011. The 2010–2030 Master Plan provides PRASA with a clear roadmap for the implementation of its future investments in water and wastewater infrastructure over the next 20 years. PRASA is currently evaluating, comparing, and merging its existing CIP project inventory with the one provided by the updated 2010-2030 Master Plan. Also, demand projections are currently being revised in accordance with the most updated census population data and, as previously mentioned, the project prioritization system is also being revised. 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.

4.7. Conclusions

PRASA’s CIP generally addresses the needs of the System and complies with PRASA’s existing commitments with regulatory agencies. The CIP includes projects that cover a broad array of current and future needs, as identified by PRASA and as required by consent decrees. The CIP also includes funding for PRASA’s R&R program. However, 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 preventive 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.

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, 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. As such, PRASA must continue to engage and communicate effectively with Regulatory Agencies.

5. Financial Analysis

5.1. Introduction

In the preparation of this CER, MPPR/Malcolm Pirnie reviewed the PRASA-prepared financial forecast (the Forecast) shown in Exhibit 1 (enclosed at the end of this section). This section summarizes the findings of MPPR/Malcolm Pirnie'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 reserve deposits. Additionally, the Forecast illustrates the anticipated debt service coverage (DSC) for the five fiscal years from July 1, 2012 through June 30, 2017 (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/Malcolm Pirnie 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:

- PRASA's FY2012 preliminary results
- PRASA's FY2013 Annual Budget
- PRASA's FY2014-FY2017 revenue and expense projections
- Audited financial statements for FY2009, FY2010, and FY2011
- Draft audited financial statements for FY2012
- Debt service schedules for all currently outstanding debt service and preliminary projected debt obligations
- Amended and restated 2012 MAT
- Amended and restated 2012 FOA
- FY2013 year-to-date (YTD) results as of October 31, 2012

The following presents a summary of the financial review and MPPR/Malcolm Pirnie's assessment of the reasonableness of the Forecast and its key underlying assumptions regarding water consumption (demand) and sales, customer growth, revenues, O&M expenses, capital expenditures and debt service. As part of its review, MPPR/Malcolm Pirnie also completed a

sensitivity analysis and prepared an Alternate Case Forecast, shown in Exhibit 2 (enclosed at the end of this section), utilizing more conservative assumptions for certain budget components.

5.2. PRASA's Rate Structure

PRASA implemented a two-phase rate increase effective on October 10, 2005 and July 1, 2006. Resolution No. 2167 (the Resolution) was approved on October 6, 2005 by PRASA's Board of Directors after recommendation by PRASA's Executive President and the Board's Revenue Committee. The Resolution included provisions for future increases as outlined below:

- a) Rates for water and sewer service are not allowed to be increased prior to July 1, 2009 (FY2010);
- b) Increases after July 1, 2009 will be calculated according to a specified formula (Coefficient of Annual Adjustment [CAA] described below);
- c) Beginning July 1, 2009, there is a cap or limit on future annual increases of 4.5% and a limit on the cumulative increases of 25%;
- d) 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, 2009 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:

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

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

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

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 FY2014 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.

The rates that are currently in place are based on the public utility ratemaking principles taken from Principles of Public Utility Rates¹⁵ and promote water conservation. The rate structure for water and wastewater services consists of a fixed monthly base charge with a volumetric consumption unit rate. Charges and rates are different for each of the residential, commercial, industrial and government customer classes. The fixed base charge varies with the size of the water service line and includes 10 cubic meters of monthly consumption regardless of total water use, while the volumetric rate is assessed based on the metered water consumption that exceeds the first 10 cubic meters per month.

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 Programa de Asistencia Nutricional (PAN) Program or residents under the Programa de Asistencia Temporal para Familias Necesitadas (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 5-1 summarizes the number of residential customers that are provided a subsidy for water and wastewater bills as of June 30, 2012.

**Table 5-1:
Water and Wastewater Subsidized Customer Accounts**

Subsidy	Number of Customers	Percent of Total Residential Customers ¹
PAN Subsidy	42,071	3.22%
TANF Subsidy	12,274	0.94%
Fixed Tariff (Public Housing)	51,476	3.94%
Total	105,821	8.10%

¹Based on a total number of residential customers of 1,307,436 as of June 30, 2012.

PRASA's current rate structure for residential customers, effective since July 1, 2006, is shown in Tables 5-2 and 5-3 below. No changes to PRASA's rate structure have been made since then.

¹⁵ James C. Bonbright, Albert L. Danielsen, and David R. Kamerschen with assistance from John B. Legler

**Table 5-2:
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"	16.18	13.94	30.12
1"	26.58	17.90	44.48
1 1/2"	50.22	27.54	77.76
2"	85.49	47.09	132.58
3"	131.13	78.45	209.58
4"	294.97	137.76	432.73
6"	786.63	642.86	1,429.49
8"	1,258.61	734.69	1,993.30
10"	2,013.79	1,175.50	3,189.29
12"	\$3,222.06	\$1,880.81	\$5,102.87

**Table 5-3:
Residential Volumetric Rate per Cubic Meter**

Block	Monthly Usage (cubic meters)	Water	Wastewater	Water & Wastewater
1	>10 - 15	\$1.10	\$0.90	\$2.00
2	>15 - 35	1.60	1.33	2.93
3	> 35	2.16	1.77	3.93

Table 5-4 presents benchmark values for water and wastewater rates for the year 2011.

**Table 5-4:
2011 Water and Wastewater Rates Benchmarks Summary**

Metric	Top Quartile	Median	Bottom Quartile
Monthly residential water rate per cubic meter	\$0.80	\$1.02	\$1.36
Monthly residential wastewater rate per cubic meter	\$0.94	\$1.16	\$1.49
Average residential water bill amount for one month of service	\$20.94	\$26.27	\$40.00
Average residential wastewater bill amount for one month of service	\$21.20	\$27.97	\$38.22

Source: Independent survey of 94 water utilities and 65 wastewater utilities conducted in 2011.

Based on FY2010–FY2012 water usage, PRASA’s average residential customer consumed 16.26 cubic meters of water. Table 5-5 shows a typical residential bill under existing water and wastewater rates for 16.26 cubic meters of use. When compared to the 2011 water and wastewater benchmarks (also shown in Table 5-5), PRASA’s average monthly rates are below the median values.

**Table 5-5:
Average Residential Bill Based on FY2010-FY2012
Monthly Usage Average of 16.26 cubic meters**

Rate	Water	Wastewater	Water and Wastewater
PRASA	\$18.12	\$15.29	\$33.41
2011 Median Benchmark	\$18.18	\$20.51	\$38.69

PRASA's current rate structure for non-residential customers (includes commercial, industrial and government customer classes), effective since July 1, 2006, is shown in Tables 5-6 through 5-8 below.

**Table 5-6:
Non-Residential Monthly Base Charge per Account¹
(includes first 10 cubic meters of monthly consumption)**

Water Service Line	Water	Wastewater	Water & Wastewater
1/2" & 5/8"	\$21.43	\$17.67	\$39.10
3/4"	31.73	28.00	59.73
1"	53.72	39.43	93.15
1 1/2"	107.64	66.14	173.78
2"	171.11	103.15	274.26
3"	384.09	214.40	598.49
4"	638.07	404.26	1,042.33
6"	1,607.67	1,296.75	2,904.42
8"	2,584.65	2,011.63	4,596.28
10"	4,135.45	3,218.61	7,354.06
12"	6,616.72	5,149.77	11,766.49

¹ Commercial, industrial and government customer classes.

**Table 5-7:
Commercial and Government Volumetric Rate per Cubic Meter**

Block	Monthly Usage (cubic meters)	Water	Wastewater	Water & Wastewater
1	>10 – 100	\$1.53	\$1.27	\$2.80
2	>100 – 200	1.60	1.33	2.93
3	> 200	1.90	1.60	3.50

**Table 5-8:
Industrial Volumetric Rate per Cubic Meters**

Block	Monthly Usage (cubic meters)	Water	Wastewater	Water & Wastewater
1	> 10	\$1.67	\$1.40	\$3.07

5.3. Master Agreement of Trust

In connection with the 2012 bond issue, on January 24, 2012 PRASA's Board of Directors authorized the execution of an amended and restated MAT (2012 MAT) by and between PRASA and Banco Popular de Puerto Rico as Trustee. 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 (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 Tests (ABT) requirements of the 2012 MAT would also have to be met. A summary of PRASA's 2012 MAT DSC and ABT requirements is presented in Table 5-9.

**Table 5-9:
Summary of 2012 MAT DSC Requirements**

Lien Level	Debt Secured	DSC for Additional Bonds Test ¹	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

¹Two 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.

5.4. Fiscal Oversight and Support Agreement

In connection with the 2012 bond issue, on January 24, 2012 PRASA’s Board of Directors 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 and GDB, as fiscal agent, currently holds it in trust for PRASA.

PRASA initially funded the Budgetary Reserve Fund with 2012 bond proceeds. According to the 2012 FOA, GDB will review and approve PRASA’s five-year Fiscal Improvement Plan with its corresponding Budgetary Reserve Requirement for such fiscal years. If the balance in the Budgetary Reserve Fund falls below a certain level (i.e., transfers exceed the amount budgeted for the fiscal year or insufficient funds are available to cover the additional revenue requirement for the ensuing fiscal year) the Commonwealth agrees that, starting in FY2013 and for each fiscal year thereafter, it shall either (i) request an appropriation or provide another funding source for the projected Budgetary Reserve Requirement applicable to the next succeeding fiscal year (for example, in FY2013, as part of the FY2014 budget, the Commonwealth will request an appropriation or funding source sufficient to cover estimated Budgetary Reserve Requirement for FY2014) or (ii) advise PRASA that it does not intend to request an appropriation to cover all or a portion of the projected Budgetary Reserve Requirement for such next succeeding fiscal year. 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 revenue enhancement and/or expense reducing measures, a rate structure change (i.e., rate increase), or a combination of these measures, in order to satisfy the requirements of the 2012 MAT.

5.5. FY2013 – FY2017 Forecast

Considering the requirements of the 2012 MAT and the 2012 FOA including, but not limited to, the amended Rate Covenant, PRASA has prepared a five-year financial projection for FY2013 through FY2017. MPPR/Malcolm Pirnie reviewed the PRASA prepared FY2013 budget and the Forecast for FY2014 through FY2017 shown in Exhibit 1.

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, 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.

The PRASA-prepared Forecast presented in this section is an updated version of the one included in PRASA's Fiscal Improvement Plan, submitted to GDB in August of 2012. It includes certain projection changes/updates incorporated by PRASA since then. PRASA's revenue projections, (on a cash basis), expense projections (on an accrual basis), and their respective assumptions are discussed below.

5.5.1. 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 2)** – PRASA’s single largest source of revenue is from the monthly base charge and volume rate for services. PRASA’s FY2013 Annual Budget projection includes revenues from base fee and service charges (service revenues) net of subsidies in the amount of \$713M, which is in line with FY2012 results. Similarly, PRASA’s Forecast projections for FY2014 through FY2017 include service revenues, also net of subsidies, of \$714M in each year. As such, PRASA is forecasting that service revenues will remain steady over the forecast period.

PRASA has experienced a modest growth in its number of accounts of approximately 0.98% per year from FY2008 to FY2012, shown in Table 5-10 below. However, PRASA is assuming a conservative forecast of customer growth going forward by projecting a zero percent (0%) customer growth rate in future fiscal years.

**Table 5-10:
Customer Accounts (as of June 30) of FY2008 – FY2012**

Fiscal Year	Customer Class				Total
	Residential	Commercial	Industrial	Government	
2008	1,181,366	63,004	1,447	11,519	1,257,336
2009	1,184,661	61,657	1,280	11,290	1,258,888
2010	1,204,636	62,938	1,237	10,946	1,279,757
2011	1,214,409	62,823	1,218	10,932	1,289,382
2012	1,231,752	63,470	1,217	10,997	1,307,436
CAGR¹ FY2008-FY2012	1.05%	0.18%	-4.24%	-1.15%	0.98%

¹ CAGR = Compound Annual Growth Rate

Despite the modest growth in customer accounts from FY2011 to FY2012, there was a decline in service revenues in FY2012. Total consumption in FY2012 decreased over 2% compared to FY2011, as shown in Table 5-11.

**Table 5-11:
Average Monthly Billed Consumption by Class FY2011 – FY2012
(1,000 Cubic Meters)**

Fiscal Year	Customer Class				
	Residential	Commercial	Industrial	Government	Total
FY 2011	19,721	3,350	1,153	2,788	27,013
FY 2012	19,052	3,064	1,212	2,990	26,318
% Difference	-3.39%	-8.54%	5.12%	7.25%	-2.57%

The reduction in average consumption, combined with the increase in the total number of customers, results in a decrease in the average billed consumption per account of approximately 3.9%, as presented in Table 5-12.

**Table 5-12:
Average Monthly Consumption per Account FY2011 – FY2012
(Cubic Meters)**

Fiscal Year	Customer Class				
	Residential	Commercial	Industrial	Government	Total
FY 2011	16.24	53.32	946.63	255.03	20.95
FY 2012	15.47	48.27	995.89	271.89	20.13
% Difference	-4.75%	-9.47%	5.20%	6.61%	-3.92%

However, it should be noted that FY2013 YTD results through October 31, 2012 show that the average monthly billed consumption is 8% above the FY2012 results. Also, FY2013 YTD service revenues have been reported to be above the FY2013 budget target by approximately 11%.

As previously mentioned, PRASA's service revenues are presented net of subsidies. Currently PRASA offers subsidy programs to customers who qualify for the PAN and TANF programs, and public housing customers. The PAN/TANF programs subsidy is projected to amount to \$4M in each year 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.

With regards to PRASA's rates, PRASA has not raised its service rates in recent years due to the difficult economic situation in Puerto Rico. Instead, the Commonwealth has provided funding to cover deficits in the last three fiscal years. As it will be later discussed, starting on FY2014 PRASA plans to supplement its Operating Revenues by increasing rates, increasing the Authority Revenues with Other Sources of Revenue which may include transfers (yet to be identified) from the Budgetary Reserve Fund, or with a combination of these measures.

MPPR/Malcolm Pirnie believes that PRASA's projection for service revenues seem reasonable given the FY2012 preliminary results and FY2013 YTD results. However, it

should be noted that continued strain on the economy and the high unemployment rate in Puerto Rico¹⁶ could cause further decline in the consumption patterns of PRASA customers, resulting in reductions of projected service revenues. Hence, FY2013 YTD results should be closely monitored and projections for subsequent fiscal years shall be adjusted accordingly if necessary.

2. Operational Initiatives (Exhibit 1, lines 3 & 4) – As mentioned in Section 3 of this report, PRASA’s operational initiatives are a set of programs implemented to optimize revenue billings and collections. The Revenue Optimization Program is the most significant (in terms of additional revenue potential) of these initiatives and has shown encouraging results in each of the past four fiscal years. A summary of the estimated annual benefits of the Revenue Optimization Program for the forecast period, as provided by PRASA and its consultant, is shown in Table 5-13 below. It should be noted that in FY2013, PRASA has budgeted an additional \$4.6M in revenues to be obtained from other NRW reduction efforts.

**Table 5-13:
Projections of Revenue Optimization Initiatives for FY2013 – FY2017
(\$, Thousands)**

Initiative	FY2013 Budget	FY2014 Projection	FY2015 Projection	FY2016 Projection	FY2017 Projection
Revenue Optimization Program					
Small Meters	\$33,732	\$39,416	\$43,442	\$47,249	\$50,052
Degradation	(7,000)	(7,000)	(7,000)	(7,000)	(7,000)
Large Meters	9,814	10,245	10,010	10,783	12,388
Theft and Tx ¹ Accounts	8,715	11,489	12,216	12,773	13,161
Sprinklers	1,316	1,091	1,233	1,375	1,517
Disconnections	17,332	10,000	9,600	9,000	8,400
Inactive Accounts	320	-	-	-	-
Class Correction	564	408	522	594	666
Condominiums	600	600	600	600	600
Collection Management and Miscellaneous	1,200	1,353	1,353	1,353	1,353
Additional NRW Reduction Initiatives					
MIYA Initiatives	\$4,607	-	-	-	-
Total	\$71,200	\$67,602	\$71,976	\$76,728	\$81,138

¹Inactive customer accounts with consumption.

MPPR/Malcolm Pirnie believes that PRASA has a strong commitment to its operational initiatives, particularly the Revenue Optimization Program (as evidenced by historical

¹⁶ Based on the United States Bureau of Labor Statistics, as of October of 2012 the unemployment rate in Puerto Rico was 13.8%, which is 2.3% lower than reported in June of 2011; Source: www.bls.gov/lau/

results), and to achieving the goals outlined for each initiative. As presented in Section 3, FY2012 preliminary results show that PRASA collected \$74.2M in additional revenue from these initiatives. FY2013 YTD results through October 31, 2012 show that PRASA is slightly below budget targets; however, historical results show that these initiatives usually experience a ramp up in the third and fourth quarters of the fiscal year.

Based on the FY2012 preliminary results and FY2013 YTD results through October 31, 2012, MPPR/Malcolm Pirnie finds the FY2014 and FY2015 projections reasonable. However, MPPR/Malcolm Pirnie recommends the use of a more conservative projection for FY2016 and FY2017. As such, projected revenues from the Revenue Optimization Program have been adjusted to \$71.9M in these two fiscal years. These adjustments are reflected in the Alternate Case Forecast presented in Exhibit 2.

3. Billings to Collections Adjustment (Exhibit 1, line 5) – PRASA’s Forecast includes a billings to collections adjustment to account for uncollectible invoices. Historically, this adjustment has varied from a high of 18% in FY2009, to 8.5% in FY2012. FY2013 Annual Budget includes a collections adjustment of \$65M (or 9% of service revenues, excluding operational initiatives), which is in line with FY2012 results. FY2013 YTD results through October 31, 2012 are encouraging as the current rate of uncollectibles is approximately 5.6%. For FY2014 through FY2017, PRASA is assuming a collections adjustment rate of approximately 8.5% of projected service revenues (excluding operational initiatives) in each fiscal year. MPPR/Malcolm Pirnie finds PRASA’s assumption to be in line with FY2012 preliminary results and FY2013 YTD results; however, considering the current economic environment, MPPR/Malcolm Pirnie cautions that the rate for uncollectible accounts could increase. As such, PRASA should closely monitor its rate of uncollectible accounts throughout FY2013 and adjust its projections as needed.
4. Miscellaneous Income (Exhibit 1, line 6) – PRASA projects \$3M from miscellaneous income in FY2013 and in each year of the Forecast thereafter. Miscellaneous income includes fines, reconnection charges, bulk water sales, other miscellaneous revenues, and interest income. Results show that PRASA collected \$8.6M in miscellaneous income in FY2012, doubling the budgeted amount. FY2013 YTD results through October 31, 2012 show that PRASA is currently above its budget target by about \$2.2M. With this in consideration, MPPR/Malcolm Pirnie finds these projections reasonable based on results from previous years and FY2013 YTD results.
5. Special Assessments (Exhibit 1, line 7) – 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 current fees are \$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 generated \$4.6M in FY2012 from special assessments, almost half the amount generated in FY2008, and \$2.2M less than FY2011. This four-year downward trend is consistent with the current economic situation and its impact on the local housing market. PRASA has budgeted \$4M from special assessments during FY2013. The \$4M projection for special assessments, although lower than the most recent three-year average of \$5.9M, is in line with the FY2012 results. However, this revenue source is exclusively dependent upon economic conditions, and could be lower than the FY2012 level if the recession continues. FY2013 YTD results through October 31, 2012 show that PRASA is on target with its budget. PRASA has also projected \$4M in each year of the Forecast for special assessments. MPPR/Malcolm Pirnie finds this projection reasonable considering FY2012 preliminary results and FY2013 YTD results. Nevertheless, due to the current status of the Puerto Rico housing market, results should be closely monitored in case economic conditions further deteriorate new developments.

6. Rate Stabilization Account (Exhibit 1, line 8) – In accordance with the 2012 MAT, a Rate Stabilization Account, the balance of which is determined in the annual budget, must be established. This account is established within the Surplus Fund which contains any remaining moneys after all the required deposits are made. Equal monthly deposits over the fiscal year must be deposited to the account to make the balance in the fund equal to the balance set forth in the annual budget. Given PRASA’s current financial situation, PRASA has not projected that any funding will be available for establishing a Rate Stabilization Account over the forecast period.

5.5.2. Authority Revenues (Other Sources of Revenues)

The addition of PRASA’s Operating Revenues, presented above, and Other Sources of Revenues result in PRASA’s Authority Revenues. Other Sources of Revenues may include: transfers from the Budgetary Reserve Fund, General Fund contributions/appropriations, and additional external support or other measures that increase revenues.

In FY2011, PRASA received a contribution of \$105M from the Central Government General Fund to fund an otherwise anticipated operational deficit. In FY2012, PRASA received an additional General Fund contribution of \$70.3M. However, because Central Government contributions require legislative approval and are subject to the availability of funds in the Central Government’s annual budget, PRASA’s ability to secure these funds in future years is uncertain.

In order to supplement its future revenue requirements and to comply with the requirements of Section 7.01 of the 2012 MAT, PRASA is projecting that other funding sources will be available from either transfers from the Budgetary Reserve Fund or other revenue sources. PRASA is

projecting draws from the Budgetary Reserve Fund in the amount of \$145M in FY2013 (funded from 2012 bond proceeds). The Forecast shows that PRASA projects funding deficits in each year thereafter. Projected deficits are presented in Exhibits 1 and 2.

PRASA is projecting that these deficits will be covered with either Other Sources of Revenue which may include additional transfers from the Budgetary Reserve Fund; other measures to increase revenues and/or reduce costs; service rate increases; or with a combination of these measures. With the exception of revenues generated from rate increases which are defined as Operating Revenues, all Other Sources of Revenue are considered Authority Revenues under the 2012 MAT.

While PRASA's Forecast does not specify how the Budgetary Reserve Fund will be funded once its initial funding has been depleted (2012 bond proceeds were used to partially fund the Budgetary Reserve Fund in FY2012, and in its entirety in FY2013), the 2012 FOA clearly states that PRASA shall be obligated to implement revenue enhancing and/or cost reducing measures, revise its rates and fees, or implement a combination of these measures, in the case the Commonwealth fails to seek or receive an appropriation or provide another source of funding to satisfy the Budgetary Reserve Requirement.

In the way that PRASA's projected net benefits from other operational initiatives materialize, the projected need of Other Sources of Revenue may decrease. Nevertheless, based on the estimated net benefits presented in Section 3, additional funds will still need to be identified for PRASA to be able to meet all its obligations.

5.5.3. 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 16) – 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 shown in Table 5-14, over the past five fiscal years PRASA has reduced its staff levels, on average, by about 3.4% each year. PRASA reports that at the end of FY2012 it had 5,076 employees. However, as of October 31, 2012 its staff levels had slightly increased up to 5,124.

**Table 5-14:
Staff Levels**

End of FY	Appointed Employees	Management Employees	HIEPAAA Employees	UIA-AAA Employees	Temporary Employees	Total Employees
2008	167	991	178	3,814	690	5,840
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
5-year CAGR	-0.45%	-1.92%	-0.85%	-6.36%	6.57%	-3.44%

Source: PRASA Human Resources Department

PRASA has budgeted payroll and benefits expenses of \$300M for FY2013. The FY2013 budget represents a 2% decrease from the FY2012 preliminary result of \$307M, established prior to the capitalization of project overhead costs. FY2013 YTD results through October 31, 2012 show that PRASA is currently above its payroll and benefits budget by approximately \$3M. This deviation is mostly a result of higher overtime costs. Control measures will have to be employed to prevent this trend from continuing throughout the fiscal year. Failing to do so, will cause the payroll and benefits expense category to remain above the established budget.

PRASA is projecting annual increases of approximately 3% each year in this expense category for FY2014 through FY2017. PRASA’s projections consider the following assumptions: one time payments (in FY2013) and salary increases for UIA-AAA¹⁷ and HIEPAAA¹⁸ unionized personnel as agreed to in the new CBA’s; salary increases for certain

¹⁷ On January 20, 2012 PRASA and its largest union, the UIA-AAA, signed a new CBA, effective from January of 2012 through December of 2015; it contains certain retroactive and future economic agreements that have an impact on PRASA’s payroll and benefits expense projections.

¹⁸ On May 31, 2012 PRASA and the HIEPAAA signed a new CBA effective from May of 2012 through June of 2015; it contains certain economic agreements (i.e., salary increases) that have an impact on PRASA’s payroll and benefits expense projections.

career/management personnel; increase in employer contribution to the Retirement System to comply with Law 116 of 2011; and additional costs to comply with financial accounting requirements.

PRASA has assumed an average cost per full time employee (FTE) for its regular employee classifications¹⁹ of \$56,500. This amount is reasonable considering the FY2012 average salary per FTE was close to \$55,000.

PRASA intended to continue its personnel reduction initiative in future years, as programmed. However, given the current economic situation and high unemployment rate of Puerto Rico, PRASA's administration determined that it was in the best interest of Puerto Rico's citizens and overall economy to delay its staff reduction plan to future years. PRASA is projecting to maintain staff levels throughout the forecast period at FY2012 levels. As such, PRASA projects staff levels for the remainder of the forecast period to approximate a total of 5,092.

Although PRASA has been able to reduce and control its staff levels over the past five fiscal years, on recent years PRASA's payroll and benefits budget has been negatively affected by higher than budgeted overtime costs. FY2013 YTD results through October 31, 2012 show that PRASA's staff levels (currently at 5,124) are above the assumed headcount, and also that overtime costs are over budget. With this in consideration, MPPR/Malcolm Pirnie believes that PRASA's payroll and benefits forecast is aggressive. MPPR/Malcolm Pirnie recommends the use of a more conservative projection for FY2014 through FY2017 assuming 5,192 employees (instead of 5,092) throughout the forecast period. These adjustments are reflected in the Alternate Case Forecast presented in Exhibit 2.

2. Electricity (Exhibit 1, line 17) – Electricity is PRASA's second largest expense category. PRASA has included in its FY2013 budget an electricity expense of \$174M. This amount represents a 5% decrease from FY2012 preliminary results (\$183M). The FY2013 budget is based on historical results and assumes an average market price per barrel of oil of \$95. FY2013 YTD results through October 31, 2012 show that PRASA's electricity costs are over its targeted budget, by approximately \$7M (or 11%). PRASA is also projecting an increase of 3% (over the FY2013 base) in electricity costs in each year from FY2014 through FY2017.

PRASA's electricity expense projections do not consider the potential savings from the energy conservation measures and diversification of power sources that it is currently implementing under its Comprehensive Energy Management Program (approximately \$20M annually). Also, the projections do not incorporate any additional potential savings to be achieved by PRASA from the acquisition of PREPA's hydroelectric facilities (refer to

¹⁹ Regular employee classifications include: appointed, career, UIA-AAA, and HIEPAAA employees.

Section 3 for the detailed discussion of these initiatives). However, even if energy consumption at PRASA's facilities is reduced as planned, if oil price increases continue at high rates throughout FY2013 and in future fiscal years, PRASA's projections for energy costs could be materially understated. Hence, PRASA must monitor YTD results and adjust projections as necessary.

Considering that FY2013 YTD results show a negative deviation with respect to PRASA's budget and that in previous fiscal years electricity costs have been higher than budgeted (mostly as a result of a higher than projected cost of energy), MPPR/Malcolm Pirnie finds the electricity costs projections aggressive. MPPR/Malcolm Pirnie recognizes that PRASA's ongoing efforts to diversify its energy sources and reduce costs are expected to materialize in future years, which should help offset potential energy cost increases. However, considering that PRASA's Forecast does not include the potential net benefits of these efforts, MPPR/Malcolm Pirnie recommends the use of a more conservative projection for FY2014 through FY2017 using the FY2013 projected results as a base and also assuming an annual increase of 5% per year, instead of 3%, in each fiscal year thereafter. These adjustments are reflected in the Alternate Case Forecast presented in Exhibit 2.

3. Maintenance and Repairs (Exhibit 1, line 18) – PRASA has budgeted \$41.2M for maintenance and repair expenses in FY2013. This is approximately 13% less than the FY2012 preliminary results. In future years, PRASA is assuming maintenance and repair cost will increase at a rate of 3% per year due mostly to inflation. FY2013 YTD results through October 31, 2012 show that PRASA is currently below its maintenance and repair budget which, in turn, helps to offset some of the budget overruns experienced in other categories such as payroll and electricity. In future years, PRASA is projecting that these cost will increase (over the FY2013 base) by 3% each year in FY2014 through FY2017. MPPR/Malcolm Pirnie believes PRASA's projections for maintenance and repair costs are reasonable, considering YTD results and PRASA's commitment to implementing and achieving cost controls in this and other expense categories. However, PRASA must continuously monitor this expense category to ensure that it is appropriate to maintain a system of PRASA's size and complexity in good operating condition.
4. Chemicals (Exhibit 1, line 19) – PRASA's FY2013 budget for chemical expenses amounts to \$31M. This projection is based on the FY2012 preliminary results, which were approximately \$31.3M (4% higher than budgeted for the fiscal year). Considering that chemical costs are usually affected by inflation and worldwide demand as they are mostly commodities, in future years (FY2014 through FY2017) PRASA is assuming chemical costs will increase at an annual rate of 3% over the FY2013 budget amount.

FY2013 YTD results through October 31, 2012 show that PRASA is on target with its chemicals budget. Assuming that PRASA is able to control the consumption and cost controls

during the remainder of FY2013, and considering historical results and the projected annual increases, MPPR/Malcolm Pirnie find PRASA's projections reasonable.

5. Superaqueduct (Exhibit 1, line 20) – 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). The Master Agreement between Thames-Dick and PRASA was terminated by the parties pursuant to a Resolution Agreement dated May 18, 2011. The operations, maintenance and administration of the Superaqueduct were transferred back to PRASA as of June 19, 2011. The decision was made based on business and policy reasons, mutually agreed by the parties, and not based on the operator's performance. PRASA has subcontracted Caribbean Water Specialist Corp. (composed primarily of ex-Thames employees) to operate the Superaqueduct System, under a reduced scope of work. PRASA, however, retained liability, purchasing, logistics and general management responsibilities of the facilities.

FY2012 preliminary results for the Superaqueduct expenses totaled \$29.7M. PRASA budgeted \$28.1M in FY2013 for this expense category (includes chemical, electricity, and materials/replacement costs, as well as the operator's fee). FY2013 YTD results through October 31, 2012 show that PRASA is over budget in this expense category by approximately \$0.3M as a result of higher electricity costs. PRASA is assuming this expense category will increase at a rate of 3% per year from FY2014 through FY2017.

Based on FY2013 YTD results and assuming that high electricity costs continue to negatively affect the budget, MPPR/Malcolm Pirnie finds PRASA's projections aggressive. MPPR/Malcolm Pirnie recognizes that PRASA's on-going efforts to diversify its energy sources and reduce costs are expected to materialize in future years, which should help offset potential energy cost increases in the future. However, considering that PRASA's Forecast does not include the potential net benefits of these efforts, MPPR/Malcolm Pirnie recommends the use of a more conservative projection for FY2014 through FY2017 using the FY2013 projected results as a base. These adjustments are reflected in the Alternate Case Forecast presented in Exhibit 2.

6. Insurance (Exhibit 1, line 21) – Results for insurance expenses over the past four fiscal years have been more or less consistent, averaging approximately \$10M per year. PRASA has budgeted \$11.5M for insurance expenses in FY2013 and has assumed that this cost will increase at an annual rate of approximately 3% per year from FY2014 through FY2017. FY2013 YTD results through October 31, 2012 show that PRASA is on target with its insurance budget. Hence, MPPR/Malcolm Pirnie believes the Forecast projections to be reasonable considering historical results.

7. Other Expenses (Exhibit 1, lines 22) – Other expenses include several costs associated with the O&M of the System, including: materials and supplies, security, treatment of residuals and rentals, and water transport. Over the past five fiscal years, PRASA has averaged approximately \$125M in other expenses each year. PRASA has budgeted other expenses of \$130M for FY2013. Overall, the other expenses budget for FY2013 is in line with historical and FY2012 preliminary results. Also, FY2013 YTD results through October 31, 2012 show that PRASA is on target with this budget and that, to date, it has been able to achieve cost savings related to professional services and other sub-contracted services. PRASA is assuming an annual increase of 3% per year (using the FY2013 as base) from FY2014 through FY2017. MPPR/Malcolm Pirnie finds these projections reasonable when compared to actual results in previous years and considering FY2013 YTD results.

8. Capitalized Expenses (Exhibit 1, line 23) – PRASA projects that 5.7% of Operating Expenses will be capitalized every year of the forecast period. This capitalization rate is 0.3% lower than the rate used in FY2011, and 0.8% lower than in previous years. For prior years, a 6.5% capitalization rate was used based on the recommendations provided by an independent consultant retained by PRASA. The revised capitalization rate of 5.7% considers the projected reduction in PRASA’s capital expenses, and is based on the latest revised report issued by its external consultant (issued in 2010 as an update to its 2007 Asset Capitalization Report).

MPPR/Malcolm Pirnie has not reviewed this estimation in detail and, as such, is not providing an opinion. MPPR/Malcolm Pirnie assumes this estimation is reasonable given it has been accepted by PRASA’s outside, independent auditors in the preparation of its financial statements. However as part of the sensitivity analysis, using the assumed 5.7% capitalization rate MPPR/Malcolm Pirnie has also adjusted PRASA’s projected capitalized expenses in the Alternate Case Forecast presented in Exhibit 2 to reflect the adjustments made to payroll and benefits, electricity, and Superaqueduct expenses.

5.6. Funding of PRASA CIP

PRASA is projecting capital investment expenditures of \$1,505.4M over the forecast period. Table 5-15 provides a summary of the CIP uses of funds, previously presented in Section 4, along with the anticipated sources of funding (as currently approved by PRASA’s Board of Directors).

The distribution of CIP sources of funds projected in the forecast period are as follows: 78% from bond proceeds and/or interim financing; 20% from Federal Funds (State Revolving Fund, Rural Development bonds, American Recovery and Reinvestment Act, and other matching sources); and the remaining 2% from surplus cash available from unused CIP funds. 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 have to continue to work with the GDB to secure the necessary interim financing to continue its CIP implementation.

**Table 5-15:
CIP Projected Uses and Sources of Funds (\$, Thousands)**

	FY2013	FY2014	FY2015	FY2016	FY2017	TOTAL
USES OF FUNDS						
Repair & Replacement of Fixed Assets	\$40,609	\$59,581	\$63,002	\$66,236	\$50,000	\$279,428
CIP Infrastructure Projects	353,063	303,069	234,440	193,069	142,353	1,225,994
Total Projected Capital Expenses (Uses)	\$393,672	\$362,650	\$297,442	\$259,305	\$192,353	\$1,505,422
SOURCES OF FUNDS						
Surplus Cash Available from CIP	\$8,097	\$10,358	\$7,792	\$4,550	\$6,999	\$37,794
Federal Funds – Rural Development Funds	15,000	15,000	15,000	15,000	15,000	75,000
Federal Funds – State Revolving Funds	50,933	45,084	49,200	46,754	40,000	231,971
Federal Economic Stimulus – Grants	-	-	-	-	-	-
Federal Economic Stimulus – Loans	-	-	-	-	-	-
Local Stimulus	-	-	-	-	-	-
Bonds Proceeds / Interim Financing	330,000	300,000	230,000	200,000	135,000	1,195,000
Total Sources of Funds	\$404,030	\$370,442	\$301,992	\$266,304	\$196,999	\$1,539,765

5.7. Debt Service

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. A summary of the projected debt service for the forecast period is presented in Table 5-16.

**Table 5-16:
FY2013 – FY2017 Projected Debt Service (\$, Thousands)**

Debt Service Level	FY2013	FY2014	FY2015	FY2016	FY2017
Senior Debt	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
Senior Subordinate Debt	-	-	18,526	34,508	45,405
Subordinate Debt	-	-	-	-	-
Commonwealth Guaranteed Indebtedness	81,692	88,604	91,966	94,940	98,341
Commonwealth Supported Obligations	-	-	1,594	8,999	8,999
Total	\$183,092	\$369,381	\$392,858	\$419,213	\$433,501

As shown in Table 5-16 above and unless PRASA increases its Operating Revenues, starting on FY2015 PRASA would need to issue Senior Subordinated Debt given that Operating Revenues would not be sufficient to meet the 2012 MAT Rate Covenant requirements for Senior Lien Bonds.

Table 5-17 below, 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. These include the new definition for Operating Revenues and Authority Revenues, and assume that PRASA appropriately replenishes the Budgetary Reserve Fund and/or identifies Other Sources of Revenues, or implements the necessary rate increases to cover the PRASA-projected annual deficits summarized in Table 5-18 below.

**Table 5-17:
FY2013 – FY2017 Projected Debt Service Coverage**

Debt Service Level	DSC Requirement	FY2013 Budget	FY2014	FY2015	FY2016	FY2017
Senior Debt	2.50	7.16	2.59	2.61	2.62	2.64
Senior Subordinate Debt	2.00	7.16	2.59	2.44	2.33	2.27
Subordinate Debt	1.50	7.16	2.59	2.44	2.33	2.27
Commonwealth Guaranteed Indebtedness	1.00	1.17	1.00	1.11	1.15	1.12
Commonwealth Supported Obligations	1.00	1.17	1.00	1.09	1.05	1.03
Authority Revenues / All Expenses and Debt Service	1.00	1.02	1.00	1.01	1.00	1.00

**Table 5-18:
Projected Revenue Needs (\$, Thousands)**

Case	FY 2013 Budget	FY2014 Projection	FY2015 Projection	FY2016 Projection	FY2017 Projection
PRASA Forecast	-	\$342,000	\$390,000	\$430,000	\$460,000

Based on the anticipated debt service obligations and projected deficits, PRASA's ability to meet its DSC requirements is contingent upon the following:

- Maintaining its billings and collections performance
- Continuing to implement its Revenue Optimization Program
- Identifying and securing the necessary additional revenues in each fiscal year (either from service rate increases, transfers from the Budgetary Reserve Fund, etc.)
- Controlling its Operating Expenses

If at any given time the DSC requirements are not met, the 2012 MAT outlines specific actions, remedies, and timetables for PRASA to comply with the Rate Covenant previously discussed.

5.8. 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, and thereafter:

- (i) if there is a line of credit (LOC) on deposit in the reserve fund, the reserve shall mean for the term of LOC an amount equal to at least ninety (90) days of current expenses determined on the first day of the fiscal year in which such LOC 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 established a LOC on deposit to maintain the Operating Reserve Fund. The maturity of the LOC was extended to June 30, 2016 and its maximum drawdown capacity was increased to \$180M to comply with the 2012 MAT requirements detailed above.

5.9. Capital Improvement Fund

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

- (i) the amount set forth in the annual budget for such fiscal year, and
- (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 also be credited to the Fund:

- (i) the proceeds of any condemnation awards,
- (ii) proceeds of insurance (other than use and occupancy insurance),
- (iii) the proceeds of sales of property constituting a part of the Systems, and
- (iv) the proceeds of any termination or similar payment received by PRASA under any interest rate swap or similar hedge agreement.

PRASA has deposited \$300M in the Capital Improvement Fund from the 2012 bond issuance proceeds. As reported by PRASA, this amount will be sufficient to fund PRASA's planned FY2013 CIP in its entirety. Based on the projected CIP capital expenditures, this deposit amount seems reasonable. However, future funding sources to be deposited to the Capital Improvement Fund have not been identified by PRASA in its Forecast.

5.10. Sensitivity Analysis – Alternate Case Forecast

MPPR/Malcolm Pirnie has prepared a sensitivity analysis of PRASA’s Forecast. The objective of the sensitivity analysis is to demonstrate the impact that more conservative assumptions could have on PRASA’s financial projections. This sensitivity analysis is presented in Exhibit 2 as the Alternate Case Forecast. As mentioned above, it incorporates adjustments to PRASA’s Revenue Optimization Program initiatives, payroll and benefits expenses, as well as to electrical and Superaqueduct expenses based on historical and FY2013 YTD results. Also, because these three expense categories have been adjusted, the projected amount of capitalized expenses has also been adjusted. The Alternate Case Forecast does not include potential benefits from PRASA’s other operational initiatives such as the Comprehensive Energy Management Program and Treatment Automation Program.

In the event that these expense adjustments hold true, PRASA will need to identify and secure additional revenues in the amounts summarized in Table 5-19 below, to ensure that both Operating Revenues and Authority Revenues will be sufficient to meet all DSC requirements over the forecast period. DSC results for the Alternate Case Forecast are also presented in Table 5-19. Again, in the way that the potential net benefits from PRASA’s operational initiatives materialize, the Alternate Case Forecast adjustments could be mitigated and, in turn, the need for Other Sources of Revenue could be reduced.

**Table 5-19:
FY2013 – FY2017 Alternate Case Forecast
Projected Debt Service Coverage and Other Sources of Revenue Needs**

Debt Service Level	DSC Requirement	FY2013 Budget	FY2014	FY2015	FY2016	FY2017
Senior Debt	2.50	7.16	2.59	2.61	2.60	2.60
Senior Subordinate Debt	2.00	7.16	2.59	2.44	2.32	2.24
Subordinate Debt	1.50	7.16	2.59	2.44	2.32	2.24
Commonwealth Guaranteed Indebtedness	1.00	1.17	1.01	1.02	1.10	1.10
Commonwealth Supported Obligations	1.00	1.17	1.01	1.00	1.01	1.00
Authority Revenues / All Expenses and Debt Service	1.00	1.02	1.00	1.00	1.00	1.00
Other Sources of Revenue Needs (\$, Thousands)	-	\$145,000¹	\$366,000	\$410,000	\$463,000	\$504,000

¹Included in Budgetary Reserve Fund; funded with 2012 bond proceeds.

5.11. Conclusions and Recommendations

Overall, PRASA's Forecast for FY2013 through FY2017 (included in Exhibit 1) is mostly reasonable based on recent historical performance. MPPR/Malcolm Pirnie conducted a sensitivity analysis and prepared an Alternate Case Forecast, reflecting more conservative projections for PRASA's Revenue Optimization Program initiatives, and payroll and benefits, electricity and Superaqueduct expenses (included in Exhibit 2). Both PRASA's Forecast and the Alternate Case Forecast show projected deficits from FY2014 through FY2017. As shown in Exhibits 1 and 2, additional revenue sources are needed for PRASA to meet its DSC requirements. Therefore, the probability of PRASA achieving its Forecast and meeting its DSC requirements 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 further decline in the consumption patterns of PRASA customers and collections, resulting in reductions in projected revenues. Hence, the YTD results for FY2013 should be closely monitored and projections for subsequent fiscal years shall be adjusted accordingly.
2. **PRASA's ability to continue to successfully implement all of its operational initiatives** – PRASA's Forecast includes results from select operational initiatives that have been described throughout this report. The Forecast also includes certain revenue enhancing and cost reduction initiatives that are currently underway. MPPR/Malcolm Pirnie'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 Other Sources of Revenue beyond FY2013 (after the initial funding of the Budgetary Reserve Fund has been depleted)** – Starting in FY2014, compliance with the Rate Covenant and DSC requirements included in the 2012 MAT is contingent upon PRASA obtaining additional sources of revenues from the Budgetary Reserve Fund, as a result of future replenishments from the Central Government Fund or other sources of funding, or from the implementation of changes in its rate structure. The additional revenue requirements projected in PRASA's Forecast for FY2014, FY2015, FY2016 and FY2017 amount to approximately \$342M, \$390M, \$430M, and \$460M respectively. However, if the adjustments included in the Alternate Case Forecast materialize the projected revenue requirements could be in the range of \$366M in FY2014 up to \$504M in FY2017. In the event that the Budgetary Reserve Fund is depleted and not replenished with additional funding (i.e., with additional Central Government appropriations or other sources of funding), PRASA would be required to implement revenue enhancing and/or cost

reduction measures, rate structure changes, or a combination of these actions, that would generate sufficient revenues to meet its DSC requirements. Under PRASA's Forecast, these additional measures would have to provide an equivalent percent increase in net revenues of approximately 48% in FY2014, with additional increases of, approximately, 4% in both FY2015 and FY2016, and 3% in FY2017. Under the Alternate Case Forecast, the equivalent percent increase in net revenues needed would be higher: 51% in FY2014, 4% in FY2015, 5% in FY2016, and 3% in FY2017.

Considering the overall conclusions presented above, MPPR/Malcolm Pirnie 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 stronger cost reduction and cost control measures in O&M expense categories by administrative orders from PRASA's Executive President; these include payroll and benefits, overtime costs, maintenance and repair, and chemical costs.
2. PRASA should also continue to focus on achieving the implementation of all of its planned revenue enhancing and cost reducing initiatives on a timely manner to mitigate (reduce) the need for Other Sources of Revenue.
3. PRASA could benefit from a utility-wide organizational assessment designed to find efficiencies, reduce overtime costs, and maximize the use of its human resources.
4. PRASA should consider deferring the implementation of some of its current capital investment commitments over a longer period of time so that its associated debt service requirements increase in a more gradual manner than as currently projected. Hence, PRASA should accelerate discussions with Regulatory Agencies regarding the possibility of deferring some projects and/or implementing temporary, less capital intensive projects to remediate certain situations.
5. PRASA should develop capital financing policies that provide direction and guidance regarding the use of debt and cash funding the CIP in the future. PRASA should then begin funding the Rate Stabilization Account and continue to fund the Capital Improvement Fund.
6. At the time of preparation of this report, PRASA projects that the Budgetary Reserve Fund for FY2013 will be used in its entirety and its Forecast does not specify how the Budgetary Reserve Fund will be funded from FY2014 through FY2017. Although it is possible that

PRASA may be able to secure Central Government appropriations or other sources of funding in the future and/or that potential benefits from operational initiatives may reduce the projected annual deficits, PRASA may be required to modify its current rate structure to meet its growing financial obligations. As such, PRASA should begin setting the stage for rate increases as part of a multi-year, sustainable financial plan and avoid the use of long-term debt to pay for current expenses as previously done in FY2012 and FY2013 when bond proceeds were used to fund the Budgetary Reserve Fund. The long-term financial plan for PRASA should be a self-sustaining plan with limited or no reliance on Central Government appropriations and no reliance on long-term debt to fund O&M expenses.

Any possible rate increase and changes in the rate structure should follow the basic Bonbright principles considered when the previous rate increases were authorized in October of 2005. These principles include: revenue stability and predictability, simplicity and public acceptance, fairness to all customer groups, defensibility, and conservation.²⁰ Although PRASA's Board of Directors can approve up to a 4.5% automatic annual rate adjustment (up to 25% cumulative) as stipulated in the 2005 Rate Resolution, any increase above this amount must follow the due process established in Law #21 of May 1985, Law #170 of August 1988 and corresponding amendments.

²⁰ James C. Bonbright, Albert L. Danielson, and David R. Kammerschen, *Principles of Public Utility Rates* (Public Utilities Reports Inc.) 2nd ed. 1989.

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EXHIBIT 1

PRASA FINANCIAL FORECAST PRO FORMA¹ (\$, Thousands)	FY2013 BUDGET	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION
OPERATING REVENUES					
1 Service Collections					
2 Base Fee and Service Charges	713,252	714,000	714,000	714,000	714,000
3 Operational Initiatives - Additional Billings	43,700	50,470	54,781	59,775	64,513
4 Operational Initiatives - Collections from Prior Years	27,500	17,132	17,195	16,953	16,625
5 Billings to Collections Adjustment	(65,194)	(61,158)	(61,502)	(61,902)	(62,281)
6 Miscellaneous Income	3,000	3,000	3,000	3,000	3,000
7 Special Assessments	4,000	4,000	4,000	4,000	4,000
8 Transfer from/(to) Rate Stabilization Account	-	-	-	-	-
9 Total Operating Revenues	\$726,258	\$727,444	\$731,474	\$735,826	\$739,857
10 Other Sources of Revenue					
11 Transfer from Budgetary Reserve Fund	\$145,000	-	-	-	-
12 General Fund Contributions	-	-	-	-	-
13 Additional External Support/Other Measures	-	-	-	-	-
14 Total Other Sources of Revenue	\$145,000	\$342,000	\$390,000	\$430,000	\$460,000
15 Total Authority Revenues (Line 11 + Line 15)	\$871,258	\$1,069,444	\$1,121,474	\$1,165,826	\$1,199,857
OPERATING EXPENSES					
16 Payroll and Related	\$300,439	\$309,708	\$318,632	\$327,640	\$336,804
17 Electric Power	173,449	185,862	191,438	197,181	203,097
18 Maintenance and Repair	41,156	42,391	43,662	44,972	46,321
19 Chemicals	29,947	30,845	31,771	32,724	33,706
20 Superaqueduct Service Contract	28,143	28,987	29,857	30,753	31,675
21 Insurance	11,495	11,840	12,195	12,561	12,938
22 Other Expenses	130,239	132,558	136,542	140,646	144,865
23 Capitalized Operating Expenses	(40,747)	(42,305)	(43,554)	(44,829)	(46,136)
24 Total Operating Expenses	\$674,121	\$699,886	\$720,544	\$741,648	\$763,270
25 Total Senior Debt Service (S + SSUB + SUB)	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
26 Revenues Available for Operating Expenses and Other Debt Service After Senior Debt Service	\$769,858	\$788,666	\$822,176	\$850,553	\$873,696
27 Total Commonwealth Debt Service (CGI & CSO)	\$81,692	\$88,604	\$93,560	\$103,940	\$107,340
28 Net Authority Revenues After Operating Expenses and All Debt Service Obligations	\$14,045	\$177	\$8,072	\$4,966	\$3,087
DEBT SERVICE					
Senior (S)	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
Senior Subordinated (SSUB)	-	-	18,526	34,508	45,405
Subordinated (SUB)	-	-	-	-	-
Commonwealth Guaranteed Indebtednes (CGI)	81,692	88,604	91,966	94,940	98,341
Commonwealth Supported Obligations (CSO)	-	-	1,594	8,999	8,999
Total Debt Service	\$183,092	\$369,381	\$392,858	\$419,213	\$433,501

¹Numbers may not add up due to rounding

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EXHIBIT 1

**PRASA FINANCIAL FORECAST PRO FORMA
DEBT SERVICE COVERAGE¹
(\$, Thousands)**

	FY2013 BUDGET	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION
1 Operating Revenues	\$726,258	\$727,444	\$731,474	\$735,826	\$739,857
2 Other Sources of Revenue	145,000	342,000	390,000	430,000	460,000
3 Authority Revenues (Line 1 + Line 2)	\$871,258	\$1,069,444	\$1,121,474	\$1,165,826	\$1,199,857
4 Operating Expenses	\$674,121	\$699,886	\$720,544	\$741,648	\$763,270
Senior Debt					
Senior					
6 Annual Debt Service	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
7 DS Coverage Required = 2.50	7.16	2.59	2.61	2.62	2.64
Senior & Senior Subordinated					
9 Annual Debt Service	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
10 DS Coverage Required = 2.00	7.16	2.59	2.44	2.33	2.27
Senior, Subordinated Subordinated & Subordinated					
12 Annual Debt Service	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
13 DS Coverage Required = 1.50	7.16	2.59	2.44	2.33	2.27
14 Net Authority Revenues	\$769,858	\$788,666	\$822,176	\$850,553	\$873,696
15 Total Operating Expenses	674,121	699,886	720,544	741,648	763,270
16 Net Authority Revenues Available for Other Debt	\$95,737	\$88,780	\$101,632	\$108,905	\$110,426
Other Debt					
Commonwealth Guaranteed Indebtedness					
18 Annual Debt Service	81,692	88,604	91,966	94,940	98,341
19 DS Coverage Required = 1.00	1.17	1.00	1.11	1.15	1.12
Commonwealth Supported Obligations					
21 Annual Debt Service	-	-	1,594	8,999	8,999
22 DS Coverage Required = 1.00	1.17	1.00	1.09	1.05	1.03
23 Total Annual Debt Service	183,092	\$369,381	\$392,858	\$419,213	\$433,501
24 Net Authority Revenues After Operating Expenses and All Debt Service Obligations	\$14,045	\$177	\$8,072	\$4,966	\$3,087
25 Total Authority Revenues / All Obligations (Operating Expenses + Debt Service)	1.02	1.00	1.01	1.00	1.00

¹Numbers may not add up due to rounding

EXHIBIT 2

ALTERNATE CASE FORECAST PRO FORMA¹
(\$, Thousands)

Adjusted Category	FY2013 BUDGET	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION
OPERATING REVENUES					
1 Service Collections					
2 Base Fee and Service Charges	713,252	714,000	714,000	714,000	714,000
3 Operational Initiatives - Additional Billings	43,700	50,470	54,781	54,781	54,781
4 Operational Initiatives - Collections from Prior Years	27,500	17,132	17,195	17,195	17,195
5 Billings to Collections Adjustment	(65,194)	(61,158)	(61,502)	(61,902)	(62,281)
6 Miscellaneous Income	3,000	3,000	3,000	3,000	3,000
7 Special Assessments	4,000	4,000	4,000	4,000	4,000
8 Transfer from/(to) Rate Stabilization Account	-	-	-	-	-
9 Total Operating Revenues	\$726,258	\$727,444	\$731,474	\$731,074	\$730,695
10 Other Sources of Revenue					
11 Transfer from Budgetary Reserve Fund	\$145,000	-	-	-	-
12 General Fund Contributions	-	-	-	-	-
13 Additional External Support/Other Measures	-	-	-	-	-
14 Total Other Sources of Revenue	\$145,000	\$366,000	\$410,000	\$463,000	\$504,000
15 Total Authority Revenues (Line 11 + Line 15)	\$871,258	\$1,093,444	\$1,141,474	\$1,194,074	\$1,234,695
OPERATING EXPENSES					
16 Payroll and Related	\$300,439	\$315,358	\$324,282	\$333,290	\$342,454
17 Electric Power	173,449	204,000	214,200	224,910	236,156
18 Maintenance and Repair	41,156	42,391	43,662	44,972	46,321
19 Chemicals	29,947	30,845	31,771	32,724	33,706
20 Superaqueduct Service Contract	28,143	29,856	30,751	31,674	32,624
21 Insurance	11,495	11,840	12,195	12,561	12,938
22 Other Expenses	130,239	132,558	136,542	140,646	144,865
23 Capitalized Operating Expenses	(40,747)	(43,710)	(45,224)	(46,784)	(48,397)
24 Total Operating Expenses	\$674,121	\$723,137	\$748,180	\$773,993	\$800,667
25 Total Senior Debt Service (S + SSUB + SUB)	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
26 Revenues Available for Operating Expenses and Other Debt Service After Senior Debt Service	\$769,858	\$812,666	\$842,176	\$878,801	\$908,534
27 Total Commonwealth Debt Service (CGI & CSO)	\$81,692	\$88,604	\$93,560	\$103,940	\$107,340
28 Net Authority Revenues After Operating Expenses and All Debt Service Obligations	\$14,045	\$925	\$436	\$869	\$527
DEBT SERVICE					
Senior (S)	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
Senior Subordinated (SSUB)	-	-	18,526	34,508	45,405
Subordinated (SUB)	-	-	-	-	-
Commonwealth Guranteed Indebtednes (CGI)	81,692	88,604	91,966	94,940	98,341
Commonwealth Supported Obligations (CSO)	-	-	1,594	8,999	8,999
Total Debt Service	\$183,092	\$369,381	\$392,858	\$419,213	\$433,501

¹Numbers may not add up due to rounding

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EXHIBIT 2

**ALTERNATE CASE FORECAST PRO FORMA
DEBT SERVICE COVERAGE¹
(\$, Thousands)**

	FY2013 BUDGET	FY2014 PROJECTION	FY2015 PROJECTION	FY2016 PROJECTION	FY2017 PROJECTION
1 Operating Revenues	\$726,258	\$727,444	\$731,474	\$731,074	\$730,695
2 Other Sources of Revenue	\$145,000	\$366,000	\$410,000	\$463,000	\$504,000
3 Authority Revenues (Line 1 + Line 2)	<u>\$871,258</u>	<u>\$1,093,444</u>	<u>\$1,141,474</u>	<u>\$1,194,074</u>	<u>\$1,234,695</u>
4 Operating Expenses	\$674,121	\$723,137	\$748,180	\$773,993	\$800,667
Senior Debt					
5 Senior					
6 Annual Debt Service	\$101,400	\$280,778	\$280,772	\$280,765	\$280,756
7 DS Coverage Required = 2.50	<u>7.16</u>	<u>2.59</u>	<u>2.61</u>	<u>2.60</u>	<u>2.60</u>
8 Senior & Senior Subordinated					
9 Annual Debt Service	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
10 DS Coverage Required = 2.00	<u>7.16</u>	<u>2.59</u>	<u>2.44</u>	<u>2.32</u>	<u>2.24</u>
11 Senior, Subordinated Subordinated & Subordinated					
12 Annual Debt Service	\$101,400	\$280,778	\$299,298	\$315,273	\$326,161
13 DS Coverage Required = 1.50	<u>7.16</u>	<u>2.59</u>	<u>2.44</u>	<u>2.32</u>	<u>2.24</u>
14 Net Authority Revenues	\$769,858	\$812,666	\$842,176	\$878,801	\$908,534
15 Total Operating Expenses	<u>674,121</u>	<u>723,137</u>	<u>748,180</u>	<u>773,993</u>	<u>800,667</u>
16 Net Authority Revenues Available for Other Debt	<u>\$95,737</u>	<u>\$89,529</u>	<u>\$93,996</u>	<u>\$104,808</u>	<u>\$107,867</u>
Other Debt					
17 Commonwealth Guaranteed Indebtedness					
18 Annual Debt Service	81,692	88,604	91,966	94,940	98,341
19 DS Coverage Required = 1.00	<u>1.17</u>	<u>1.01</u>	<u>1.02</u>	<u>1.10</u>	<u>1.10</u>
20 Commonwealth Supported Obligations					
21 Annual Debt Service	-	-	1,594	8,999	8,999
22 DS Coverage Required = 1.00	<u>1.17</u>	<u>1.01</u>	<u>1.00</u>	<u>1.01</u>	<u>1.00</u>
23 Total Annual Debt Service	183,092	\$369,381	\$392,858	\$419,213	\$433,501
24 Net Authority Revenues After Operating Expenses and All Debt Service Obligations	\$14,045	\$925	\$436	\$869	\$527
25 Total Authority Revenues / All Obligations (Operating Expenses + Debt Service)	<u>1.02</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>

¹Numbers may not add up due to rounding

6. Conclusions and Recommendations

6.1. Considerations and Assumptions

In preparation of this report and the conclusions contained herein, MPPR/Malcolm Pirnie 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/Malcolm Pirnie 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 to us by others, the actual results will vary from those forecast.

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

1. MPPR/Malcolm Pirnie has made no determination as to the validity and enforceability of any contracts, agreement, existing law, rule, or regulation applicable to PRASA and its operations. However, for purposes of this report, MPPR/Malcolm Pirnie 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.

6.2. Conclusions and Recommendations

Set forth below are the principal opinions which MPPR/Malcolm Pirnie 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 the facilities visited varied from new to those requiring capital upgrades. The condition of most facilities improved from FY2010 to FY2012. 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. Also, PRASA's O&M practices are deemed to be adequate.

2. 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.
3. MPPR/Malcolm Pirnie also recommends that PRASA continue to develop and implement all the operational initiatives presented in this report, in particular the additional NRW reduction initiatives, the Comprehensive Energy Management Program and acquisition of PREPA's hydroelectric facilities, and the Treatment Plant Automation Program. These operational initiatives will help minimize the need for additional revenues in future years. Should PRASA achieve the projected net benefits of these operational initiatives, PRASA could potentially reduce its additional revenue needs by as much as \$100M, assuming all initiatives presented in this report are successfully implemented as planned.
4. 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 by PRASA in recent months and have been reported to PRASA as a result of the 2012 asset condition assessment conducted by MPPR/Malcolm Pirnie.
5. 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 \$50M in each year of the Forecast for R&R. 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, an analysis of PRASA's R&R needs and budget is recommended to develop a sound R&R program that will allow PRASA to improve and extend the useful life of its System.
6. 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.

7. Considering PRASA's fiscal situation, PRASA should consider deferring the implementation of some of its current capital investment commitments over a longer period of time so that its associated debt service requirements increase in a more gradual manner than as currently projected. Hence, PRASA should accelerate discussions with Regulatory Agencies regarding the possibility of deferring some projects and/or implementing temporary, less capital intensive projects to remediate certain situations
8. Overall, PRASA's Forecast for FY2013 through FY2017 (included in Exhibit 1) is mostly reasonable based on recent historical performance. MPPR/Malcolm Pirnie conducted a sensitivity analysis and prepared an Alternate Case Forecast, reflecting more conservative projections for operational initiatives (Revenue Optimization Program), and payroll and benefits, electricity, and Superaqueduct expenses. The adjustments included in the Alternate Case Forecast (included in Exhibit 2) are based on historical and FY2013 YTD results. Under both PRASA's Forecast and the Alternate Case Forecast, PRASA meets the DSC requirements stipulated in the 2012 MAT assuming that additional revenue sources are identified as shown in Exhibits 1 and 2. The probability of PRASA achieving its Forecast and meeting its DSC requirements 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 further decline in the consumption patterns of PRASA customers and collections, resulting in reductions in projected revenues. Hence, the YTD results for FY2013 should be closely monitored and projections for subsequent fiscal years shall be adjusted accordingly.
 - **PRASA's ability to continue to successfully implement all of its operational initiatives** – PRASA's Forecast includes results from operational initiatives that have been described throughout this report. The Forecast also includes certain revenue enhancing and cost reduction initiatives that are currently underway. MPPR/Malcolm Pirnie'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 other sources of revenue beyond FY2013 (after the initial funding of the Budgetary Reserve Fund has been depleted)** – Starting in FY2014, compliance with the Rate Covenant and DSC requirements included in the 2012 MAT is contingent upon PRASA obtaining additional revenue sources from the Budgetary Reserve Fund, as a result of future replenishments from the Central Government Fund or other sources of funding, or from the implementation of changes in its rate structure. The

additional revenue requirements projected in PRASA's Forecast for FY2014, FY2015, FY2016 and FY2017 amount to approximately \$342M, \$390M, \$430M, and \$460M respectively. However, if the adjustments included in the Alternate Case Forecast materialize the projected revenue requirements could be in the range of \$366M in FY2014 up to \$504M in FY2017. In the event the Budgetary Reserve Fund is depleted and not replenished with additional funding (i.e., with additional Central Government appropriations or other sources of funding), PRASA would be required to implement revenue enhancing and/or cost reduction measures, rate structure changes, or a combination of these actions, that would generate sufficient revenues to meet its DSC requirements. Under PRASA's Forecast, these additional measures would have to provide an equivalent percent increase in net revenues of approximately 48% in FY2014, with additional increases of, approximately, 4% in both FY2015 and FY2016, and 3% in FY2017. Under the Alternate Case Forecast, the equivalent percent increase in net revenues needed would be higher: 51% in FY2014, 4% in FY2015, 5% in FY2016, and 3% in FY2017.

