REPORT TO AUDIT COMMITTEE

915 I Street, Sacramento, CA 95814-2604
www.CityofSacramento.org

Staff
May 12, 2011

Honorable Members of the Audit Committee

Title: Sacramento Department of Utilities Operational Efficiency and Cost Savings Audit

Location/Council District: Citywide

Recommendation: Accept the *Sacramento Department of Utilities Operational Efficiency and Cost Savings Audit* and forward to City Council for approval.

Contact: Jorge Oseguera, City Auditor 808-7270

Presenters: Jorge Oseguera

Department: Office of the City Auditor

Division:

Organization No: 01001201

Description/Analysis

Issue: On January 18, 2011, the Council directed me to issue a request for proposal (RFP) and select a consultant to perform an operational efficiency and cost savings audit of the Utilities Department.

On February 22, 2011 the Council adopted Resolution No. 2011-105 authorizing the City Auditor to execute a Professional Services Agreement with Public Financial Management, Inc. to conduct the audit.

The Audit is attached.

Policy Considerations: The City Auditor's presentation of the *Sacramento Department of Utilities Operational Efficiency and Cost Savings Audit* is consistent with the Mayor and City Council's intent to have an independent audit function for the City of Sacramento.

Environmental Considerations: None.

Sustainability Considerations: None.

Rationale for Recommendation: The *Sacramento Department of Utilities Operational Efficiency and Cost Savings Audit* was requested by the City Council. The audit report provides an overall assessment of the Utilities Department and proposes six potential cost reduction options for the City's consideration.

Financial Considerations: The costs of this contract were funded by the Utilities Department.

Emerging Small Business Development (ESBD): No goods or services are being purchased as a result of this report.

Respectfully Submitted by: _____
Jorge Oseguera, City Auditor

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Attachment 1

CITY OF SACRAMENTO
CALIFORNIA

Office of the City Auditor
Jorge Oseguera, City Auditor

May 5, 2011

Honorable Mayor and
Members of the City Council
915 I Street - Fifth Floor, New City Hall
Sacramento, CA 95814-2604

Enclosed is the *Sacramento Utilities Department Operational Efficiency and Cost Savings Audit* conducted on behalf of the Sacramento City Auditor's Office, by Public Financial Management, Inc. and co-proposers Diemer Engineering, Inc., EMA, Inc., and Gershman, Brickner & Bratton Inc. The report provides an overall assessment of the Utilities Department and proposes six potential cost reduction options for the City's consideration.

We would like to thank the Utilities Department staff, City Attorney's Office staff, and the City Manager's Office staff for their assistance and cooperation during this audit.

Should you have any questions, please contact me at 808-7270.

Respectfully submitted,

Jorge Oseguera
City Auditor

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Attachment 2

Sacramento Department of Utilities Operational Efficiency and Cost Savings Audit

April 29, 2011

Public Financial Management, Inc.
Diemer Engineering, Inc.
EMA, Inc.
Gershman, Brickner & Bratton, Inc.

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Introduction

This independent audit provides an overall assessment of the Department of Utilities (DOU), identifies efficiencies and/or cost saving opportunities, and prioritizes the top cost savings opportunities identified for the City's consideration. The work was prepared at the direction of, and with the cooperation of the Office of the City Auditor. The audit was conducted in accordance with field work and reporting standards as set by Generally Accepted Government Auditing Standards for performance audits. However, given the short timeframe of this audit, a draft report was not provided to the Utilities Department. Instead, findings and areas for improvement were discussed orally with the department, and feedback was collected from the department and taken into consideration prior to finalizing the final report.

Executive Summary

The City of Sacramento's Department of Utilities (DOU) has a long history of providing safe and reliable service to the City. Yet, as with any organization, there may be ways to operate more efficiently and save money for ratepayers. This audit provides an outside assessment of the DOU by a team of independent professional advisers that specialize in the management and operation of water, wastewater, and solid waste utilities, and offers suggested changes in practices for improvement. The audit has reviewed DOU staffing, use of equipment, and capital investment, and has found that significant operational efficiencies and cost savings are possible by modifying the DOU's approach to its meter installation program, reduced staffing, energy efficiencies, investment in more productive equipment, and the use of software.

Primary Findings

The audit team believes there are several opportunities for the DOU to reduce its costs for the upcoming fiscal year 2011-2012 (FY12) and in future years through changes in its capital spending, use of staff and technology, and public education. The primary findings and the potential cost impact are summarized in the following table. In addition to the primary findings, several other ideas for improvement or areas for future investigation are discussed in the body of the report.

	Finding	Recommendation	FY12 Impact	FY13-15 Impact
1.	Backyard water mains are being replaced and moved to the street prior to the end of their useful life	Keep backyard mains in place; new meters can be installed in resident's back yard; reallocate funding from backyard main replacement for immediate capital replacement needs	$6,000,000	$25,400,000
2.	Water treatment plants are staffed 24-hours per day with multiple-man crews	Reduce the man hours at treatment plants and rely more on technology to monitor and control equipment	$580,000	$1,740,000
3.	DOU does not have an operations focused energy management program	Implement a "best practice" operations energy management program to achieve significant energy and cost savings	($70,000)	$480,000
4.	DOU is using an inefficient two-vehicle system to collect loose-in-the-streets garden refuse	Change to a boom truck to collect garden refuse	$1,375,000	$4,125,000
5.	DOU is not fully utilizing software that can optimize the routes taken by refuse trucks	DOU should utilize the routing software and follow the recommended routes, which will reduce staff and vehicle road time	$240,000	$720,000
6.	Recycling bins contain a relatively large amount of non-recyclable materials	Implement a more effective public information program that can reduce non-recyclables from 32% to 10%	$516,000	$1,998,000
7.	Investment in capital assets is likely insufficient, but DOU's proposed capital plan is not well defined and there are few specific projects identified	Continue development of a capital master plan that includes a long-term financing plan	(see section "DOU Overview - Capital Plan")	
	Total		$8,641,000	$34,463,000

In the course of the review, the audit team identified numerous other cost-saving initiatives. Some were smaller than those summarized above, and others would require up-front investment or start-up time that would limit savings in FY12 or immediately subsequent years. Still others are related to

policy decisions taken by the Mayor and Council that affect all City agencies. While some of these items are described in the body of the report, the consultants believe that a wide variety of additional savings and efficiency measures are possible with further investigation and development.

Council Recommendations

The audit recommends that City Council consider the cost containment options presented in this report (i.e., the "Primary Findings") and provide direction to the City Manager as to which approaches to pursue further.

The audit further recommends that City Council provide direction to the City Manager as to the need for further analysis of the secondary tier of potential cost savings/efficiency opportunities as identified in this report (i.e., the "Additional Operational Efficiencies and Cost Savings").

Conclusions

Overall, the audit team finds that the DOU provides high quality utility services as measured by its record of meeting regulatory requirements and providing reliable service, while attempting to reduce costs and the size of the organization. The rates that it charges for service are generally comparable to California utilities that provide similar services, but the rates and the types of services offered – particularly for solid waste – are also higher. However, as with any organization, there are opportunities for efficiencies and cost savings through the more effective use of staff, equipment, and technology. If the DOU implements, or further investigates the management and operational changes identified in this audit, it has the potential to reduce costs or reallocate resources to other priorities. However, the City also faces significant challenges in maintaining its aging infrastructure, and is not investing sufficiently in capital replacement. The DOU would benefit from a comprehensive construction and financing plan that identifies and prioritizes its capital needs, including meter installation, and best achieves system reliability, environmental compliance, and public health protection with limited financial resources.

Objective and Scope of the Study, Methodology

The objective of the audit was to conduct an objective assessment of the Utilities Department, and identify 3-5 opportunities for efficiencies/cost savings to facilitate development of the City's Fiscal year 2011-12 budget. The overall scope reflects the need to begin the project in early March 2011, and provide a final report to the Auditor and Sacramento City Council by the end of April 2011.

The audit includes all four major areas of the DOU – water, wastewater, drainage and solid waste – and also encompasses non-utility functions to the extent that they provide support or assistance to the DOU. The audit explores best practices in the utilities industry, and specifically those adopted by peer public utilities. Areas for investigation include the amount and deployment of staff; work processes and organizational structure; service levels; use of equipment and technology; capital project management; and adequacy of capital investments. The overall scope reflects the need to begin the project in early March 2011, and provide a final report to the Auditor and Sacramento City Council by the end of April 2011.

The audit team has ensured completeness of the audit by performing meetings and interviews with relevant DOU and City staff. Given the short timeframe, we were dependant on the department providing timely information and relied on the information provided for our analysis. We conducted interviews, toured facilities, accompanied staff during day-to-day activities, and reviewed the budget, organization charts, policies and procedures, historical service data, capital plans, master plans, work schedules, costing and financial spreadsheets, as well as prior studies and reports. The examination of City information has been augmented by the compilation of targeted best practice data, and by the professional experience and judgment of the project team. Preliminary results and conclusions were shared with the Auditor and the DOU.

DOU Overview

Department Organization

The DOU is responsible for providing safe and reliable drinking water, sewer, drainage, and solid waste services for the City. DOU services include the treatment and delivery of water, conveyance of sewage and storm water, collection and disposal of solid waste, maintenance and construction of facilities, financial management, billing and collection, regulatory compliance, and coordination with regional and state and federal agencies. The DOU has budgeted 697.5 full time equivalent positions (FTE) for FY11, with approximately 50 of these positions vacant, most of which will remain vacant for the current fiscal year. The DOU is organized in six main divisions – the Office of the Director, Plant Services, Engineering Services, Field Services, Business Services, and Solid Waste.

Office of the Director

There are 26.0 FTE budgeted in the Office of the Director division. The division is organized into 6 groups: Department Administration, Flood Control/Drain Policy, DOU Fund Level Programs, Metropolitan Water Planning, Public Education Outreach, and Water Legislation.

Table 1 – Office of the Director Programs and Staffing

Group	Programs	FTE
Department Administration	- Employee programs - Human Resources - Training - Clerical/Administrative	4.0
Flood Control/Drain Policy	- Policy development - Sacramento Regional Flood Control Agency counsel	16.0
DOU Fund Level Programs	- Program administration	0.0
Metropolitan Water Planning	- Development of comprehensive area-wide water supply plan	0.0
Public Education Outreach	- Media inquiries - Public records requests - Outreach and education - Staff support to Utilities Rate Advisory Commission	5.0
Water Legislation	- Legislative impact analysis	1.0

Plant Services

There are 149.5 FTEs budgeted in the Plant Services division, with 8 of those positions currently vacant. The division is organized into 13 groups: Water Production Operations, Wastewater Operations, Drainage Operations, Water Mechanical Maintenance, Sewer Mechanical Maintenance, Drainage Mechanical Maintenance, Water Quality Operations, Water Electrical Maintenance, Sewer Electrical Maintenance, Drainage Electrical Maintenance, Plant Services Administration, Plant Services O&M Support, and O&M Generator Support.

Table 2 – Plant Services Programs and Staffing

Group	Programs	FTE
Water Production Operations	- Treat surface and groundwater for drinking and irrigation - Routine maintenance of facilities	36.0

Group	Programs	FTE
Wastewater Operations	- Treat wastewater in combined system before discharge - Routine maintenance of facilities - Operate and oversee sewer pump stations	5.0
Drainage Operations	- Operate and oversee drainage pump stations	10.0
Water Mechanical Maintenance	- Maintain generators and pumps - Compliance with Air Quality parameters - Preventative maintenance	17.0
Sewer Mechanical Maintenance	- Maintain generators and pumps - Compliance with Air Quality parameters - Preventative maintenance	5.0
Drainage Mechanical Maintenance	- Maintain generators and pumps - Compliance with Air Quality parameters - Preventative maintenance	14.0
Water Quality Operations	- Water quality sampling - Source water monitoring - Regulation and permit oversight	9.0
Water Electrical Maintenance	- Electrical preventive maintenance - Corrective work and rehabilitation - Maintain peak efficiencies - Calibration and maintenance of instrumentation	13.0
Sewer Electrical Maintenance	- Electrical preventive maintenance - Corrective work and rehabilitation - Maintain peak efficiencies - Calibration and maintenance of instrumentation	2.0
Drainage Electrical Maintenance	- Electrical preventive maintenance - Corrective work and rehabilitation - Maintain peak efficiencies - Calibration and maintenance of instrumentation	8.0

Group	Programs	FTE
Plant Services Administration	- Administrative support - Purchase of equipment - Inventory - Distribution and disposal of supplies	13.5
Plant Services O&M Support	- Inspection of Plant Facility and capital improvement projects - Condition assessment	12.0
O&M Generator Support	- Preventive maintenance on engines and power sources - Purchase and placement of power equipment - Monitor and maintain emissions - Emergency response - Liaison between electrical and mechanical staff	5.0

Engineering Services

There are 83.5 FTEs budgeted in the Engineering Services division, with 7 of those positions currently vacant. The division is organized into 5 groups: Engineering Administration, CIP Engineering, Water Quality Engineering, Development Services, and Information Technology.

Table 3 – Engineering Services Programs and Staffing

Group	Programs	FTE
Engineering Administration	- Public information - Asset management - Project prioritization - Construction administration	4.32
CIP Engineering	- Treatment plant CIPS - Drainage CIPS - Construction administration - Water planning - Water meter program - CSS/Sewer/Drainage planning	30.00
Water Quality Engineering	- Drinking water quality - Storm water quality	11.00
Development Services	- Flood plain management - Building permits	13.00

Group	Programs	FTE
Information Technology	- GIS - SCADA - Energy efficiency -CIS system support	25.18

Field Services

There are 220.0 FTEs budgeted in the Field Services division, including 27 vacant positions. The division is organized into 5 groups: Water Distribution, Wastewater Collection, Draining Collection, Water Conservation, Management & Administration, and USA Program.

Table 4 – Field Services Programs and Staffing

Group	Programs	FTE
Water Distribution	- Operation and maintenance - Water service connection - Metering - Fire hydrants	86.5
Wastewater Collection	- Operation and maintenance	58.5
Draining Collection	- Operation and maintenance	46.0
Water Conservation	- Water waste calls and citations	8.0
Management & Administration	- Administrative support	11.0
USA Program	- Notify utilities prior to excavations	10.0

Business Services

This division has 54.5 budgeted FTEs, including 5 vacant positions, and is responsible for customer service, billing and collections, and accounting.

Table 5 – Business Services Programs and Staffing

Group	Programs	FTE
Administration	- Budget - Financial planning - Rate setting - Contract administration - Grant administration - Employee services - Department management	14.0
Customer Service	- Customer service calls	22.5
Account Management	- Account management - Billing - Collection	18.0

Solid Waste

There are 160 FTEs budgeted in the Solid Waste division. The division is organized into 14 groups: Solid Waste Administration, Solid Waste Operations Administration, Residential Collection, Residential Recycling, Household Hazardous Waste, Street Sweeping, Garden Refuse, Landfill Operations, Commercial Recycling, Commercial SW Services, Bin/Container Maintenance, Neighborhood Cleanup, Containerized Green Waste, and Illegal Dumping.

Table 6 – Solid Waste Programs and Staffing

Group	Programs	FTEs
Solid Waste Administration	- Annual and 5-year budget projection - Business plans - Workload and performance measures - Personnel and related support services - Implementation of the Department's mission, vision, values, and goals	8.0
Solid Waste Operations Administration	- GIS - Integrated Waste management and planning - Service contract inspections	5.0
Residential Collection	- Weekly collection of solid waste from all single family, triplex, and four-plex units	43.0
Residential Recycling	-Weekly collection of commingled recycling from all single family, duplex, triplex, and four-plex units	21.0
Household Hazardous Waste	- Customer service - Collection of household hazardous waste	0.0
Street Sweeping	- Monthly mechanical sweeping of all residential streets	4.0
Garden Refuse	- Periodic collection of green waste from City residential units with curb and gutter	34.0
Landfill Operations	- Landfill engineering - Equipment operations	2.0
Commercial Recycling	- Variable or daily collection of recyclables from multiple family residences (five or more units), City government buildings/facilities, and commercial establishments	4.0

Commercial Solid Waste Services	- Varied weekly collection of solid waste from multiple family residences (five or more units), City government buildings and facilities, commercial establishments, and street litter containers subscribing to City service	13.0
Bin/Container Maintenance	- Distribution, maintenance and repair of all commercial bins (dumpsters) and automated refuse and recycling containers	11.0
Neighborhood Cleanup	- Annual collection of bulky materials and rubbish placed on the curb from each household	0.0
Containerized Green Waste	- Periodical collection by Garden Refuse work group	11.0
Illegal Dumping	- Response and investigation	4.0

Water, Wastewater, and Drainage System

The Water System

The City provides water from the Sacramento and American Rivers to residents. The river water is treated at the Sacramento River Water Treatment Plant (SRWTP) and the Fairbairn Water Treatment Plant (FWTP) then distributed throughout the City with a system of pipelines, pumping facilities, and storage tanks.

Table 7 – Water System Components

Treatment Plants	Sacramento River Water Treatment Plant – Began operation in 1924 – Plant capacity of 160 million gallons per day (mgd) – Treatment involves disinfection, grit removal, alum coagulation, flocculation, sedimentation, and filtration Fairbairn Water Treatment Plant – Began operation in 1964 – Plant capacity of 200 mgd – Treatment involves chemical addition, coagulation, flocculation, sedimentation, filtration, and disinfection.
Groundwater Wells	– Thirty-two municipal groundwater supply wells – Fourteen additional wells used for City parks irrigation. – Capacity of 33 mgd
Storage Tanks	– Ten storage tanks – Five clearwells at the treatment plants – Storage reservoir
Pumping Facilities	– Pump stations at treatment plants – Nine pump stations located at storage tanks within the distribution
Transmission and Distribution Mains	– Transmission and distribution system of 1,400 miles – Mains of 4" to 60"

The Wastewater Sewer System

The system includes pipelines and pumps needed to collect and convey sanitary and combined sewage to the interceptor sewers of the Sacramento Regional County Sanitation District. The combined sewage system encompasses a total service area of approximately 7,545 acres and includes approximately 305 miles of 4" to 120" diameter pipes. The City's separated sewer system is located primarily in the northeast, east and southwest sections of the City with a total service area of about 25,435 acres. The City's entire collection system includes approximately 560 miles of gravity collection pipes, six miles of force mains, and 14,400 manholes.

The Drainage System

The City's drainage system provides storm water conveyance and flood control, and includes 41,000 drain inlets, 65 miles of canals and ditches, 104 pump stations, and detention basins.

Use of Computer, Information, and Communications Technologies

Introduction

One of the key strategies for public utilities to become and stay efficient is the effective use of computer and communications technologies. These include business computer systems, generally called information technology (IT) systems, and operational computer systems, variously called control systems, automation systems, or supervisory control and data acquisition (SCADA) systems.

The DOU, in conjunction with the City IT Department (CIT), maintains a comprehensive IT infrastructure. The CIT is responsible for the support, maintenance and security of enterprise wide applications, systems, and networks. Some examples include: City Email system (MS Exchange), City Financial System (eCAPs), Content Management (CCM), network infrastructure, and network security. CIT provides most of the networking infrastructure for the Department and across the City. CIT provides and maintains the servers for City-wide applications used by DOU, general IT policy, and support for technologies and systems not supported by DOU.

DOU, through its internal IT staff (part of the Engineering Division), provides support for IT equipment and a broad range of applications throughout the Department. DOU IT is responsible for the support and maintenance of applications, systems and networks that are primarily used within DOU. Some examples include: the DOU process monitoring and control SCADA equipment and network, the customer information system (CIS) utility billing system, computerized maintenance management systems (CMMS), and DOU desktop computers.

In some cases DOU IT shares responsibilities with CIT and other City departments. Examples of this are corporate network maintenance, VOIP phone support, Helpdesk support, GIS support, City website, and cashiering system support.

Overall, we found that the Sacramento DOU is doing a good job using IT systems to support DOU business objectives, including operating more cost effectively, while providing a high level of service to its customers. They have successfully placed a large quantity of IT applications in the past six years, while keeping project and costs relatively low and developing a significant degree of in-house expertise. There have been many demonstrable benefits of this IT investment, including minimizing labor costs for many operations and maintenance functions. However, DOU's widespread use of computer technology has developed relatively recently. Going forward, there are a number of improvements that can be made to expand and refine the use of technology for cost savings and other improvements.

IT Master Plan

In 2005, DOU completed an Information Technology Master Plan, with the assistance of an outside consultant. The IT Master Plan recommended key IT strategies and projects for a seven year period, based on DOU business objectives. Approximately 13 projects were planned and budgeted. To date, DOU has made excellent progress implementing the projects in the plan. Most of the planned projects have been implemented, and the remaining projects should be implemented soon. The work has been performed to a significant extent using in-house staff, with some outside assistance. Consequently, DOU IT staff have a high level of competence on the systems implemented, and can provide much of the application support in-house. This results in responsive and efficient support and development services to DOU users of these applications.

In our experience working with many water utilities across the United States, it is not common that a utility makes the rapid and effective progress Sacramento DOU has made implementing their IT Master Plan, particularly with a relatively low level of outside support. DOU has made significant progress in the past six years improving operations and maintenance practices and efficiencies using IT and automation technology.

SCADA Systems

The Sacramento DOU has a relatively comprehensive SCADA system that is used to monitor and control the water, wastewater, and drainage systems. SCADA is not used for solid waste operations, which is the industry norm.

The DOU SCADA system consists of three parts: field units, operator computer stations, and a communications system that connects the field units and computer stations all together. Using the computer stations, operations staff monitor the status of the water, wastewater, and drainage systems, as well as control the operation of these treatment and pumping facilities.

The SCADA support group is part of the Electrical/IT Group within the Engineering Division, and consists of five approved positions (one is vacant), with a supervisor in the lead. The SCADA system includes the following computers, which are supported by the Engineering SCADA Group:

Table 8 – SCADA System Computers

Type of Computer	Amount
Desktop PCs:	53
Notebook PCs:	13
Servers:	24
Printers:	1

Additional SCADA system support, particularly for controllers and field instrumentation, is provided by Electrical Maintenance staff from Plant Services.

Based on extensive experience reviewing, planning, and designing SCADA systems throughout the United States, we find that the Sacramento DOU SCADA system is, in most respects, above average for similar utilities in the United States. The technology is generally current, it is installed at most or all of the DOU facilities that can effectively use this type of technology, and the utilization by operations staff is very good. We did not find any major shortcomings. Maintenance and support of the system, using mostly in-house resources, appears to have been good, both in quality and cost-effectiveness. However, current staffing may need supplementation to maintain the current system and to optimize SCADA use in the future.

The DOU investment in SCADA technology has resulted in numerous labor saving efficiencies over the years since it was originally installed, and could be used to achieve additional energy, chemical, and labor savings with modest changes to software logic and operational practices. The high quality of the DOU SCADA system has probably made many of the recent staff reductions feasible (even if some are temporary); without such a system, reliable water, wastewater, and drainage systems operation might not have been possible with the recent staff reductions. The SCADA system also provides a wealth of data that facilitates improvements in the quality of DOU services and makes DOU water operations more reliable.

General IT Infrastructure and Support

The DOU, in conjunction with the City IT Department (CIT), maintains a comprehensive IT infrastructure for the Department. CIT provides most of the networking equipment and cables for the Department and across the City, provides servers for City-wide software applications, establishes general IT policy, and provides specialized expertise not available within DOU.

The DOU IT group, or "Department IT Support Team," currently has 13 staff positions (2 are vacant) plus one supervisor. Three of these positions are geographic information system (GIS) specialists, three others are dedicated to the Field Services Division, and one of the positions is a data entry technician.

The DOU IT Support Team is responsible for supporting personal computers and general use software within the Department, as well as servers used for DOU-specific software applications. Some network support functions are also provided, with the bulk of networking equipment and functions provided by CIT. The IT Support Team is responsible for maintaining computerized maintenance management systems (CMMS), development and support of various applications (e.g. databases, GIS tools, and websites), and producing ad-hoc reports from the systems supported.

They also operate and provide support for geographic information systems (GIS) applications and provide computer-aided design (CAD) support.

The IT Support Team supports the following IT equipment:

Table 9 – IT Support Team Computers

Type of Computer	Amount
Desktop PCs:	353
Notebook PCs:	195
Servers:	13
Printers:	174

In general, the DOU IT infrastructure appears to be appropriate for the Department, and well utilized.

Computerized Maintenance Management Systems (CMMS)

Based on the IT Master Plan recommendations, DOU has implemented two new CMMS systems, one for the Plant Services Division (Maintenance Connection) and one for the Field Services Division (CityWorks). Two different CMMS systems were chosen because of the significantly different requirements for underground, "horizontal" assets, versus above ground, "vertical" assets.

Both of the systems replace paper-based systems for issuing work orders and recording maintenance activities. DOU has made considerable progress converting their work practices to the new systems and effectively utilizing them. The new systems save maintenance staff time and provide a wealth of information to support budgeting, cost reporting, inventory management, preventative maintenance, and various maintenance work procedure improvements. Generally speaking, the two systems appear to be successful given that they are both relatively new and require some new Department skills and work processes. There are some incomplete implementation tasks and potential improvements (see "Additional Operational Efficiencies and Cost Savings"), which should be completed soon to improve the effectiveness of the systems and to prevent negative attitudes developing towards one or both of the systems.

There are approximately 4.0 FTE staff positions that are responsible for general system maintenance, user support, and some data input. There is also a small Asset Management Team within Engineering that uses the CMMS systems, but they do not appear to be used for system support. We did not evaluate the CMMS support team in detail as part of our scope. Our general impression, based primarily on interviews with various CMMS users and stakeholders, is that additional CMMS development and data entry support is needed, at least on a temporary basis, to quickly complete the implementation of certain applicable CMMS functions (see "Additional Operational Efficiencies and Cost Savings").

Geographic Information Systems (GIS)

DOU maintains a number of GIS applications for its use, including:

1. Field and CIP maps
2. Interfaces to CMMS systems
3. Custom application to assist with scheduling preventative maintenance work.

Currently, updating maps is the most active use of GIS at DOU. Overall, the Sacramento DOU is somewhat below industry averages for use of GIS. DOU should develop additional GIS applications to take better advantage of this technology. Given that the base GIS system is already in place, additional applications can be added incrementally without major one-time expenditures. DOU has approximately 3 FTEs for support of the GIS applications. This staffing appears adequate to support the current GIS applications, but additional support may be warranted to expand the use of GIS applications.

Customer Information System (CIS) and Related Business Applications

DOU maintains and supports the CIS Billing System and a number of related web-based and client-based business systems. The CIS system interfaces to over 20 separate software applications and systems located within DOU, at the City, and at external businesses and governments. To support the CIS systems and interfaces, DOU provides technical solutions, applications development, and customization of various related business applications and interfaces between systems.

In addition to the core CIS billing system, DOU supports a variety of web-based systems which are currently hosted by outside vendors, including:

1. The Kubra Electronic Bill Presentment and Payment (EBPP) system.
2. A phone-based Interactive Voice Recognition (IVR) system that enables Sacramento residents and businesses to view and pay their Utility bills online via internet and/or by phone.

3. The Datamatic MOSAIC system, which collects water meter reads for the billing system.

The DOU CIS system is supported by a staff of six application software analysts and specialists. This group appears to be very skilled, and have been responsible for a quite a few successful improvements to the billing system and a broad range of applications. This level of in-house expertise and application development are uncommon in the water industry, and DOU has been able to implement many time and cost saving software applications as a result.

Rates and Charges

Water Rates and Charges

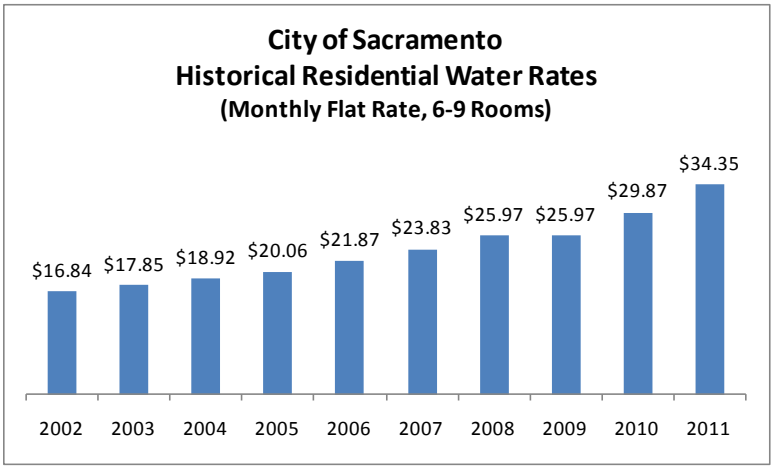
The City charges different water rates depending on the customer classification (residential or commercial customers), and whether the customer's service is metered and unmetered. The City's metered customers are charged a monthly basic service charge based on the meter size and a water use charge based on actual monthly water use. The City charges a flat rate for residential unmetered customers based on the number of rooms in the residence and for non-residential unmetered customers a flat monthly water rate depending on the type and size of establishment. As of March 2011, 20% of the City's residential accounts are billed based on metered service.

Table 10 – Water Accounts by Customer Class

Customer Class	Number of Accounts	%
Residential – Unmetered	106,153	73%
Residential – Metered	29,694	20%
Commercial	6,990	5%
Fire Service	1,836	1%
Irrigation	1,737	1%
Total	146,410	100%

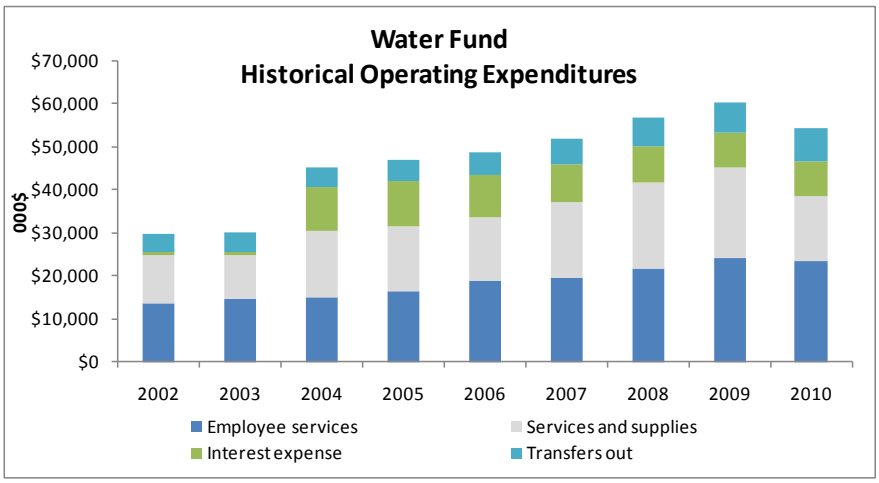
Source: Department of Utilities, "SA Count – Number of Services 3-11-11.xlsx".

The monthly flat water rate for residential customers, which represented 65% of total revenue in calendar year 2010, has steadily increased over the last 10 years, growing 104% from FY02 to FY11.



Source: Department of Utilities

The DOU costs (paid from the Water Fund) have also increased since FY02, with the largest increases attributable to employee services, which are comprised of labor-related costs.



Source: Department of Utilities

The DOU forecasts that water rates may need to increase over the next 5 years (FY12 to FY17) by 12% to 13% annually. The increases in water rates are needed to fund a growing capital program and operating expenses that grow 4% to 8% annually. The capital program includes state-required installation of water meters and repair of the existing plant and pipes.

Comparison to Other Utilities

Direct comparisons to other utilities are complicated by differences in rate structure, cost of water supply, age of system, and service territory. This audit compares the City's rates to those cities closest in population (the 4 next highest and 5 next lowest), as these urban utilities generally have a similar number of customers, composition of customer classifications, service area, and age of system. However, there are also noticeable differences, as all other cities surveyed, except Fresno, have water rates based on usage. In addition, four of the cities have "tiered" rates, where the rate increases as usage increases (and is typically done to encourage conservation and reflect higher long-run marginal costs). The neighboring communities of Sacramento, including the cities of West Sacramento, Roseville, and Citrus Heights, have some characteristics in common, but also have much different sources of water and service areas and are not included in the rate comparison.

The City's flat residential monthly service charge (which is the rate charged to most homeowners in Sacramento) is generally higher than the comparable rate of similarly-sized California utilities at lower typical rates of usage. For higher typical rates of usage, Sacramento's charges are lower than similar cities. As shown in the following chart, the City's monthly flat rate is above the median for those cities closest in population, for residential customers that consume 10 hundred cubic feet (hcf)

of water.[1] The cities with groundwater or river water as a source of supply, which have much lower conveyance costs compared to imported water, have the lowest rates.

Table 11 – Monthly Residential Water Rate Comparison (10 hcf)

City	Population	Water Supply	Monthly Residential Water Rates (10 hcf)
Fresno – metered	502,303	Mostly groundwater	$16.13
Bakersfield	338,952	Mostly river water	$18.65
Fresno – flat rate	502,303	Mostly groundwater	$22.87
Anaheim	353,643	Groundwater/imported	$23.70
Riverside	304,051	Mostly groundwater	$25.39
Sacramento – metered	486,189	Mostly river water	$25.82
Santa Ana	357,754	Groundwater/imported	$26.73
San Jose	1,023,083	Mostly imported	$29.50
Sacramento – flat rate	486,189	Mostly river water	$34.35
Long Beach	494,709	Groundwater/imported	$35.72
Oakland	430,666	Mostly imported	$38.61
San Francisco	856,095	Mostly imported	$44.31

For customers that consume 20 hcf of water, the City's flat and metered residential rates are below the median of similarly-sized California cities. The highest rates at this level of water usage are for cities with tiered rates.

[1] The City charges metered water customers a usage charge for each hcf consumed. The assumed average consumption of 10 hcf per month is a "rule of thumb," although usage varies widely across utilities depending on average temperatures, precipitation, and other factors.

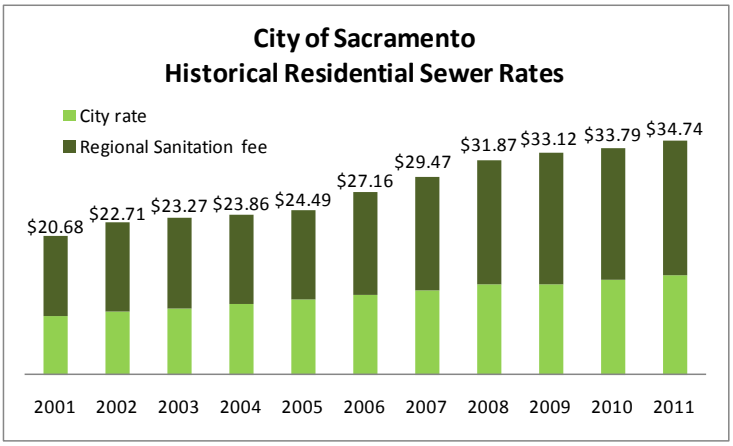
Table 12 – Monthly Residential Water Rate Comparison (20 hcf)

City	Monthly Residential Water Rates (20 hcf)
Fresno – metered	$22.23
Fresno – flat rate	$22.87
Bakersfield	$27.75
Sacramento – metered	$33.30
Sacramento – flat rate	$34.35
Riverside	$40.24
Anaheim	$42.40
San Jose	$51.86
Santa Ana	$53.46
Oakland	$65.31
Long Beach	$66.21

Wastewater Rates and Charges

The City's wastewater rates depend on the customer classification (residential, commercial, or special facility customers), and whether the customer is metered and unmetered. The City charges a flat rate for residential unmetered customers based on the number of rooms in the residence and for non-residential unmetered customers a flat monthly water rate depending on the type and size of establishment. The City's metered customers are charged a monthly sewer service charge based on the meter size and an additional charge if water use exceeds a threshold. The following chart shows the City's flat monthly sewer rate plus the additional fee paid to the Sacramento Regional County Sanitation District.[2] The combined set of fees for sewage treatment has increased from $20.68 to $34.47 from FY 2001 for FY11. The City's sewer rate and the Sacramento Regional County Sanitation District have each increased by approximately 68% over this time.

[2] The Sacramento Regional County Sanitation District (SRCSD) monthly rate is a separate utility rate charged to City customers by a different legal entity over which the City has no rate setting (nor other) authority. The City is required by agreement to collect the SRCSD rate on the City utility bill, but it is not part of the City's monthly flat rate.



Source: Department of Utilities

Comparison to Other Utilities

The City's flat residential monthly sewer service charge is higher than the median for those cities closest in population, for residential customers that consume 10 hundred cubic feet (hcf) of water. The following chart shows the City's monthly flat rate and the estimated monthly sewer rate for cities closest in population.

Table 13 – Monthly Residential Sewer Rate Comparison (10 hcf)

City	Monthly Residential Sewer Rates (10 hcf)
Bakersfield	$16.67
Riverside	$20.55
Long Beach[1]	$22.78
Fresno – flat rate	$25.75
San Jose	$32.86
Sacramento – flat rate[1]	$34.74
Oakland	$36.62
Santa Ana[1]	$41.06
Anaheim[1]	$42.71
San Francisco	$79.40

1 – Includes regional sanitation charges.

Drainage Rates and Charges

The City charges residents and other property owners a rate for drainage services, based on the number of rooms of the residence or square footage of the property. The average monthly

residential rate, based on 6 to 7 rooms, is $11.31. The residential rate has not changed since 1996. Any increase in the drainage rate requires voter approval, due to the restrictions on this category of property-related fees assessments imposed by Proposition 218.

Capital Needs

Water System Capital Needs

The City has capital needs to replace aging infrastructure that has reached the end of its useful life, including the existing water treatment plants, and continue with its state mandate to install meters on all residential water services by 2025. The following table shows the capital projects, by type, in the City's FY11-FY15 Approved Capital Improvement Plan (CIP).[3]

Table 14 – Water Capital Improvement Plan

Project Type	FY11	FY12	FY13	FY14	FY15
Meter Installation and Retrofit	$8,820,000	$12,606,000	$18,999,000	$26,483,000	$25,100,000
Replacement and Rehabilitation	1,569,000	1,279,000	779,000	1,200,000	1,200,000
System Expansion	2,500,000	300,000	0	0	0
Regulatory Compliance	278,000	379,000	318,000	250,000	224,000
Planning and Studies	195,000	350,000	450,000	250,000	250,000
Unplanned Maintenance	250,000	250,000	300,000	350,000	400,000
Projects Under Evaluation	0	2,592,000	3,510,000	5,607,000	5,000,000
Total	$13,612,000	$17,756,000	$24,356,000	$34,140,000	$32,174,000

Source: 2010-2015 Capital Improvement Program

The largest component of the City's CIP is the meter retrofit program. The program would, in accordance with state law, install meters on all residential customer service lines by 2025. The legislature passed AB 2572 in 2004 requiring water suppliers to install water meters on all customer connections by January 1, 2025. To meet this goal, the DOU implemented a Meter Retrofit Program, which includes the installation of water meters for all unmetered residential customers and the introduction of advanced metering technology that electronically collects meter readings and other data to improve service.

Asset Management - Water

The DOU is developing an asset management process for its CIP that would allow it to inventory assets, evaluate its condition, and prioritize the repair and replacement needs of the entire water system. The DOU has generally determined that many water mains are near the end of their useful life but has not evaluated the condition of all distribution lines, or developed a replacement plan for treatment facilities, transmission mains, or storage reservoirs. The DOU intends to update its Water

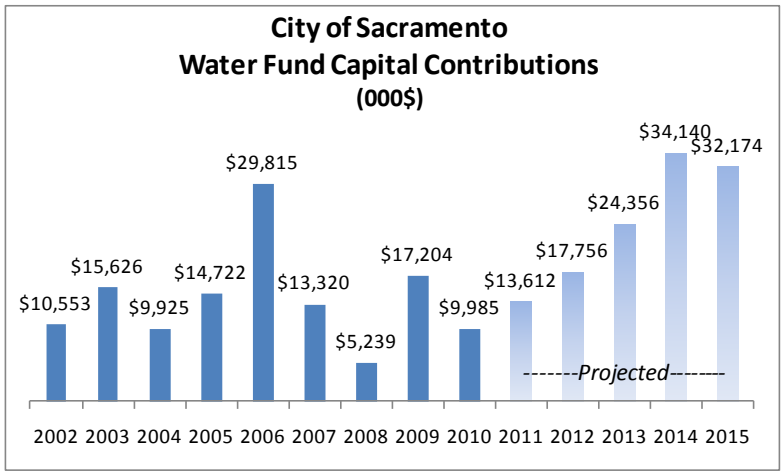
[3] City Council recently approved a $7 million professional service agreement to prepare final design plans for a water treatment plant project estimated to cost $150 million, with construction anticipated to begin in approximately 2013. This project is not included in the approved CIP.

Distribution System and Supply Master Plan, and this document will include a capital replacement plan and long-term funding strategy to meet the system's capital needs.

Adequacy of Capital Program - Water

The DOU water system master planning process is in progress, so it is unclear if the approved CIP is adequate to meet repair and replacement, system expansion and regulatory needs. The DOU has not yet developed a comprehensive inventory of assets that identifies the age, condition, and replacement schedule. Ideally, the update of the Water Distribution System and Supply Master Plan will include this information, and the City can then compare its CIP to the identified needs. The City prepared a *Water Distribution System Master Plan* in October 2005 that identified specific capital projects that would address identified deficiencies.

The City's approved five-year CIP includes an average of $1.2 million per year for repair and replacement, excluding any unplanned repair and maintenance. The total water system assets have a book value of $605 million, excluding accumulated depreciation. The City expensed $14.2 million for depreciation during FY10. Depreciation is one measure of the amount that should be set aside for replacement of assets that will continue to be used to provide service. Since the average $1.2 million per year for system repair and replacement in the approved CIP is only a small proportion of the amount of depreciation expensed each year, the City may not be investing sufficiently in the upkeep of the water system. It should be noted, however, that the approved CIP also includes $16.7 million for yet unidentified projects and this may represent repair and replacement projects, which would help meet the apparent capital investment need.



Source: Comprehensive Annual Financial Reports; 2010-2015 Capital Improvement Program

Wastewater System Capital Needs

The DOU must invest in the sewer system for the maintenance, repair, and replacement of existing facilities that collect and convey sewage to the Sacramento Regional County Sanitation District, to meet regulatory requirements, and to meet increased growth. As shown in the following table, the

DOU's planned $47.9 million sewer CIP for the next five years is primarily for unidentified projects (81% of the total five-year CIP), and for the replacement and rehabilitation of the existing system.

Table 15 – Wastewater Capital Improvement Plan

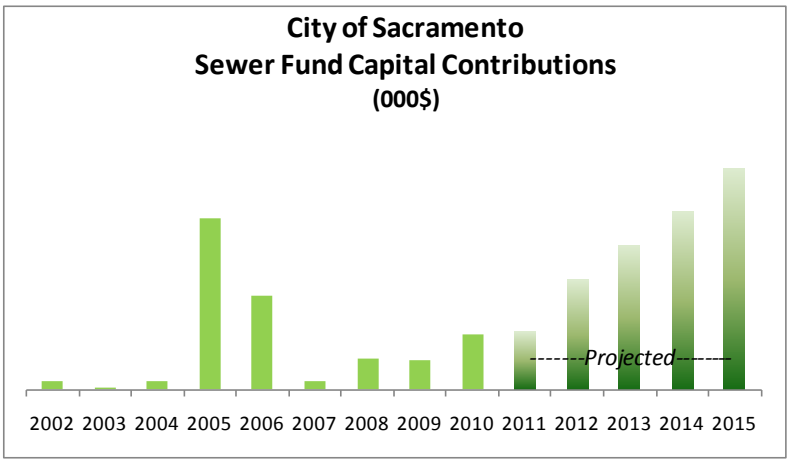
Project Type	FY11	FY12	FY13	FY14	FY15
Replacement and Rehabilitation	$2,525,000	$900,000	$900,000	$900,000	$900,000
System Expansion	100,000	0	0	0	0
Regulatory Compliance	400,000	0	0	0	0
Planning and Studies	400,000	100,000	100,000	100,000	100,000
Planned Maintenance	100,000	100,000	100,000	100,000	100,000
Unplanned Maintenance	350,000	200,000	200,000	200,000	200,000
Projects Under Evaluation	0	6,106,865	8,366,106	10,704,419	13,608,390
Total	$3,875,000	$7,406,865	$9,666,106	$12,004,419	$14,908,390

Source: 2010-2015 Capital Improvement Program

Adequacy of Capital Program - Wastewater

The DOU has stated in interviews that is has partially developed an inventory of assets that identifies the age, condition, and replacement schedule for the sewer system. The DOU has not yet prepared a master plan that would identify hydraulic deficiencies, prioritize rehabilitation and replacement needs, and identified needs from new development. A master plan would allow the City to identify capital investments that would help prevent sewer overflows, and handle peak and infiltration sewage flows.

The City's approved sewer CIP includes an average of $1.2 million per year for repair and replacement, for a system that has a book value of assets of $158 million, excluding accumulated depreciation. The City expensed $3.9 million for depreciation during FY10. Since the average $1.2 million per year for system repair and replacement in the approved CIP is less than half of the amount of depreciation expensed each year, the City may not be investing sufficiently in the upkeep of the wastewater system. The CIP also includes $38.8 million for unidentified projects or projects under evaluation. If these projects represent repair and replacement, the City may be investing sufficiently in the sewer system; however, without a master plan or other detailed capital plan, it is difficult to assess whether the amounts are adequate to meet the capital needs of the system.



Source: Comprehensive Annual Financial Reports; 2010-2015 Capital Improvement Program

Drainage System – Capital Needs

The City storm drain system includes ground pipes, pumping stations, ditches, channels, and secondary levees. The City's storm drain capital needs include projects for repair and rehabilitation, ongoing maintenance, and expansion of the storm drainage system. The system must allow for the safe and reliable collection and conveyance of storm water runoff, prevent flooding of streets and structures, and expand as the City population grows.

The primary components of the City's planned capital program are projects that rehabilitate obsolete infrastructure and those that are yet unidentified.

Table 16 – Storm Drainage Capital Improvement Plan

Project Type	FY11	FY12	FY13	FY14	FY15
Replacement and Rehabilitation	$673,000	$0	$0	$0	$0
Planning and Studies	$225,000	$0	$0	$0	$0
Equipment	$250,000	$0	$0	$0	$0
Projects Under Evaluation	$0	$1,500,000	$2,500,000	$3,500,000	$4,500,000
Total	$1,148,000	$1,500,000	$2,500,000	$3,500,000	$4,500,000

Source: 2010-2015 Capital Improvement Program

Adequacy of Capital Program - Drainage

The City's approved drainage CIP does not include any projects specifically for repair and replacement, for a system that has a book value of assets of $409 million, excluding accumulated depreciation. The City expensed $11.0 million for depreciation during FY10. As the CIP does not include any projects for repair and replacement, while the City is depreciating $11.0 million each year, the City may not be investing sufficiently in the upkeep of the storm drainage system. The CIP

includes $12.0 million for unidentified projects or projects under evaluation. If these projects represent repair and replacement this would help meet the apparent capital investment need.

Solid Waste Program

The Solid Waste Division (SWD) of the Department of Utilities (DOU) provides City of Sacramento residents with a broad range of solid waste services and oversees legacy assets the City owns from past solid waste management activities at the closed 28th Street and Old Elvas Landfills.

Goals and Priorities

The goals of SWD are embodied in its mission statement: "…provides … residents with cost-effective, high quality, environmentally sound, efficient services covering the full range of solid waste management including collection, recycling, planning and education."

The services highlighted by the DOU are:

- Automated Residential Collection;
- Appointment Based Neighborhood Cleanup;
- Loose-In-The Street Garden Refuse Collection;
- Commercial Collection;
- Street Sweeping;
- Container Delivery;
- Illegal Dumping Eradication; and
- Community Outreach.

On the SWD website, DOU presents several initiatives undertaken to create efficiencies or savings in the above services, as follows:[4]

- Re-routing crews and vehicles to limit fuel consumption;
- Switching to a 4-day a week/10-hour day collection schedule for garbage, recycling and yard waste collection services to reduce overtime, fuel and labor costs;
- Implementing employee furloughs;
- Holding vacancies open; and
- Seeking additional funding for Utilities' programs through grant funding and financing.

These are good ideas that have been for the most part implemented and should have a positive effect on efficiency and costs.

Regulatory Requirements

Reviewed below are selected regulatory requirements. This is not a full review and it mentions only state and local laws and regulations that particularly apply to the recommendations presented by the audit team.

[4] http://www.cityofsacramento.org/utilities/customer-service/CityofSacramentoDepartmentofUtilities-CustomerServiceRateIncreaseFAQ.cfm.

AB 939 (California Integrated Waste Management Act of 1989)

This act addresses regulations and guidelines related to solid waste management and diversion programs. It is administered by CalRecycle, officially known as the Department of Resources Recycling and Recovery, and is responsible for programs formerly managed by the State's Integrated Waste Management Board and Division of Recycling.

AB939 requires that jurisdictions include in the their solid waste management plan an implementation schedule which shows: diversion of 25% of all solid waste from landfill or transformation facilities by January 1, 1995 through source reduction, recycling, and composting activities; and, diversion of 50% of all solid waste by January 1, 2000 through source reduction, recycling, and composting activities. Excluded are agricultural wastes, inert wastes and other wastes not normally disposed of at landfills.

Moving forward, per AB 341, CalRecycle would be required to, on January 1, 2020 and annually thereafter, ensure that 75% of all solid waste generated is source reduced, recycled, or composted. The SWD will need to plan and implement additional services and programs to meet this higher level of diversion. Higher costs to reach this level can be expected.

Proposition 218

Passed in 1996 as California law, Proposition 218 specifies requirements for setting utility rates for water, sewer, and drainage and solid waste services and the use of funds generated by those rates. There are public hearing requirements for rate changes and a requirement that funds generated by a particular rate, are used for those particular services. In the course of our review, we have found areas where adjustments in rate setting may result if/when the efficiency ideas presented are implemented, have an effect on costs, and affect the rates SWD charges for its services.

City of Sacramento Codes and Regulations

Chapter 13.10 Garbage Collection and Disposal and Chapter 17.72 Recycling and Solid Waste Disposal Regulations of the City's municipal code provide the mainstay of regulations related to solid waste management and recycling in the City.

These codes address such things as:

- Gives the duty of collection, recycling, recovery, and disposal of all solid waste in the City to SWD;
- Gives SWD the right to divide the City into collection districts and may fix the day on which collection occurs;
- Gives the director of public works, the manager of SWD, the authority to make and enforce rules and regulations concerning these matters;
- Requires all premises to subscribe to a collection service;
- Sets rates and fees to be established by resolution of the City Council;

- Establishes minimum service levels for garbage;
- Establishes maximum weekly service levels for loose garden refuse placed adjacent to a residential dwelling for collection; and
- Establishes requirements for recycling containers placement and supply by the city.

The audit team's review has kept these laws and regulations in mind. As part of our suggested areas for improvement, the audit team is not recommending changing any of the service currently provided to residences or other properties. The audit team is recommending changing the manner in which and the equipment with which those services could be provided in order to lower costs and/or raise revenue.

SWD Organization and Description of Existing System

SWD provides a broad range of administrative and service functions. Organizationally, it is organized into the following areas:

- Administration (overall);
- Operations Administration;
- Residential Collection;
- Residential Recycling;
- Household Hazardous Waste:
- Street Sweeping;
- Garden Refuse;
- Landfill Operations;
- Commercial Recycling;
- Commercial SW Services;
- Bin/Container Maintenance;
- Neighborhood Cleanup;
- Containerized Garden Refuse; and
- Illegal Dumping.

SWD receives services from DOU and other City departments. Most notable are fleet maintenance services provided by the Department of General Services Fleet Maintenance, financial services for billing and customer service provided by DOU, and public information assistance that SWD receives from DOU. Other City departments provide legal, capital, human resources, and labor negotiations support.

SWD Budget, Rates and Charges, and Actual Performance (FY10 and FY11)

Residential Cart Services for Waste, Recyclables and Garden Refuse

SWD provides services to approximately 124,000 residences in the City. These services comprise approximately 79% of all of its costs. And, as such, the audit team's review made residential services a primary focus. The audit team identified several areas where increasing efficiency and changing the way service is delivered would provide significant cost savings that could be planned and implemented in FY12.

Components

Table 17 shows the FY11 budget for each of SWD areas along with the full-time equivalent employees for each operational area indicated. Shown here are $39 million of operation expenses in the FY11 budget. There are other costs for SWD shown in Table 17 as Interfund Transfers, which include charges from City overhead, City Attorney, debt service, capital projects, public outreach, Retired/Transfer Employee Benefits, payment of transfer to the City General Fund, and other expenses that SWD rates must cover. These expenses are estimated to be an additional $22.4 million per year. Therefore, rates need to be designed to raise approximately $61.46 million to cover all these costs. However, this budget does not include any contributions to an operating reserve fund. The audit team generally recommends an operating reserve sized at approximately three-months of operations expenses, i.e. $9.75 million in FY12, for an enterprise operation like SWD. At the existing reserve level, if there are operating shortfalls, SWD must obtain required funds from other City sources. Example uses of the operating reserve could be the costs associated with unforeseen natural disasters or legal settlements.

The SWD has a long listing of rates for the many services and choices for its customers and to generate the revenue necessary to cover its budget. The current rates are presented in Appendix A.

Table 17 – Solid Waste FY11 Expense Budget[5]

Operational Expense Budget	Amount	FTE[6]
14001711 Solid Waste Administrative Svc	$2,238,936	8
14001716 Solid Waste Operations Admin	$578,935	5
14001721 Residential Collection	$14,478,039	43
14001731 Residential Recycling	$5,292,380	21
14001741 Household Hazardous Waste	$442,951	0
14001751 Street Sweeping	$768,629	4
14001761 Loose in the Street Greenwaste	$6,064,714	34
14001771 Landfill Operations	$1,675,091	0
14001791 Solid Waste Technical Services	$0	2
14001801 Commercial Recycling	$445,595	4
14001811 Commercial Solid Waste Service	$2,438,133	13
14001821 Container Maintenance	$1,416,861	11
14001831 Code Enforcement	$158,695	0
14001841 Containerized Greenwaste	$3,205,614	11
14001851 Illegal Dumping Collection	-$161,929	4
Total Operational Expense:	**$39,042,644**	**160**
Interfund Expense Budget		
07001111 Applications	$127,506	
08001321 Admin & Medical Programs	$91,315	
13001051 City Operator	$401,709	
14001011 Department Administration	$248,172	
14001041 Fund Level Programs	$13,569,264	
14001061 Public Education Outreach	$171,576	
14001351 Information Technology	$124,574	
14001611 Fiscal and Administration Services	$349,985	
14001621 Customer Service	$447,787	
14001631 Account Management	$545,209	
51000000 Capital Projects	$2,017,000	
70001020 Debt Svc-Financing Leases	$1,239,475	
70001045 Debt Service-1999 Cap Imp Bonds	$717,071	
70001090 Debt Service-2003 Cirbs	$121,023	
70001095 Debt Service-2005 Refunding	$1,259,938	
80001025 Retired/Transfer Emp. Benefits	$484,103	
80001055 Administrative Contingency	$500,000	
Total Interfund Expense:	**$22,415,707**	
Total Solid Waste Expense Budget:	**$61,458,351**	

[5] SWD Tonnage Report, CY 2010.

[6] Source: City of Sacramento RFP for Utilities Department Operational Efficiency and Cost Savings Audit, Addendum #1; February 1, 2011.

SWD is developing a new rate model which is planned to be completed in the near future. SWD shared the current draft of the model to show how the other charges from DOU and other City departments are allocated to the services that SWD charges its customers.

The core services that SWD currently provides include:

- Weekly automated residential garbage collection service to more than 124,000 households that place their garbage in green carts that come in either 32-, 64-, or 96-gallon sizes and delivery of garbage collected to the Sacramento Recycling & Transfer Station (owned and operated by BLT Enterprises)[7] for load out and transfer to a sanitary landfill;
- Weekly automated commingled recycling collection service to more than 124,000 households with blue City-owned carts; and delivery of materials collected to the Sacramento Recycling & Transfer Station (BLT) for processing and sale of materials to markets;
- Residential yard waste collection provided in two ways: (1) Loose-in-the-Streets (LITS) whereby residents are allowed to place unlimited garden refuse in the street adjacent to their properties and have it collected on a weekly basis, and (2) containerized service whereby residents are provided a cart for yard waste that is serviced on a weekly basis. In addition, residents that subscribe to containerized service are allowed 8 LITS collections per year during designated timeframes. Yard and garden refuse collected is delivered to several contractor sites that process the material for a variety of organic feedstocks and products;
- Commercial garbage storage and collection service to non-residential customers that place their waste in a variety of SWD-provided carts, bins or boxes and according to contracted frequencies. SWD also can collect yard waste from non-residential properties and offers reduced rates for certain materials (cardboard, metal, garden refuse, drywall, and wood waste) that are kept separate; and
- Other services for street sweeping, bulky and large metal item collection, household hazardous waste, etc.

The SWD should be complemented from a customer service perspective. By applying a standard of one miss per 1,000 as exceptional service (0.1%), 3 misses per 1,000 as average service (0.3%), and anything greater would be considered below average. In FY10, SWD had 72.4 misses per day delivering residential garbage, recycling, and garden refuse service serving one fourth of the City, or to 31,000 customers, results in a percentage of 0.23%, which is above average.

Presented in Table 18 are the types of waste and materials that SWD collects and the location they are delivered for further processing, recycling, and/or disposal. Overall, SWD managed over 250,000 tons and diverted approximately 124,000 tons or 49.6 % of this amount for recycling or other beneficial uses in 2010.

[7] BLT located at 8491 Fruitridge Road, Sacramento, CA.

Table 18 – SWD Types of Waste, Contractor, and CY2010 Tonnages

Type of Waste	2010 Tonnage	Contractor	2010 Tonnage
Residential Municipal Solid Waste (MSW)	110,915	**BLT**: Residential MSW	102,560
		NARS: Residential MSW	8,355
Residential Recycling	36,918	**BLT**: Residential Recycling	36,918
Garden Refuse (containerized)	36,821	**BLT:** Garden Refuse	1,267
		Elder Creek: Garden Refuse	28,665
		K&M: Garden Refuse	6,888
Garden Refuse (loose-in-the-street)	41,947	**BLT:** Garden Refuse	24
		Elder Creek: Garden Refuse	7,865
		K&M: Garden Refuse	34,058
Garden Refuse (commercial)	146	**Elder Creek:** Garden Refuse	0
		K&M: Garden Refuse	146
Garden Refuse (contaminated)	1,661	**BLT:** Garden Refuse	959
		Elder Creek: Garden Refuse	702
Commercial MSW	15,965	**BLT:** Commercial MSW	15,905
		BLT: Commercial MSW (Wells Fargo)	60
Commercial Recycling	1,944	**BLT**: Commercial Recycling	987
		BLT: Office Recycling	197
		RI: Commercial Recycling	588
		RI: Office Recycling	172
Illegal Dumping	1,525	**BLT**: Illegal Dumping	1,525
Neighborhood Cleanup	427	**BLT**: Neighborhood Cleanup	427
Street Sweeping	1,057	**BLT**: Street Sweeping	1,057
Treated Medical Waste	759	**BLT**: Treated Medical Waste	759
Other (out of service bins, etc.)	81	**Other (out of service bins, etc.)**	81
Total	250,164	Total	250,164

Source: SWD Tonnage Report, calendar year 2010.

SWD Service Centers and the facilities SWD uses are shown in Figure 1.

Figure 1 – Map of City Showing SWD and Service Provider Locations

SWD's approved rate schedule for Fiscal Years FY10 and FY11 for its range of services is presented in Appendix A. Presented in Table 19 are selected rates from Appendix A for residential services, which represent most of the customers the SWD serves.

Table 19 – SWD Selected Residential Rates (Monthly) Approved for FY10 and FY11

Description	Level of Service	FY10 Rates	FY11 Rates
I. GARDEN REFUSE COLLECTION (LAWN & GARDEN)			
Non-Containerized (LITS)			
Single-family residence	Weekly	12.41	13.71
Containerized			
Single-family residence (1 to 4 units)	Weekly - Per unit	9.37	10.35
II. STREET SWEEPING			
Single-family residence	Quarterly	1.34	1.34
III. RECYCLING SERVICES			
Commingled 32, 64, or 96 gallon can	Weekly - Per Unit	4.58	5.13
IV. GARBAGE COLLECTION SERVICE			
Auto-lift 96-gallon	Weekly - Per unit	19.90	21.49
Auto-lift 64-gallon	Weekly - Per unit	16.35	17.66
Auto-lift 32-gallon	Weekly - Per unit	12.41	13.40

Source: Department of Utilities

Residents have a number of choices and combinations of rates they can select from the four SWD services listed above. For example, the lowest combination in FY11 would be for a 32 gallon garbage cart with containerized garden refuse service. This would result in a monthly charge of $30.22.[8] The most expensive combination of the above services would be for 96-gallon garbage service coupled with LITS non-containerized garden refuse service, resulting in a monthly charge of $ 41.67. If a residential customer (that does not have curbs or gutters) chooses not to have any garden refuse collection, the rate could drop to as low as $19.87 or as high as $27.96. Currently, approximately 9,000 customers do not have any garden refuse collection service. Both these monthly charges assume that the resident does not purchase any extra carts or bags for garbage or garden refuse. Customers cannot drop recycling or street sweeping from their services and rate determination.

Comparison to Other Utilities

Table 20 presents a comparison of curbside residential services and charges for six other cities in California – three with populations above Sacramento's and three with populations just below. Generally, Sacramento's rates are on the high side of these examples with one exception: City of Oakland's rate for 96-gallon service.

The audit team notes that Sacramento provides services (like more frequent collection) that are more extensive and charges for services that in other cities (like street sweeping) are provided outside of the utility budget and fee structure. Comparable jurisdictions also do not provide a LITS-type

[8] Only one month within the quarter would have a $30.22 total as street sweeping is charged once each quarter.

service as Sacramento does. Due to time constraints, the audit team did not consider the impact that service level changes may have on future cost savings (e.g., bi-weekly versus current weekly collection). Such changes and the possible resulting cost savings should be further investigated.

Table 20: Curbside Residential Rates in California Cities with Similar Populations as Sacramento

Location (Service Provider)	Service Description	Bulky Item Collect	Metal Junk Recycle	Household Hazardous Waste Services	Rates
Sacramento - (City) - FY11 Rates	• Carts for trash and recycling • Yard waste loose-in-the-street or containerized	Not Included	Not Included	Yes	• **Recycle**, any size $ 5.13 • **Garden Waste -** Containerized - $10.35 Loose-in-the-street - $13.71 • **Garbage -** 96gl cart - $ 21.49 64gl cart - $ 17.66 32gl cart - $ 13.40 • **Street Sweeping -** $ 1.34
San Francisco[9] (Contractor – Recology)	• 3-cart; recycle, compost, landfill • Weekly, same day service	Yes	Yes	Yes	• 20-gal landfill cart – $21.22/mo • 32-gal landfill cart – $27.55/mo • Other carts – free
Oakland[10] (City)	• 3-cart; yard/food, recycle, waste • Weekly, same day service • Used motor oil, oil filters	Yes	Yes	Yes, through County	• 20-gal – $20.63/mo • 35-gal – $27.68/mo • 64-gal – $60.36/mo • 96-gal – $93.00/mo
Santa Ana[11] (contractor – WM)	• Cart of waste • Used motor oil, oil filters	Not Included	Not Included	Yes, through County	No information
Long Beach[12] (City)	• Carts for trash and recycling • Yard waste goes in trash	Yes	Yes	Yes, through County	• 64-gal waste – $18.32/mo • 100-gal waste – $22.16/mo

[9] http://www.recologysf.com/residentialServices.php
[10] http://www2.oaklandnet.com/Government/o/PWA/o/FE/s/GAR/OAK024618
[11] http://www.ci.santa-ana.ca.us/pwa/default.asp
[12] http://www.longbeach-recycles.org/home/refuse_collection/automated_collection.htm

Location (Service Provider)	Service Description	Bulky Item Collect	Metal Junk Recycle	Household Hazardous Waste Services	Rates
Fresno[13] (City)	• 3 96-gal carts; trash (waste), garden refuse, recycling • UMO/OF • Weekly, same day service	Yes	Yes	Yes	• $25.37 for all service
Anaheim[14] (Private – Anaheim Disposal, Inc.)	• 3-barrel: trash, yard waste, and recycling	Yes	Yes	Yes; through County	• 60-gal – $18.69 • 110-gal – $19.53 • 1st yard waste barrel – free • Recycling cart - free • Street Sweeping - $2.33

Notes: Household Hazardous Waste Service generally refers to services that provide for either permanent or scheduled collection events for residents or small businesses to deliver a variety of hazardous materials (paint, chemicals, etc.) to specific locations so that they can be disposed of separately from MSW.

Table 21 presents some other locations from around the U.S. where there are different rates for different sized garbage/waste carts. As can be seen, Sacramento's rates (showing rates for both containerized and LITS garden refuse service) are higher than a few and only lower for the large cart service rates in San Jose and Seattle. Sacramento's rates are reasonably comparable to Portland, Oregon. However, these locations generally do not offer a set of services as comprehensive as Sacramento. In some cases, the services are provided and not charged to the residential customer (e.g. street sweeping). The majority of the programs utilize volume-based pricing with variable-sized containers. Austin was the only city with a multi-tiered approach, charging a base rate of $8.75 per month to all customers, with an additional variable rate based on cart size. San Francisco, Seattle, Portland, and San Jose offer a mini-can option that economically rewards those households that do not generate much waste for disposal. Portland offers the largest variety of options in services and fees, including on-call only options for garbage, yard waste, and debris. Most of the volume-based programs also offer residents the flexibility to pay extra for the occasional extra bag of trash.

[13] http://www.fresno.gov/NR/exeres/5205EFEC-7C3B-4A76-853C-B9F59AFBE5CC.htm
[14] http://www.anaheim.net/article.asp?id=574

Table 21 – Pay-As-You-Throw (PAYT) Community Summary

Source: GBB Internal database, March 2011

Jurisdiction	Population (US Census 2010 population)	32 Gallon Cart Pricing ($/month)	64 Gallon Cart Pricing ($/month)	96 Gallon Cart Pricing ($/month)	Bulky Trash Pricing ($/month)	Bag Pricing/ Extra garbage Pricing
Sacramento, CA[15]	466,488	$30.22 $33.58	$34.48 $37.84	$38.31 $41.67		5 -6 bags $12.55 3 - 4 bags $ 9.75 1 - 2 bags $ 8.36
San Francisco, CA	805,235	$27.55	-	-	No charge	-
San Jose, CA	945,942	$27.50	$55.00	$82.50	$25.00	-
Seattle, WA	608,660	$26.40	$52.80	$79.20	30.00 per item	8.10 per bundle or extra garbage
Fort Worth, TX	741,206	$12.75	$17.75	$22.75	10 cubic yards included in monthly refuse collection; amount over this charge is an additional fee.	15.00 - 5 bags for excess trash
Austin, TX	790,390	*Base rate of 8.75 regardless of cart size 4.75 - 30-gallon cart	*Base rate of 8.75 regardless of cart size 10.00 – 60-gallon cart	*Base rate of 8.75 regardless of cart size 19.20 – 90-gallon cart	Included in base fee; off-schedule service available for $120 for two items	Extra garbage: Purchase sticker for $4 to affix to each extra bag or be charged $8 per bag
Portland, OR	583,776	$26.40 - $30.50 – 32-gallon	$33.15 - $37.40 – two 32-gallon	$39.85 - $44.10 three 32-gallon	Fees charged directly by franchised waste hauler	Extra garbage: $5.00 per occasional extra can or bag

[15] Rates shown are for Sacramento for FY11. The first rate shown is for containerized garden refuse services, while the second rate is for LITS service. All Sacramento rates include street sweeping, recycling and the garbage collection service indicated.

Facilities

SWD facilities at the North Area Corporate Yard and the Meadowview South Service Centers appear in very serviceable condition and offer excellent locations for current and even expanded operations. Figure 2 shows the entrance to the Meadowview south service yard.

Figure 2 – Meadowview South Service Center Entrance

SWD currently contracts for many of its processing and disposal requirements. These assets are owned either by private parties or by Sacramento County. If this approach is to change in the future, there may be capital required to purchase SWD-owned assets. Recognizing that SWD is an enterprise activity, raising capital for these requirements could be done under a revenue bond project financing approach, with payments to cover debt service requirements guaranteed by a covenant to raise user fees as necessary. Debt is also a potential method for paying any post-closure costs for former City landfills.

Vehicles

Although the audit team did not see the entire fleet in daylight, the collection vehicles we did see appeared clean and well maintained.

The industry standard for replacing front line collection vehicles is seven to eight years. After that, collection vehicles are either sold for surplus, or used for spares or for spare parts. One past purchase of collection vehicles has resulted in SWD having very high maintenance costs. In 2007, Department of General Services Fleet Division (FD) purchased seven 1996 and 1999 model year used collection vehicles from the City of Los Angeles. These vehicles were already eight to ten years old. Although a less expensive initial cost to purchase, these collection vehicles have the highest costs of all collection vehicles. Presented in Table 22 is a listing of the various service delivery vehicles SWD uses and their average age and estimated replacement cost. The typical retirement age of these types of equipment is seven to ten years. As shown, all collection vehicle types, except one, have an average age of over seven years. Having this age of a fleet contributes to higher than

necessary maintenance costs. Also, there was a period between 2005 and 2008 that collection vehicles were not replaced and that gap in purchasing is costing additional expenses to maintain those older vehicles, according to the Fleet Management Equipment Review Report provided to the audit team.

Table 22: Average Age of SWD Service Vehicles

Service Type	Average Age	Median	Number of Vehicles	Estimated Replacement Vehicle Unit Cost
Residential Collection	7.9	2002	39	$290,000
Residential Recycling	7.5	2004	26	$290,000
Garden Refuse (packer trucks)	8.0	2001	25	$220,000
Garden Refuse (Claw)	6.6	2003	20	$90,000
Commercial	11.0	2001	12	$240,000
Rolloff	10.5	2001	2	$180,000
Containerized Greenwaste	8.8	2002	9	$290,000

Source: March 16, 2011 Fleet Management Equipment Review Report.

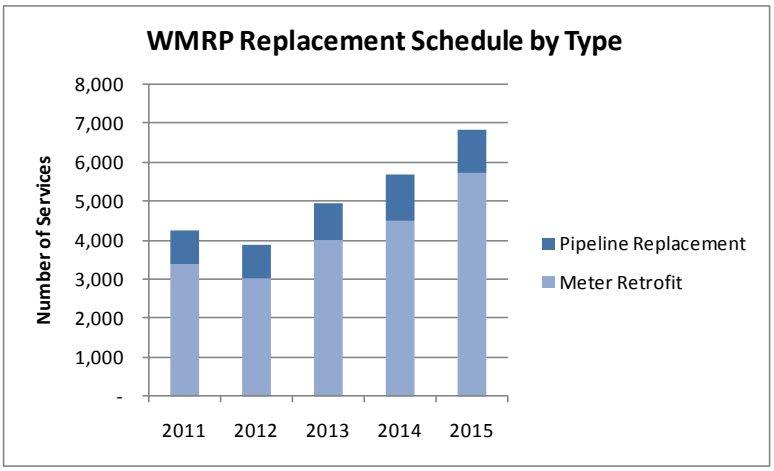
Because of the higher maintenance costs, it is important for SWD to receive new vehicles and lower the average year age of the fleet. Recently, FD purchased new vehicles and has committed to continue doing so in FY11. A recommendation to Council by FD's fleet manager on April 22, 2010 for the purchase of 23 refuse side-load trucks was approved by Council. FD needs to continue a replacement plan into FY 2015 until the entire vehicle fleet is back on a normal replacement cycle. The audit team has been unable to determine the savings from quickly reducing the number of older and costly vehicles because of the limitations of this review.

Finding 1: Backyard Mains Are Being Replaced Before End of Useful Life

AB 2572 was passed by the State legislature in September 2004 and requires cities throughout California to install water meters on all residential properties by January 1, 2025. Since 1992, the City has required that meters are installed on new construction.

In order to comply with AB 2572, the City will have to install approximately 100,000 new water meters within the City limits. When fully implemented, the City will have approximately 140,000 residential meters. To date approximately 30,000 meters have been installed.

To meet the 2025 schedule mandate, the City has decided to implement a Water Meter Replacement Program (WMRP) over a 20-year period. The WMRP involves the installation of meters on residential properties that do not have meters, retrofitting existing meters with automated meter reading devices (that transmit meter data electronically), the relocation of water mains from backyards to the front of the properties, and installation of new water lines from the water mains to the residential property.



Source: Department of Utilites

Revise Backyard Main Replacement Policy

Of the $342 million total program costs for the WMRP, $200 million is associated with the relocation and replacement of mains in backyard easements. The mains are being replaced irrespective of their condition or remaining service life. The service life of water transmission and distribution mains varies depending on soil conditions, pipe material, climate, and capacity requirements. The U.S. Environmental Protection Agency reports that water pipes have lifecycles

from 50 to over 100 years, with some pipes in use in eastern cities that are almost 200 years old.[16] The current policy should be revised to ensure that the full useful life of the pipeline has been obtained before replacement and relocation. Although, as discussed in "Capital Needs – Asset Management – Water," the DOU has generally determined that many water mains are near the end of their useful life, it has not evaluated or documented the age or condition of all distribution lines, and it is possible that DOU is replacing mains prior to end of their service lives.

When the WMRP was first implemented, one of the reasons for establishing the current policy to replace all mains in backyard easements was to allow for the reading of newly placed water meters. Subsequent to initial implementation, the City has moved to automated meter reading for all of its meters. This technology allows for the easy reading of meters located away from the street and in backyard easements. Thus one of the impediments to meter installation on backyard mains has been eliminated.

The audit team estimates the cost of the backyard pipeline replacement projects to be $46.4 million for FY11 through FY15 (in year of expenditure dollars), based on DOU unit cost estimates and the amount of linear feet of new pipe and number of meter installation services. The average cost is $9,200 per service over the next five years. If the DOU, instead, kept the backyard main in place and only installed a meter, the cost would be $1,900 per service. As shown in the following table, the total cost of installing only the meter would be $6.0 million less in FY12, compared to pipeline replacements. The total cost reduction is estimated to be $31.5 million for FY12 through FY15 (in year of expenditure dollars).

Table 23 – Additional Cost of Backyard Meter Replacement

Component	FY11	FY12	FY13	FY14	FY15
Linear ft.[1]	22,642	25,323	25,128	28,274	40,989
No. of services[1]	847	866	968	1,190	1,123
Total Cost, Pipeline Replacement	$6,808,462	$7,632,012	$8,506,971	$10,597,759	$12,873,743
Additional Costs, Meter Replacement	$1,453,217	$1,563,673	$1,839,434	$2,379,779	$2,363,471
Cost Differences	$5,355,244	$6,068,339	$6,667,537	$8,217,980	$10,510,272

[1] Source: Department of Utilities

Continue with Backyard Main Replacement, But Modify Service Lateral Policy

The replacement of backyard mains requires that the City install new "laterals" that connect to the new mains through the front of the residence. Customers are not required to pay for the new

[16] United States Environmental Protection Agency, Office of Water, *The Clean Water and Drinking Water Infrastructure Gap Analysis,* September 2002, p. 8.

laterals. The City is installing most of the new meters and automated meter reading devices in the sidewalk.

Installing the meter in the sidewalk costs an additional $510 per service. It is estimated that under current City policy, 85% of customers will have their meters installed in the sidewalk as the City complies with the state-mandated metering requirement over the next decade. Thus, approximately 85,000 meters will be installed in sidewalks under the current policy.[17] If the City continued with its backyard main replacements, but changed its policy and installed the meter adjacent to the sidewalk on the customer's property, this will save an estimated $42 million over the life of the program.[18]

Information obtained by the City from its customer survey and focus group efforts indicated a preference for the sidewalk location, but also expressed concerns about cost.[19] In May 2005, the City Council approved resolution 2005-347 that approved the DOU plan to place water meters in the sidewalks. Nevertheless, the audit team believes City Council should reconsider this resolution, given the high costs of the sidewalk replacements and the related replacement of backyard mains prior to the end of their service lives.

In addition, installing the meters adjacent to rather than in the sidewalk will result in lower maintenance costs in the future. To the extent that meters need to be repaired or replaced in the future, installations in sidewalks will incur additional costs to repair and replace concrete. Staff also reports that concrete work associated with meter placement in sidewalks is often more extensive than originally anticipated due to customer expectation that damaged concrete in proximity to the meter installation will also be repaired/replaced.[20]

If the City decides to continue with backyard main replacement, it is recommended that consideration be given to either installing the new meters behind sidewalks, rather than in them, or at least consider requiring residents to pay for sidewalk installation.

Additional Considerations

If the City stops the practice of relocating and replacing backyard mains and/or installing meters in the sidewalk, it would be able to install or retrofit meters at a faster pace, which would help the City meet the 2025 deadline and enjoy the benefits of metered service, including the implementation of tiered, conservation rates/increasing block rates. Tiered rates have higher per unit costs as water use increases to a higher range (or block), which provides a disincentive to consume additional water.

[17] Water Meter Retrofit Projects binder, Summary Cost Table, Updated March 17, 2006.
[18] November 2008 Technical Report No. 1, 11/24/08.
[19] November 2008 Technical Report, Black and Veatch.
[20] Conversation with Mike Malone.

Finding 2: Plant Operations Staffing Can Be Reduced

Presently, the two water treatment plants are staffed with three eight-hour shifts per day, seven days a week, all year. Each shift has a minimum of two operators, per plant. This arrangement requires 9.5 FTEs (minimum staffing), per plant. With advances in supervisory control and data acquisition (SCADA), instrumentation, and communication systems, the trend in water treatment plant operations is towards reduced or unattended operations during off shifts (evenings, graveyard).

It is also common at many water utilities to have longer, but fewer shifts, which can also reduce total staff position requirements. This approach has the added benefit with recruitment and retaining operators by offering employees fewer shifts with more days off. The Sacramento DOU could reduce total treatment plant staff requirements using one of the following methods:

1. Reduce graveyard shift staffing. With the existing computerized monitoring and control systems at the water treatment plants, they can be operated by one operator during the graveyard shift, versus the current practice of always having two operators at each facility. This could save 2.5 to 3.0 FTE operator positions, for a savings of roughly $420,000 per year. This is based on a fully-loaded Plant Operator cost of $152,000 per year.

   A few issues would need resolution prior to implementation of this change. First, additional safety policy, procedures, and some inexpensive equipment would be needed to minimize risks to operations staff working alone at night. The status of automation functions at the water plants should be reviewed. Also, this arrangement would likely be prohibited under the current collective bargaining agreement with Local 39, which represents the DOU's treatment plant operators. Therefore, modification of the Agreement would be required, prior to implementing this cost-saving measure.

2. Unattended operation. Operate one of the two treatment plants unattended during graveyard shift. With the installed SCADA technology, staff from one plant could monitor operations at the other plant during the graveyard shift. This would produce the same $420,000 per year savings as the first alternative.

   This alternative is somewhat less desirable than the first, because it would make it more difficult to respond to late night and early morning changes in demand or raw water quality at the unattended facility. It would also result in longer production interruptions when there is a utility power failure at the unattended facility. And, the City's operating permit would likely require modification, which would take some time to get approved. However, we believe these issues can be resolved, if needed.

3. Modified shifts. There are a number of different common shift arrangements used by other utilities that could produce similar cost savings. For example, the following "Fireman's"

shift schedule is used by the City of Roseville, California, at one of its wastewater treatment plants. Operators on a Fireman's shift work 24 hour shifts, take two to three days off, and then work another 24-hour shift. During the daytime hours they perform normal operator duties. During the evening hours they are responsible for monitoring treatment operations and performing lab tests, but do not perform maintenance or other physical duties, except in an emergency. During the graveyard shift the operator sleeps near the control room but is responsible to respond to any mid- or high-level alarms that occur. Other operations staff work during daytime hours, but the 24-hour shift operator is alone during the graveyard shift, and possibly during some night shifts. This option would also save 2.5 to 3.0 FTEs, with a potential cost savings of roughly $420,000 per year. Other modified shift arrangements are used at other water utilities in combination with reduced staff or unattended operation to reduce staffing requirements at their facilities.

Based on information collected from DOU staff and experience at other water utilities, we believe a reduction of 2.5 to 3.0 FTE's should be feasible without shifting work to other times or positions and thus creating the need for overtime to backfill tasks from the reduced positions.

There are a number of issues that must be resolved before the recommendation can be implemented. First, the best approach to reduced operations staffing must be selected. A choice of one of the alternatives discussed above, or a different alternative, must be made. Second, the state operating permits for the two water plants may have to be revised to modify the water quality testing requirements, or other requirements. Third, the union agreement for Local 39 may need to be modified.

Any reduction in treatment plant staffing below current levels may reduce the "safety margin" for the reliable water production and delivery, particularly during peak demand periods. We believe that the cost savings are worth the very small reduction in system reliability, particularly if effective steps are taken to minimize risks. The City might consider starting with the treatment plant staffing reductions during off-peak months, and after a trial period, extend the staffing reduction to year round.

However, it is noted that the number of DOU operator positions and the number of filled positions have both been reduced considerably over the past few years. We do not recommend a larger reduction in operations staff at this time, beyond the 2.5 to 3.0 FTEs suggested above, even if theoretically feasible from a purely automation and shift-modification basis. Additional analysis of workloads and other factors would need to be performed to support additional operator staffing reductions.

Given the potential safety, policy, and union issues with unattended operations, we recommend that if the City wishes to move forward with some form of shift modification or unattended operation, a short feasibility study and implementation plan should be completed.

The DOU can also reduce operations staffing during shutdowns. One of the two water treatment plants is shut down for a period of between two and three months a year. However, operations personnel still staff these out-of-service facilities the same way as during normal operations: 2 operators, 24 hours a day, seven days a week. Most utilities reassign operators during shutdowns and do not staff out-of-service water plants at all during nights and weekends. DOU should consider going without staff at out-of-service plants, except for the normal weekday 40-hour workweek. This could save up to $160,000 per year in productivity, assuming the operators would be reassigned to other productive work during the shutdowns.

Finding 3: An Operations Energy Management Program Should Be Implemented

Presently DOU spends approximately $4.5 million per year on electricity. Many utilities across the country are implementing aggressive energy management programs to reduce energy costs and reduce the utility's carbon footprint. Savings of 5 to 20 percent are common.

Over the past few years, the City and DOU have implemented a number of energy conservation measures, including lighting retrofits, variable frequency drive (VFD) retrofits, off-peak pumping and operating backup generators for peak shaving (program subsequently cancelled by SMUD). Recently, several solar energy photovoltaic (PV) projects have been initiated by the City and DOU.

Several years ago, there was an evaluation performed of special proprietary SCADA software (by Dercetto) to optimize the operation of distribution system pumps and reservoirs. This approach to energy conservation is called operations optimization, or operations energy management. At the time, the risk/benefit ratio and return on investment of the system did seem adequate to justify moving forward with the project.

Since that time, there have been a number of successful operations energy management approaches developed and tested in the water industry. Based on our brief review of DOU operations, and based on results at other utilities, we estimate the Sacramento DOU could readily save 5%, and potentially save up to 15%, of its annual electricity costs with an aggressive operations energy management program. Using the midpoint of the 5% to 15% range, the estimated annual cost savings would be $450,000 per year, once all elements of the program are in place.

Some of the elements of an operations energy management program should include:

1. Implement energy management automation. This would include monitoring energy use at key locations using smart energy monitoring devices and improvements in the use of automatic control strategies.

2. Reduce water system pumping costs through use of advanced optimization algorithms. This would include reconsidering the Dercetto software solution, as well as potentially less costly alternatives being used by other water utilities.

3. Provide operators, through SCADA, real-time energy cost monitoring capability.

4. Discussions with SMUD on pricing options for demand charges, demand reduction, and time-of-use rates.

The first step would be for the Sacramento DOU to commission an operations energy management study to determine the most effective electrical cost reduction methods and projects for the Sacramento system. After completion of the study, the energy management projects could be implemented within three to four years.

The costs for this program will be highly dependent on the results of the energy management study and decisions made concerning opportunities, investments, and priorities. For illustration purposes, we have assumed the following representative costs:

- Initial study, approximately $70,000,
- Project designs, roughly $100,000,
- Installation of equipment and software, roughly $500,000, and
- Miscellaneous services, roughly $50,000.

For savings, we have assumed the following electrical cost reductions:

- FY12 – none
- FY13 - $250,000
- FY14 - 450,000
- FY15 and beyond - $500,000 per year

For FY15 and beyond, $500,000 was used for the estimated energy savings, just slightly more than the $450,000 estimated above, which was based on 2010 electricity usage. Some escalation of electrical rates will occur, hence the increase for future years. But, this should be partially offset by reductions in water demand due to installation of water meters and water conservation efforts. The following table shows the estimated net savings/investment for fiscal years 2012 through 2015.

Table 24 – Impact of Implementing a Comprehensive Energy Management Program

Description	FY12	FY13	FY14	FY15
Initial Study	$70,000			
Project Design	-	$100,000		
Project Costs, equipment/software	-	$200,000	$300,000	
Miscellaneous Services			$50,000	
Subtotal of Costs	$70,000	$300,000	$350,000	-
Energy Savings	N/A	$250,000	$450,000	$500,000
Totals, net savings/(investment)	($70,000)	($50,000)	$100,000	$500,000

Finding 4: The Two-Vehicle System for Loose-In-The-Streets Pickup Is Inefficient

The LITS services is the second highest operational expense category in the SWD. For FY11, the LITS operational budget was approximately $6 million. It is a very generous service the audit team has not seen provided in this manner elsewhere. It is an expensive service and, in the audit team's opinion, is provided in an inefficient manner. Assuming that City residents continue to require that SWD provide these services, a change in service delivery should be explored.[21] Below, the audit team presents a change in equipment and service delivery approach. SWD could also explore privatizing this service to seek lower costs.

The containerized garden refuse system allows residents to utilize the LITS program eight times per year at specified weeks. Currently, SWD collects LITS with two pieces of equipment and two operators. The sets of equipment used are a front-load vehicle equipped with a clam device for scooping and loading, and a rear-load packer vehicle to receive the garden refuse. This equipment currently services approximately 4,500 LITS-only residences each week and 111,100 containerized customers eight times per year.[22] The garden refuse placed in the streets is collected by the loader and then placed into the rear-load vehicle, moving from routed stop to stop. Figure 6-4 shows this equipment in operation. Because of the loader, this pair moves very slowly through its route. Once the packer is full, it proceeds to the yard waste facility, unloads and returns to the route or back to the appropriate service center.

[21] The audit team has suggested an equipment and service delivery approach that preserves the current LITS approach. If the City is willing to explore other service options, another example of providing green waste service would be to expand the current containerized service to be expanded for all residents as well as to include allowing green refuse to be set out in additional brown Kraft bags (30 gallon size) along with brush cut and tied in 6 foot bundles. This material could be serviced with semi-automated packer trucks (modified garden LITS packers) and 2-person crews.

[22] The data used is from an Excel file provided by SWD titled: "Solid WasteScheduleAndMissedPickups." The audit team also identified different data in an April 5, 2011 staff report to Council which states there are 12,121 LITS and 103,787 containerized garden refuse customers. Also, the FY11 SWD budget include 8,400 LITS and 107,400 containerized garden refuse customers.

Figure 3 – SWD Claw Front Loader and Packer Servicing LITS

Source: GBB, March 4, 2011

Table 25 analyzes revenue and expenses of the residential garden refuse collection on a per route and per resident cost on a weekly basis.

Table 25 – Residential Garden Refuse Collection Statistics

	Weekly			Revenues		Expense			
	# of Routes	# of Customers	FY10 Tons	per Route day	$ per Customers per Month	$ per Route day	$ per Customers per Month	$ Expense /ton	lbs / HH /week
Garden Refuse- LITS	33	4,523	41,947	$4,023	$127.18	$5,344	$168.94	$218.60	356.7
Containerized Garden Refuse	60	111,095	36,821	$2,879	$6.74	$2,691	$6.30	$228.03	12.7
Total - Residential Garden Refuse Collection	93	115,618	78,767	$3,285	$11.45	$3,632	$12.66	$223.01	26.2

In FY10, each LITS route cost SWD $5,344 (as shown in Table 26) per day to service an average of 4,523 customers. This equated to a cost of $168.94 (as shown in Table 26) per customer per month in FY10. Current productivity is 134 tons per day average, 8 routes and approximately 1.67 tons per driver hour with approximately 160 labor hours per day.

The audit team recommends changing the method of collection from the front-loader equipped with a claw/rear- load packer vehicle system to a clam shell, boom truck system. The new system will consist of a vehicle with an attached boom/clam shell and one driver (see Figure 4). The driver will get out at each stop, operate the boom to pick up the pile on the street and if necessary, clean up with a broom and shovel, loading into the top of the claim shell to be dumped into the box. The driver will also pack down the load with the clam shell to get a better payload. When the box is full the driver will proceed to the processing facility, dump the load and return to the route. The "Clam Shell" method will necessitate additional processing trips.

Figure 4 – Boom Truck Approach for Collecting LITS

Source: Peterson Industries, Lightning Loader grapple truck, model BL-3.

SWD vehicles are currently equipped with a Zonar system that is used primarily for maintenance. A digital camera system can be added to Zonar and can instantly send picture to the 311 call center and/or supervisors to document any nonconforming stop. The audit team also suggests that when residential route drivers see a pile outside the container on these weeks, they hit a programmed button on the Zonar system so SWD can route the new boom trucks for the next day efficiently, saving extra payroll and vehicle costs of driving by every LITS and containerized customer. We also suggest for these 8 weeks that the allowed LITS pickups be performed the day after the normal collection day (to allow efficient routing), running Tuesday through Friday.

Based on our knowledge and experience we can assume a 20% decrease in productivity using 1.34 tons per hour due to lack of density, 10 boom truck routes will be needed (approx 100 labor hours). This will add 2 additional routes per day based on the current number of customers and density. As shown in Table 26, this method will add two additional routes on the street per day and save an estimated $1.4 million annually. The savings will be achieved by reducing the crew size and the equipment per route from two to one. The City would need to purchase a total of 12 boom/clam shell vehicles (10 routed per day plus two spare vehicles) at an estimated purchase price of $150,000 each. This is a total expenditure of $1,800,000, that would be offset by the sale of the surplus equipment, (all the claws and half of the rear-load vehicles estimated at $360,000), resulting in a net expenditure of $1,440,000. The estimated net debt service would be $244,235 per year assuming financing at 5% over 7 years.

Table 26 – Estimated LITS Annual Savings Calculation

	Annual Expense	# of wkly Routes	Expense / Route day
Current 2-vehicle system	$9,169,651	33.0	$5,344
Proposed boom truck	($7,550,460)	40.0	$3,630
Net cost of new boom trucks	($244,235)		
Savings	$1,374,956		$1,714

This system can be phased in on a route by route basis. The surplus equipment will be sold and will help offset the purchase of the new vehicles. Based on the fleet unit utilization report the audit team received, the cost of a rear-load vehicle and a loader with a claw was $313,000 per set, where the cost of a boom/clam shell vehicle is estimated at $150,000. This will provide additional savings to SWD for capital and equipment replacement costs for providing this service in the future. Also, the revenue from the sale of the current LITS equipment has not been estimated.

Finding 5: DOU Is Not Fully Utilizing Its Route Optimizing Software

The audit team analyzed the daily scheduled routes by line of business and compared this to the average vehicle utilization information provided. It became clear that additional vehicles and drivers are being utilized to help complete the routes. However, it is not clear how many additional vehicles are dispatched daily and how often. To obtain an accurate savings estimate, a more detailed review of the SWD would need to be conducted. The additional labor and vehicle expense that is incurred by utilizing additional assets when the routes are not completed makes an efficiently routed system very inefficient and unproductive. The audit team learned that path routing outputs from the routing software is not diligently followed by SWD drivers, although SWD has the capability and software to prepare efficient path routes. By utilizing the path routes and instilling path routing with reroutes, the drivers will be able to be held accountable and see reductions in time and mileage to complete their routes.

Increased Routing Efficiency for Garbage

The drivers on the garbage routes are picking up an average of 1,084 homes per route per day. By utilizing path routing and increasing these routes to an average of 1,120 homes per route per day, a saving of half an hour vehicle and labor will be achieved. Table 27 shows the saving of one half hour a day for the residential garbage routes after path routing is implemented. The table below shows a 5% productivity gain and a $240,000 savings. If a 10% productivity pickup is achieved, SWD would see a $480,000 savings. It is typical for path routing to achieve a 10-20% savings. However, since SWD has already used the area aspect of route optimization, the audit team is estimating a smaller savings that would result from following the paths generated by route optimization software.

Table 27 – Productivity Increase Due To Path Routing For Garbage Routes

Weekly collection routes		113
Average hours per route		10
Annual route hours		58,760
Hours after path routing *		55,822
Reduced hours from increases in productivity		2,938
Expenses	**Estimated cost/hr**	**Amount**
Labor expense	$ 29.70	$ 87,259
Fuel expense	$ 7.50	$ 22,035
Truck expense	$ 44.76	$ 131,505
Total annual savings	$ 81.96	$ 240,798
*Assuming 5% savings due to path routing		

To implement this change, SWD will need to implement path routing and manage the routes and employees on a daily basis. The SWD has calculated that due to the City's level of benefits, the City needs to employ a minimum of 18% floaters to cover potential times off for vacation, sick days, personal time off or credited time off. These floaters must be managed and used in-house and not put on the street and incur vehicle costs. The audit team suggests that supervisors and superintendents manage certain benchmarks to drive the expenses out.

Finding 6: There Is Excessive Non-Recyclable Material in Residential Recycle Bins

In FY10, SWD collected approximately 37,000 tons of recyclables from its residential sources. The current residue content (the material remaining after the separation and removal of the recyclable commodities) per the contract with BLT, was determined to be over 30%. This is an unacceptable level of residue for single stream recycling. Residue closer to 10% is more typical and possible with well-run programs. The audit team understands that BLT will be conducting a new residue test as this report is being reviewed. If the results of this year's test show high residue rates, SWD should consider conducting additional sorting to both confirm the results and to identify where the residue is high in the City, and use this information to target public information and education, and stepped-up enforcement, for the various neighborhoods that most need improvement for both quality and quantity.

In FY10, residents set out approximately 600 pounds of recyclables per household per year; or, about 50 pounds per month. The audit team believes that this amount is below the potential for recycling by these residents. In order to increase both the tonnage and the quality of recyclables set out, a new public information and education program needs to be established. The audit team learned that the current level of effort and funding is very modest based on the data we reviewed, and is not very effective. Provided in Appendix B is a discussion document that outlines how a new public information and education program can be established. A new program should also recognize the diversity of languages that are spoken by the population in the City and include a type of rewards program. The audit team estimates that an additional $400,000 should be dedicated in staff and materials costs for solid waste in FY13 for these purposes; in future years this additional amount can be reduced to approximately $250,000 per year.

With these resources applied effectively, the audit team believes that both the quantity and quality of recyclables would improve. Tables 28 and 29 present the impact of lowering the residue rate and increasing the quantity of recyclables. If residue could be reduced to 10%, revenue to SWD would increase by approximately $600,000 per year, at current market values per the contract with BLT. If the quantity of residential recyclables could be increased by 10,000 tons per year, revenue to SWD would increase by another $600,000 per year. The audit team is of the opinion these are reachable targets with a robust and sustained public education program.

Table 28 – Impact of Reducing Residue in Residential Recycling

	Contamination Percent				
	31.91%	25.00%	20.00%	15.00%	10.00%
Residential Recycling tons 2010	36,917.52	36,917.52	36,917.52	36,917.52	36,917.52
Residue	11,780.38	9,229.38	7,383.50	5,537.63	3,691.75
10%	3,691.75	3,691.75	3,691.75	3,691.75	3,691.75
Cost of Residue > 10%	$ 356,708.52	$ 244,209.39	$ 162,806.26	$ 81,403.13	$ -
Current fiscal Yr Market Price	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 30.00
Loss of revenue *(residue >10%)*	$ 242,658.86	$ 166,128.84	$ 110,752.56	$ 55,376.28	$ -
Cost of Contamination	$ 599,367	$ 410,338	$ 273,559	$ 136,779	$ -
Annual Reduction savings (Baseline of 31.1%)	**$ -**	**$ 189,029**	**$ 325,809**	**$ 462,588**	**$ 599,367**

Table 29 – Impact of Increasing Quantity of Residential Recycling

2010 Recycling tons			
Residential Recycle tons/yr	**36,918**	**42,000**	**47,000**
Residue @ 10%	3,692	4,200	4,700
Recycle tons to Market	33,226	37,800	42,300
Market price per ton (Dec 2010)	$30.00	$30.00	$30.00
Revenue share to the City	$996,773	$1,134,000	$1,269,000
Disposal Avoidance	$-	$179,310	$355,710
	$996,773	$1,313,310	$1,624,710
Annual Revenue Increase (Baseline of 36,918 tons)	**$-**	**$316,537**	**$627,937**

Assuming that SWD was successful as a result of both decreasing residue to a 10% level and increasing recyclables tonnages to 42,000 tons per year, the total savings would be approximately $916,000, made up of the following components:

- Cost of Contamination at 31.1% residue - $599,367; and
- Annual Revenue Increase from 36,918 tons - $316,537

As mentioned, there would need to be additional expense for an upgraded/expanded public education program estimated to be $400,000 in the first year, reduced to an additional $250,000 in subsequent years. Therefore, the net savings would be in the order of $516,000 the first year and increase to $666,000 in years thereafter.

The audit recommends that City Council consider the cost containment options presented above (i.e., the "Primary Findings") and provide direction to the City Manager as to which approaches to pursue further.

Additional Operational Efficiencies and Cost Savings

This section identifies additional opportunities for DOU operational efficiencies and/or cost savings, which require additional research and analysis (that was not possible due to the time constraints of this audit) to determine the potential feasibility or effectiveness in achieving results. Each of the opportunities has the potential for real improvements and cost reductions, and the City is encouraged to further investigate their potential.

A. Create and Implement a Large Meter Replacement Program

The City has approximately 1,100 "large" meters ranging in size from 3" to 12". The large meters are distributed as shown in the following table.

Table 30 – Large Water Meters by Size

Meter Size	Number of Meters
3"	500
4"	375
6"	140
8"	45
10"	12
12"	1

Source: Department of Utilities

Water meters can become inaccurate over time, which can lead to an underreporting of water use and lower water revenue. In order to determine the accuracy of meters in service, it is a best practice to periodically test the meters. The American Water Works Association recommends that meters in service be tested, on average, every 5 years for meters 1" to 4" in diameter, and every year for meters greater than 4" in diameter.

The City's existing large meter installations occurred primarily between the late 1980's and the present. A few large meters were installed as far back as the late 1970's. The City's large meters account for just under 1% of the total water accounts, while large meter revenues account for 11% of total water revenue.

Other water utilities that have undertaken a meter testing and replacement program have estimated that 10%-20% of revenues were not being collected. In the City's case a 10%-20% under-reporting of water delivered to customers represents millions of dollars in lost revenues.

Over the past couple of years the City has initiated a program to begin testing its meters. Initial data from meter tests has identified a significant number of meters that are under reporting flow either due to the wrong type meter being installed (e.g., having a meter type that does not accurately measure flows at the lower end of the range and is installed for a customer that has normal usage at the lower end of the meter range) or aged meters beyond their useful life remaining in the system. While this has resulted in an immediate increase in revenues from accounts that have their under-reporting meters replaced, an insufficient amount of data has been collected to date to reasonably predict the amount of under-collection system-wide.

The following steps are recommended in order to ensure customer billings reflect the actual water volume delivered:

1. Accelerate the testing of all meters in the system that are nearing the end of their useful life, with large meters being the top priority. This can most likely be accomplished with existing staffing. However, improvements to the testing equipment in the Meter Shop will likely be needed. Staff believes that a longer test rack for 3" and above meters should be procured and installed, and that individual volume tanks should be provided for each of the three test racks. These improvements will greatly improve the rate at which large meters can be tested and will also allow for more efficient testing of smaller meters (3/4" to 2"). Staff estimates the necessary improvement could be made for a one-time cost of $250,000.

2. Develop a plan to test a sufficient number of representative meters so that a system-wide projection of under reporting can be made. Data collected from meters tested to date needs to be analyzed and data gaps identified. The testing plan should include both small and large meters, with large meters being the priority.

3. Establish process and procedures for future routine testing and replacement of under-performing meters. A testing schedule needs to be developed that will allow for testing and replacement of small and large meters as they approach the end of their useful life. Again, the testing of large meters should be the priority.

4. Develop a replacement schedule for large meters that considers the meter inaccuracy and revenue loss based on the meter age (as estimated from the sample testing data), and the cost to purchase and install the meters. The large meter replacement plan should be incorporated into the CIP master plan and long-range financing plan that are recommended as part of this audit, as well as the approved five-year CIP.

B. Verify Customer Classification and Revenue

The City has a comprehensive Customer Information System (CIS). Procedures are in place to collect new or changed customer information and enter the new information into the billing system.

However, a comprehensive review or audit of the CIS has not been performed. Recently completed studies and audits for similarly situated utilities have resulted in annual revenue increases of $1.5 million to $3 million. Similar studies for other utilities have found and corrected: 1) unauthorized use for one or more services, 2) meter inaccuracies/malfunctions, 3) meter reading errors, billing classification inconsistencies. Studies generally take 2 to 3 years to complete.

These studies are typically performed by third party vendors with specific experience and expertise due to the relatively short term nature of the study and the high FTE commitment. Upon study completion the existing utility staff are provided with training and improved procedures so that they can efficiently maintain the system going forward.

The following steps are recommended in order to confirm the potential savings of undertaking such a study and to ensure that cost savings to the City are maximized:

1. Assemble a study team comprised of City staff with knowledge of and expertise with the City's CIS system. With input from an experienced third party vendor, develop a customer classification and revenue verification review protocol and tools.

2. Conduct a pilot study. Select a representative number of customer accounts that include all of the services provided and types of accounts. Using the results of the pilot study, project the savings to be realized from a full-scale study.

3. Implement a full-scale study. Assuming the pilot study confirms cost savings potential for the City, issue a RFP for third party vendor to conduct study. (The pilot study results would also be used to determine whether all or a selected number of the services would be reviewed in the full study.) Create a "blended" team of vendor and City staff to ensure lessons learned and procedures utilized during the study are transferred to City staff and can be used to ensure accurate CIS information in the future.

Typically the third party vendor contracts are structured so that there are no upfront or out-of-pocket costs to the utility. Contracts are structured to provide an initial period of time (typically 6 months) for the vendor to identify a pre-established amount of under-billed revenue. If the defined targets are not met the vendor receives no payment, and typically the contract is terminated.

If the vendor identifies the anticipated revenue recovery amounts, the recovered revenue is shared with the vendor. The shared amount is negotiable, but often the contract calls for the vendor to receive a one-time payment for 50% of annual recovered revenue amount. For example, if the vendor were to identify an uncollected annual revenue amount of $2 million, the vendor would receive a one-time payment of $1 million. All future annual revenue increases would be retained by the City.

The full-scale study would be conducted by a "blended" team of vendor personnel and knowledgeable City staff. The study's review process would include the following steps: 1) Define team member roles and responsibilities and develop analytical tools, 2) Team analyzes accounts using tools, 3) Create database to track progress and identify corrective action required, 4) Prioritize and implement corrective action, 5) Monitor progress and develop regular reporting mechanisms for recovered revenues, 6) Analyze billing and classification inconsistencies and revise internal procedures to address.

C. Contract for Landscape Maintenance at Largest Natomas Basins

Presently, DOU maintenance workers perform maintenance on large drainage facilities in the Notamas area. This includes cleaning of waterways and mowing and other landscape maintenance work, at a cost of roughly $535,000 per year. This is based on 3.0 FTEs at $178,000 (burdened) per year, per maintenance worker. The cost of the work is funded from the Community Facilities District 3 (a Mello-Roos district established to provide funding for landscape maintenance services in North Natomas). This does not include all work and costs assessed to CFD-3, but it is a large portion of the cost.

Using a private contracting service, we believe the work could be performed at less cost. We did not formally estimate the likely outside contracting cost for this work, but based on the approximate level of manpower required, a rough initial estimate is $400,000 per year. This could save as much as $135,000 per year. This change could also free up possibly three maintenance worker FTEs for other, more skilled work. However, some o the Natomas basin work will be difficult, if not infeasible, to contract out, due to safety and equipment requirement issues.

Note, this change would not provide a DOU budget savings. The cost of the work is funded from the Community Facilities District 3, and the reduction in costs to perform the work would be passed on to CFD-3. The DOU net budget impact is neutral if staffing is reduced by the number of positions freed up. The DOU net budget (costs minus revenue) will increase (possibly as much as $535,000) if the maintenance worker positions remain filled and are reassigned to other work.

D. Increase Size of Construction Contracts

In August 2009 the City executed agreements with the California Department of Public Health for ARRA grant funds and State Revolving Fund low interest loans totaling $20 million. The funds were used initially for 11 separate WMRP projects. The initial 11 projects averaged $1.62 million each and provided for an average of 1,500 meter installations per contract.

Project delivery and administration costs for the WMRP are currently estimated and budgeted at 10%, or a total of $34.2 million for the program. Doubling the size of each contract will result in less contract administration costs (i.e., bidding, award, and contract administration), more efficient

project planning and design (e.g., less travel time to and from the field documenting existing conditions), and more competitive contractor bids (i.e., contractor mobilization/demobilization costs, bid costs, etc. spread over larger project). It is estimated that doubling the size of the contracts will reduce the project delivery and administrative costs by 2.5%, from 10% to 7.5%, resulting in a total program cost savings of $8.5 million over the life of the program.

E. Accelerate Completion of Computerized Maintenance Management Systems (CMMS) Functions

The DOU has implemented two new CMMS systems, one for the Plant Services Division (Maintenance Connection) and one for the Field Services Division (CityWorks). Both of the systems replace paper-based systems for issuing work orders and recording maintenance activities. DOU has made considerable progress converting their work practices to the new systems and effectively utilizing them. The new systems provide better planning and tracking of maintenance activities, having the potential to save maintenance staff time and provide a wealth of information to support budgeting, cost reporting, inventory management, preventative maintenance, and various maintenance work procedure improvements.

However, there are some incomplete implementation tasks and potential improvements, which should be completed soon to improve the effectiveness of the systems and to prevent negative attitudes developing towards one or both of the systems. There are approximately 4.0 FTE staff positions that are responsible for general system maintenance, user support, and some data input. There is also a small Asset Management Team within Engineering that uses the CMMS systems, but these individuals do not provide system support. We did not evaluate the CMMS support team in detail as part of our scope. Our general impression, based primarily on interviews with various CMMS users and stakeholders, is that additional CMMS development and data entry support is needed, probably on a temporary basis, to quickly complete the implementation of certain CMMS functions. DOU staff identified some areas where CMMS functionality is incomplete, and relatively slow progress on these items appears to be causing unnecessary data input efforts and time by maintenance personnel.

DOU should implement a program to ensure rapid, full implementation, and efficient use of, the new CMMS systems. DOU should hire an outside firm to assist with the effort, if needed.

1. Equipment assemblies:
    a. Whenever a crew works on a piece of equipment, someone from the crew, generally the lead worker, must record the work done and the parts replaced, lubricated, or reconditioned. Each item of equipment contains many individual parts, each with its own name and part number. Maintenance connection has the ability to remember all of the parts that make up a piece of equipment and associate them together as an assembly.

b. Assembly data must first be entered by a CMMS technician, one time, as part of setting up the system. At the Sacramento DOU, this has not yet been performed for many, if not most, equipment on the Plant Services Maintenance Connection system. As a result, each crew leader must enter the part numbers and names from the day's work, one by one, instead of just picking them from a list. The planned schedule for completing this work is not known.

c. There are approximately 18 crew chiefs in Plant Services. Assuming that, on average, each one spends an additional 45 minutes per day entering parts information, DOU is losing approximately 13.5 hours per workday of productivity.

2. Data link between CMMS and eCaps for worker time data transfer:

a. Currently, lead maintenance workers enter his or her name or time into one of the CMMS systems, and again into eCaps (the City's financial management system). This double-entry of data is time consuming and can result in errors that have to be checked and corrected. An interface between the systems should be implemented that will transfer time card data from CMMS systems to eCaps, thus allowing staff to enter data only once.

b. Given that there are approximately 80 lead maintenance workers in Plant and Field Services, if each one spends an additional 15 minutes a day entering into time card data a second time, this results in 20 lost hours of productivity, each work day.

3. Combined, the two issues discussed above result in lost productivity of approximately 3 FTE's of maintenance worker time. The estimated cost of this lost productivity, based on an average burdened maintenance personnel cost of $165,000 per year, is $495,000 per year. If DOU staff are not available to perform this work, an outside firm should be hired.

4. Completion of the planned CMMS/eCaps data transfer will also reduce data entry time by the Business Services staff. For Business Services, integration of CMMS and eCaps is estimated to save 1.0 to 2.0 administrative FTEs. Based on an average burdened administrative staff cost of $100,000 per year, we estimate this improvement could save DOU $150,000 per year in lost productivity.

5. At present, we do not recommend a corresponding reduction in Business Services administrative staff, given the furlough program, layoffs, and unfilled positions over the past few years. Further review would be needed to determine if and how one or more existing positions can be eliminated, after the new data integration is completed and operational. We

are concerned that the backlog of maintenance tasks at DOU is increasing, and additional staff reductions are not recommended at this time.

6. Integration of work orders across maintenance groups and with operations:

   a. Presently, related tasks by mechanical maintenance, electrical maintenance, and operations are not conveniently linked or combined within the CMMS system. This creates inefficient work plans and a general lack of coordination between the groups doing the work.

   b. A well integrated, cross-discipline work order system could save DOU as much as one full maintenance FTE in productivity, a potential savings of $165,000 per year. The estimated cost of hiring an outside firm to implement this configuration is $120,000. Approximately 300 hours of staff time would also be required, at a burdened cost of approximately $25,000. Therefore, the first year savings would be negligible, but after the first year, the estimated savings would be $165,000 per year.

7. Consider adding additional positions to support CMMS baseline data development and entry, implementation of additional functions, performance reporting, and functional upgrades. Alternatively, hire outside services to help with this work.

F. Modify or Eliminate the Furlough Program

The current City furlough policy as applied to DOU staff reduces payroll by roughly $3.26 million per year, which is approximately 1.5% of DOU's annual budget for FY11. This program reduces staff working hours by approximately 7.5%, as shown in Table 31.

Table 31 – Reduction in Staff Hours from Furlough

Description	Amount
Total work hours per year	2,080
Typical holiday hours	96
Typical vacation hours	120
Typical sick leave hours	40
Net available work hours, per year, without furlough program	1,824
Reduction in work hours due to furlough program	96
Additional PTO provided to workers as a concession for furlough program	40
Total reduction in available working hours	136
Percentage reduction in available working hours	7.5%
DOU labor budget for FY11	$ 70,600,000
Furlough hours as percentage of total hours	4.6%

Description	Amount
Approximate cost savings (maximum)	$ 3,260,000
DOU budget for FY11	$212,170,549
Percent savings	1.5%

The reduction in DOU staff productivity has been made even worse by the administration of the program, particularly by allowing individuals wide discretion on which days to take off. Existing furlough policy creates too many situations where employees that need to work together are absent on different days, making both employees less productive. At times, supervisors have to delay work because part of a team is missing. And, staff communication is more difficult and time consuming. Most other utilities that have furlough programs designate the specific days that all non-operational employees are furloughed, most commonly with a "furlough Friday."

Disruption to teamwork reduces the productivity of staff. We estimate the lost productivity due to non-coordinated furlough and PTO days is on the order of three to five percent, but just to be conservative in this analysis, we will assume here the reduction in productivity is only two percent. Thus, the furlough program has a large impact on staff productivity, which has caused some significant reductions in overall DOU work output. We estimate the reduced work output to be approximately 9.5%.

This program, as applied to DOU, does not seem to be a cost-effective means to deal with the challenges of reduced City general fund revenues. It has also significantly damaged DOU employee morale, which can have a negative impact on productivity and skilled employee retention. It does not appear to be an optimal use of ratepayer funds. We recommend the City strongly consider eliminating the program at the DOU, or barring that option, modify the program as described below.

1. Option A: Eliminate the furlough program. DOU productivity will improve significantly as a result. As discussed above, the productivity improvement should be 9.5% or more.

2. Option B: Modify the furlough policy to increase staff efficiency by setting fixed, common days for furloughs. We estimate this change alone should improve productivity by at least two percent, with essentially no increase in the DOU budgets or expenditures.

G. Accelerate Completion of SCADA HMI Software System Replacement

DOU has purchased new SCADA software at a cost of approximately $450,000. Installation and use of this software is being delayed by staffing vacancies, staffing cuts, and the furlough program. The value of this purchase is depreciating rapidly with time, and the reliability of the existing system will begin to decrease significantly over time until the HMI software is replaced. Further delay in

implementation of the new software will result in lost operational efficiency and an increased risk of SCADA system failures. This, in turn, could disrupt water, wastewater or drainage operations.

This project should be completed within ten months, maximum. Currently DOU is planning to complete the work by the end of September, 2012, but this is contingent on availability of staff to do the work. Other priorities could cause this date to slip, although the likelihood of this happening has not been estimated.

We recommend that DOU either obtain firm internal resources necessary to complete this project within ten months, hire temporary staff to supplement DOU staff, or procure the services of an outside company to complete the upgrade.

The short- and long-term costs of delaying the implementation of the new HMI software are difficult to estimate with precision, but rough estimates can be made to help illustrate the potential benefits of this recommendation. There are ongoing costs for maintaining the old and obsolete system and loss of operations staff productivity, which are short-term cost impacts. Other real, but less tangible costs include depreciation of the newly purchased software and risk of disruption to operations. These two impacts are not short-term "hard" costs that can be added or deleted from the budget in the next year or two. Depreciation affects future costs. Disruption to operations is a contingent cost, which is discounted based on the probability of occurrence. Values have been estimated for illustrative purposes.

The estimated additional costs for a one year delay in SCADA HMI implementation are as follows:

Table 32 – Additional Costs Due to SCADA HMI Implementation Delay

Description	Amount
Additional FIX32 software support and maintenance for roughly one additional year:	$60,000
Loss of operations staff productivity:	$70,000
Depreciation of new software value (cost depreciated over seven years using straight-line depreciation):	$48,000
Potential disruption to operations (based on an estimated probability of 5% times the estimated additional cost, $500,000, resulting from a severe disruption scenario such as loss of water pressure, a boil notice, or a significant sewage spill):	$25,000
Total estimated cost (sum of items 1-4, above) of a one year delay (beyond recommended ten months) in implementation:	$203,000

The preceding cost impacts of delay are not intended to be precise costs that can be added or subtracted from the DOU budget. Rather, they illustrate the long term, order of magnitude impact to DOU of not completing the SCADA HMI replacement expeditiously. Also the risk associated with a longer implementation schedule for this work should be factored into DOU's priorities and decisions.

H. Eliminate Machine Shop

The City of Sacramento maintains a large machine shop to fabricate various parts needed for pumps and process equipment. DOU has stated that this capability reduces the cost for parts that are either no longer available from equipment manufacturers, or are extremely expensive when purchased in the general marketplace. DOU Plant Services staff is very proud of their capabilities and the cost-effective production of unavailable and expensive equipment parts. We have also been told that there is no alternative similar machine shop in the Sacramento Area.

The machining capabilities of the DOU Plant Services maintenance group are rare among public and private water utilities across the United States. This capability is costly, which is one reason most comparable utilities do not have it. DOU maintains a large and expensive shop with a broad range of machine tool equipment. The mechanical maintenance workers are classified as machinists, which we believe makes their pay scale higher than most mechanical workers at comparable utilities (on a location cost-adjusted basis).

Consequently, we believe that the location-adjusted unit costs of running the DOU Plant Services mechanical maintenance group are probably higher than at comparable utilities in California. More importantly, we believe that the DOU could reduce its mechanical maintenance costs, over time, by eliminating the DOU machine shop and by reducing the skill level requirements for its mechanical staff.

Developing a specific recommendation and estimated cost savings for this DOU function would require an analysis and level of effort that is beyond the scope of this audit.

We recommend that DOU hire an outside consultant to undertake a comprehensive analysis of its Plant Services mechanical maintenance costs to determine if changes can be made to lower costs while providing different, but adequate, service levels. This proposed study should focus on the question of the cost-effectiveness of maintaining the machine shop and related maintenance worker skill levels.

I. Reduce the Number of Supervisors

There is an industry rule of thumb best practice that the optimum ratio of supervisors to employees is between 1:12 and 1:15. This is based partly on work with numerous utilities over the past 15 years, partly on private sector benchmarks, and partly on cases studies from various utilities.

We estimate that DOU Plant Services and Field Services combined could reduce the number of supervisors by 6 positions, reducing labor costs by an estimated $1.2 million per year. This is based on an average burdened annual cost of $200,000 per supervisor.

This cost saving suggestion is not listed as an audit finding because we recommend additional study of this issue prior to implementation. Most utilities implement this cost saving measure as part of a multi-year program, beginning with a more in-depth study of workforce effectiveness to pinpoint how and where the number of supervisors can be reduced, and how to structure work processes to make this change more successful. This process generally includes planning for reductions through attrition and reassignment. Also, employee morale and acceptance of these changes, and possibly bargaining requirements, dictate a step-by-step approach.

J. Reduce the Number of Superintendents

An industry rule of thumb best practice is that each superintendent should have at least five, but not more than nine, supervisors reporting to him or her. We estimate that DOU Plant Services and Field Services combined could reduce the number of superintendents by as many as 3 positions, reducing labor costs by as much as $660,000 per year, based on an average annual cost of $220,000 per superintendent. This is based on reducing the number of superintendents at Field Services by one, and reducing the number of superintendents at Plant Services by two.

This cost saving suggestion is not listed as an audit finding because we recommend additional study of this issue prior to implementation, similar to the suggestion to reduce the number of supervisors, above. We see this change as a relatively long-term goal (three to five years). This suggestion is also contingent on a successful reduction in the number of superintendents and implementation of other efficiency measures, particularly more extensive deployment of information technologies.

K. Downgrade O&M Positions

Evaluate the classification of O&M staff and downgrade the requirements for positions that do not require the current level of specified skills. It appears that some maintenance positions are classified at a level that is not justified by the majority of the work being performed. (Plant Services, PM and others) We estimate that DOU could, over time, save roughly $1,000,000 per year with this organizational change.

L. Implement Workforce Flexibility (WFF)

DOU operations and maintenance are not organized using current utility best practices with respect to cross training and Workforce Flexibility. At the DOU, work is generally restricted to each employee's defined specialty.

The basic idea of WFF is that employees are trained to perform work in multiple skill classifications. This reduces staff time waiting for other skills to arrive on site or to complete work, and it reduces crew sizes.

It is recommended that the Sacramento DOU implement a program of Workforce Flexibility, which could allow operations and maintenance to improve productivity roughly 15%, possibly more. A WFF approach could involve the following changes.

1. Institute more flexible work rules and cross-train between maintenance skills to reduce crew sizes and unproductive crew time. Allow mechanical maintenance staff to perform basic electrical work. Cross-train electrical and instrumentation staff so that they can both perform the most common tasks of the two disciplines.

2. Expand the maintenance duties of the operations staff. This may require reassessing some current operations practices, as well as require better maintenance data from the CMMS systems.

3. Cross-train water, sewer, and drainage workers in Field Services. The barriers to accomplishing this are more perceived than real. (see Craig Robinson notes)

4. For Plant Services, we estimate Workforce Flexibility and Total Productive Operations could reduce maintenance crew staffing by 11 FTE positions, for a potential savings of $1.2 million per year. Note that 7 maintenance positions are currently vacant, so the net reduction in staff over current actual staffing levels would be 4 FTEs.

5. For Field Services, Workforce Flexibility would improve the efficiency of the field crews by an estimated 5 to 10 FTEs. However, there has already been a significant reduction in staffing over the past few years. In addition to 12 FTEs that have been recently been defunded, there are approximately 27 additional positions vacant, although still approved. Given the recent reductions in Field Services staffing, we do not have a recommendation for reducing the number of personnel below the current level of filled positions. Further study would be required to determine if defunding any of the 27 unfilled positions would be feasible if an effective Workforce Flexibility program were to be implemented.

6. The above recommendations will require strong leadership, changes to union agreements, investments in training, and several years to implement. Outside consulting assistance is usually required. Staff reductions can usually be accomplished by retirement, other forms of attrition, and reassignment. Remaining staff can be motivated by additional compensation and other rewards for successful training, demonstrated skill levels, and where appropriate, certification.

M. Develop Additional Geographic Information System Functionality

DOU currently has a Geographic Information System (GIS) program that has been primarily focused on mapping the water, sewer and drainage system infrastructure and assets. Maximizing DOU's existing investment in GIS technology and data with the development of additional business and operational applications would provide a number of efficiencies and benefits.

GIS can provide a common platform for accessing a majority of DOU's business and operational data, updating pipe network information, integrating work orders, finding customer information, or preparing a report. With built-in spatial analysis tools, GIS applications can support network tracing as well as analyze development trends affecting future demand. Visualization and mapping features can give you an overall, connected view of your pipe networks in relation to your customers and surrounding infrastructure. GIS and GPS technology can assist supervisors for routing crews, and can help field crews for locating sites. Many utilities are using GIS to keep up with compliance, TV inspection data, and condition ratings.

GIS applications can be developed to support business decisions by bringing DOU's information together and enabling what-if analyses. System planners can use GIS to weigh multiple scenarios and balance levels of investment against asset life span. DOU has already associated assets and their specifications with maps, drawings, and photographs to increase understanding. However, it can also help you automate and integrate enterprise information processing. Some of this has already taken place with the link to the CityWorks CMMS application by eliminating data redundancy.

Finance and administration personnel need timely access to accurate, up-to-date information when they talk to customers or prepare rate justification reports. Customer care representatives need to associate billing information with a location on a map, and planners want to connect projected growth with capital improvement project planning. GIS can help by overlaying different kinds of information onto a single map so staff can analyze and display the parts of interest. Through the implementation of an integrated enterprise GIS solution, DOU could improve facility inventory analysis, customer billing, and customer care.

The integration between GIS and CMMS can provide field operations the ability to effectively track, locate, and manage assets. GIS data integration tools make it easier to perform network tracing, analyze impacts of breaks on the network, visualize work schedules and activities, and perform dynamic segmentation for pressure and flow analysis.

GIS can also improve planning and engineering tasks such as water and wastewater system master planning, development review and approval, water flow analysis, and capital improvement project tracking.

The development of an enterprise GIS program can provide a host of benefits and cost savings for DOU. Estimating the cost savings of this recommendation and the costs to implement additional GIS functionality are beyond the scope of this report. However, given the size and scope of the Sacramento DOU, annual savings from using this technology could easily exceed $1.0 million per year, and savings from a broad application of GIS technology could save upwards of $5.0 million per year. Just as important, broader use of GIS technology could significantly assist DOU personnel respond effectively to new regulations, analyze and communicate complex engineering and policy alternatives, respond more effectively to customer service needs, and meet increasingly sophisticated public information requirements.

It is recommended that a comprehensive GIS plan be developed to identify and prioritize high value business and operational applications.

1. Adopt and implement current utility best management practices. Implement a program of Performance Management, including the use of Key Performance Metrics (KPMs).

2. Commission an updated Technology Master Plan. The current plan is out-of-date.

3. Accelerate the implementation of the DOU CMMS-based Asset Management System.

4. Consider reorganizing along Fund lines, but with a combined sewer and drainage division.

5. It appears the Engineering group may not be very responsive to O&M needs and priorities. Look at better integration or moving a few staff to Operations.

6. Revisit the telecommute policy and evaluate the cost savings and benefits.

7. Update WMRP costs. The last time the current cost estimate of $342 million was comprehensively updated was 2006. With the recent completion of 14 projects completed with $20 million in ARRA and SRF funds, there is an opportunity to refine earlier program cost estimates. The update should incorporate lessons learned from the successful completion of these recent projects and also consider the current bid climate and assumed future bid climate. A more accurate WMRP cost estimate will ensure funding requests match program costs and completion goals.

8. Review rates and charges and internal procedures to ensure full cost recovery. Industry best practice is to periodically review rates and charges for work performed by the City on behalf of individual customers. Rates and charges for such services as new service installation or service "kills" should be reviewed to ensure that the costs incurred by the City are fully

recovered. Similarly, internal policies and procedures should be reviewed to confirm that proper costing, billing and collection are in place.

9. Replace current manual project and construction review procedures with an electronic system. Given the large volume of project documents that must be reviewed both by City staff and outside vendors over the life of the program, an electronic system would add efficiency by avoid printing costs and reducing the time to assemble and deliver documents to review staff. Savings are anticipated to be a fraction of several FTE's time.

10. Replace current manual project and construction review procedures with an electronic system. Given the large volume of project documents that must be reviewed both by City staff and outside vendors over the life of the program, an electronic system would add efficiency by avoid printing costs and reducing the time to assemble and deliver documents.

N. City Expands or Exits Commercial Collection and Recycling

Current rates charged commercial customers are set by Council. They are determined in a manner that has rates generating revenue that approximately equals SWD costs. SWD provides services to these customers per these rates (See Appendix A.). SWD estimates that it currently holds 25-30 percent of the commercial market in the City. At the start of FY11, SWD had 1,075 commercial waste collection accounts and 676 commercial recycling accounts. SWD's new rate model estimates that in FY10, the total revenue from these accounts was $3.336 million while it cost SWD $5.418 million to serve these accounts. This resulted in a loss of over $2 million.

In the City, there are also sixteen (16) franchised haulers listed on the Sacramento Regional Solid Waste Authority Website as having an agreement to provide services in the City of Sacramento (as well as in Sacramento County. Each of the franchised haulers competes openly for commercial services with SWD.

Each franchisee pays a nominal $500 as a financial guarantee plus $500 per truck to the General Fund of the City. Additionally, the franchisee pays 7.25% on gross revenue from providing collection services in the City, which goes to the General Fund. SWD is exempt from the franchise fees, but pays a voter-approved general tax equal to 11% of the SWD's rate revenues, which is transferred to the City's General Fund. Since the time the City Council decided to open the commercial marketplace up some ten years ago, SWD reported that it has consistently lost customers. Reasons stated included:

- SWD's rates are too high and private firms can offer lower fees;
- City cannot have rates that are more than the cost of providing the services and because of required payments to the General Fund and other overhead charges, its rates are burdened beyond what is offered by franchise haulers; and

- SWD does not have ability to promote and market its services to past and new customers.

In talking with SWD commercial service staff, they stated that SWD could increase its customers if it was able to have:

- Rate flexibility; and
- Sales people and a sales program.

Current front-load commercial vehicles that collect the recycling and garbage routes service less than 40 customers on an average day. In the audit team's experience, this type of vehicle should be serving an average of 80 – 100 containers a day. The time and distance between each stop may be preventing a higher level of productivity to be achieved. Table 33 presents SWD's current number of routes and commercial customers served.

Table 33 – Front-Load Commercial Customers by Route

Monday		Tuesday		Wednesday		Thursday		Friday	
Route #	Customers	Route #	Customers	Route #	Customers	Route #	Customers	Route #	Customers
1-62	42	2-62	45	3-62	47	4-62	38	5-62	45
1-63	60	2-63	53	3-63	38	4-63	48	5-63	52
1-64	42	2-64	32	3-64	26	4-64	22	5-64	35
1-65	14	2-65	19	3-65	16	4-65	8	5-65	22

Several approaches to changing SWD commercial services are discussed here. In summary, the approaches are:

- SWD markets services and adds customers within the existing routes;
- SWD sells its commercial business, closes this part of its services, and has a reduction in force and equipment; and
- SWD becomes the exclusive commercial waste service provider for all or a portion of the City.

The audit team is of the opinion that the City should consider selecting one of these options for immediate action. If none are selected, the outcome will be a continued decline in SWD commercial accounts to the point of SWD working itself out of the commercial sector entirely. If declines here continue, there will be added upward pressure on both commercial and residential rates.

Regarding commercial recycling services, the audit team recommends taking a hard look at the commercial recycling routes that provide 'in-office' pick up of recyclables. This service approach adds significant time per stop to perform services and, thus, much higher costs than the more typical approach. Typically, custodial staff should be collecting recyclables as they do trash and placing

them into SWD containers centralized outside a property or at its loading dock. The audit team recommends changing these customers to a bin or container service and require the customer's janitorial staff to collect recyclables and place them in SWD-provided containers.

It should be noted, that regardless of which path is followed here, commercial recycling services would continue on a competitive basis since recyclables are considered an item of commerce subject to interstate commerce protection.

SWD Markets Services and Adds Customers within the Existing Routes

If SWD's customer base could be increased, SWD average costs per customer could come down. To immediately expand customers, the audit team believes SWD should focus on customers closest to the south and north service yards as well as those that cancelled services in the past several years. Adding customers close to SWD's service yards will increase route density and lower costs. By calling past customers, SWD may find that the rates competitor's now charge for services may have crept up and are higher than SWD's current rates and may be interested to switch back to SWD. If the number of customers can be increased, SWD will be able to allocate some of its overhead to an expanded number of customers. This would also have the effect of spreading SWD's overhead (Interfund) costs to more customers.

The audit team estimates that additional SWD staff will be needed. Preferably, the additional staff can be made available as a result of implementing other efficiencies created by SWD. SWD should hire a sales manager professional and create an advertizing campaign and collateral materials to use to promote commercial service. The audit team estimates that allocating an additional budget of $200,000 for these purposes should be adequate. Sales objectives should be established (e.g., increase commercial related revenue by 20% in FY12 to go from the current $3.3 million revenue to approximately $4 million). This would require an increase of 340 or so additional accounts. If this can be done, SWD would be able to propose lowering its commercial rates in subsequent budget years. These efforts would help close the revenue-to-expense gap that currently exists. It may take several years to completely cover the gap.

If SWD continues in this business and makes the change to promote its services and does get new customers, the sales and marketing effort will need to continue and be a strong element for continued growth and success.

The audit team did not have the time or funding to investigate the rates of franchise haulers to better understand if this approach would be successful. Further analysis would be required before implementing this approach.

SWD Sells Its Commercial Business

SWD's commercial business revenue is currently generating approximately $3.3 million annually. The City could offer certain SWD equipment and service areas through an open bid process. Also, the process should encourage prospective purchasers to offer jobs to SWD employees that would be impacted and ask those employees if they would like the option of accepting a position with the buyer under favorable City employment termination stipulations. The audit team estimates that the SWD current commercial business might bring bids in the $2 to $4 million range. This assumes SWD includes offering its vehicles, boxes, other equipment currently in place, and the customers served. SWD would need to create a plan to do this, conduct a procurement process, and determine how it would implement a reduction in force for the employees that would no longer be needed. There currently are 17 FTEs providing commercial services. An additional one or two staff providing bin maintenance could also be reduced if this approach were selected.

Additional internal funding of $50,000 to $75,000 for consultant assistance may be necessary to carry out this approach. The City General Fund would lose $363,000 in revenue for the loss of this SWD business, but franchise fees would increase to offset approximately $249,000 of this loss. Taking this option would also put upward pressure on the remaining residential rates as the commercial customers would no longer absorb its portion of overhead costs.

SWD Becomes Exclusive Commercial Waste Service Provider in the City

There are two approaches to doing this. The first would be for Council to change City policy and eliminate franchised hauling under a schedule that would meet any timeframes for notice and other standards established in California law.

The second approach is to close the market through a competitive contracting process where the winner serves all or portions of the City exclusively. Members of the audit team recently conducted this type of procurement for the City of Santa Monica. This resulted in the City's existing solid waste services, which handled about one-third of the customers in the City, prevailing in competition with private service providers that operated in a similar open market arrangement as now exists in the City of Sacramento.

The procurement could ask for pricing for exclusive service throughout the City and separate rates for serving a portion of the City exclusively; perhaps the City would be divided into two to four contracted areas. This procurement could be conducted along with the managed competition discussed earlier. Additional resources with outside consultants would be needed for both the City and SWD to prepare and respond to this; the audit team estimates that an additional $100,000 would be added to the budgets mentioned previously. If this procurement is conducted without the other, then the advisor budget would be higher. The audit team estimates that a six-month timeline would be necessary to accomplish this. It could be conducted in FY12 for implementation in FY13.

Again, review of any legal restrictions needs to be conducted prior to firmly establishing this schedule.

If SWD were to prevail and be awarded the entire City, the impact on the SWD budget and rates to customers could both be positive. First, SWD may have more customers over which to spread its fixed overhead charges. Additionally, the City General Fund would see a marginal increase in revenue, as the 11% fee SWD pays on its revenues is higher than the 7.25% franchise fees paid by franchise haulers. The audit team estimates that the additional revenue to the General Fund would be on the order of $260,000 per year. This approach would also lessen the need for SWD to reduce its work force as efficiencies are implemented elsewhere. Any staff and equipment freed-up from implementing the residential efficiencies recommended in this report could be re-deployed to serve the additional commercial accounts. If the City decides to become the exclusive commercial service provider, the City can expect significant resistance from existing franchise haulers who would be losing their customers in the City.

If SWD loses all, the effect described as a result of selling its commercial business would take effect, except that there is no purchase of the business. The business would be lost, and the only offsetting revenue would be from the sale of surplus equipment.

O. Develop a Publicly-Owned Garden Refuse Site

The DOU should develop the concept of a publicly-owned facility as a processing site for garden refuse in lieu of purchasing these services under relatively short-term private service contracting arrangements. Also, the DOU should consider having garden waste chipped on the collection routes with the alternative LITS equipment approach discussed within this audit.[23] A private operator could supply the equipment and services, but it should be located on a City-provided site closer to waste centroids.

The City could also explore partnering with the County for economies-of-scale, and using the closed 28th Street Landfill or adjacent Dellar Landfill (see Figure 6-6 showing aerial of Dellar and 28th Street Landfills). The mulch and top soil can be used for City Parks, a free give away, a sale to garden centers, and/or as fill/repair material for the 28th Street and Elvas Landfills. The DOU is currently spending approximately $2.4 million for processing by contractors. Assuming 20% savings for avoided purchasing of soil/mulch and reduced cost for processing, the potential annual savings is $480,000, plus transportation savings of hauling 80,000 tons per year approximately 11,000 miles less at a savings of $0.79 per ton mile,[24] results in $88,000 per year. The total savings potential is $568,000 per year. Note: adjacent to the 28th Street Landfill is a Concrete and Asphalt Recycling

[23] Chipping involves grinding or shredding the garden waste with an additional piece of equipment pulled behind the garden waste collection vehicle. Utilities service overhead lines use this equipment commonly. Chipping on route displaces the need for a centralized chipping service as is currently provided by contractors for SWD collected garden waste.

[24] This $0.79 per ton mile was used by SWD to normalize garden refuse bids submitted for current processing contracts.

Plant that includes a large stockpiling area. The entrance and background of this private facility are shown in Figure 6. This facility is adjacent to an FD Maintenance Facility and other City improvements at this location.

Figure 5 – Aerial of Dellar Landfill on left and 28th Street Landfill on Right

Source: Google Earth

Figure 6 – Front Entrance to Private Concrete and Asphalt Recycling Plant

Source: GBB, March 4, 2011

The City should also explore developing a publicly-owned facility for processing recyclables to replace the contract with BLT, which expires in 2013, and consider private operations or explore

partnering with the County, perhaps at a County-owned facility. Doing so can result in the SWD receiving a greater portion of revenues for the sale of recyclables.

P. Labor Costs Exceed the Amount Needed to Pay Regularly Scheduled Employees

The audit team has estimated that personnel are being paid regular wages over and above the amount needed to pay those scheduled to be on duty. To support this, the audit team reviewed and analyzed the fleet utilization report, the number of routes by commodity, and the FY10 dollars charged to regular hours per day. This analysis has determined that an average of 7 additional employees is working daily. Table 34 below compares the maximum number of routes needed on a daily basis (73) with the total number of employees needed to operate those routes (82) and then compares this to the number of employees that were calculated based on FY10 actual wages (89), with the variance being seven.

Table 34 – Comparison of Employees Routed vs. Employees Paid (Residential Service)

	Total	Garbage	Recycle	Garden Waste	LITS	
Current routes/ day	**73**	29	20	15	9	
Routed employees/day	**82**	29	20	15	18	LITS – 2 employees per route
Calculated FY 2010 actual paid[25]	**89**	39	17	7	26	= 7 additional

The variance between regular wages paid vs. the amount that should be paid based on the number of scheduled routed employees is unclear and requires additional analysis that could not be completed within the audit scope. A possible cause for the variance is the existence of personnel that are on "modified duty" and are unable to perform their normal function, including garbage collection, and are instead assigned to other tasks. The DOU should investigate this variance and determine if work rules and/or practices are resulting in inefficient scheduling and labor costs that are higher than needed to perform the scheduled work.

Q. The SWD Has a Higher Than Normal Spare Factor

Industry standard dictates a 20% spare factor.[26] Based on the information the audit team has been able to review, we have identified that SWD has a 30% spare factor available for its residential garbage and recycle collection fleet. If SWD removed the four most expensive collection vehicles, SWD would have had lower maintenance costs in the amount of $520,000.[27] The audit team

[25] FY10 Regular Hour dollars divided by the average hourly rate divided by 10 regular hours per day = average employees per day.
[26] Spare Factor, also referred to as Spare Ratio, refers to the number of spare vehicles divided by the number of vehicles required. For example, if 100 vehicles are required and 20 spare vehicles are present, the spare ratio is 20%.
[27] Fleet Unit Utilization Report, evaluating periods 01-2011 to 06-2011.

recommends FD surplus the oldest and most costly to maintain equipment to the point of reaching a 20% spare vehicle factor. The audit team has been unable to determine the savings from this because of the limitations of this review.

R. General Services Fleet Division Costs Appear Excessive

SWD relies upon the Department of General Services Fleet Division (FD) for maintenance and replacement services of its rolling stock (i.e., vehicles and mobile equipment). FD has locations at both SWD's North Area Corporate yard and the Meadowview South Service Center, as well as a location in the area of the closed 28th Street Landfill. The audit team conducted a walk-through of FD's buildings at both the north and south locations. The audit team also received comments from SWD staff on their opinions of FD's services. The following summarizes the opinions noted in our discussions with the SWD staff:

- FD has facilities and equipment to perform the required maintenance services;
- FD does not have dedicated maintenance staff for SWD vehicles, which are specialized for their application to collect waste and recyclables via automated methods;
- FD's performance of maintenance is less than desired; criticisms included that trucks needed to be returned for the same problem and SWD is again charged for that same problem;
- FD does not stock standard parts therein extending the time it takes to return vehicles for service; there is no warranty;
- FD's method of purchasing replacement vehicles takes too long; an estimated 18 months to purchase replacements was mentioned; this results in keeping vehicles in service longer and SWD experiencing higher maintenance costs on older vehicles than would occur if newer vehicles came in sooner;
- The cost for service is high; it was noted that the base annual charge to SWD is $40 per month per vehicle; and service is $98 per hour plus cost of parts with a 23 % fee added; in the event outside services are used, it is also marked up 10%.

As shown in Table 35, in FY10, FD charged SWD $8.9 million in interdepartmental charges.

Table 35 – Solid Waste FY10 Fleet Report Summary

	Bill Amount	% of Total	
Accident	$42,881	0.5%	
Admin.	$90,659	1.0%	$40 per month, per vehicle base charge
Commercial Charges	$1,381,215	15.5%	Outside Contractor Charges
Dept Charges	$60,945	0.7%	
Fuel Charges	$1,650,419	18.5%	
GPS	$19,915	0.2%	
Labor Charges	$3,139,409	35.1%	
Motor Pool	$69,526	0.8%	
Parts Charges	$2,405,205	26.9%	
Special Charges	$73,358	0.8%	
Grand Total	**$8,933,531**		

Notes:

Fleet overhead costs are imbedded in these numbers which includes:

1) 23% parts mark-up
2) 10% Commercial Charge (Comm Charge) markup (not to exceed $250)
3) 10% Hazardous Material Charge with $15 maximum per work order
4) $0.25/gallon fuel mark-up
5) Heavy Duty Labor rate of $98 per hour
6) Light Duty Labor rate of $75 per hour

The audit team notes that FD does hire outside services for peak work assistance and in turn marks up outside charges by 10% and bills SWD. Comparing this to the average cost of private third-parties at $85 to $100 per hour,[28] FD is comparable at $98 per hour. However, Table 36 calculates FD's effective hourly rate. When FD overhead and mark-up charges are included, FD's effective hourly rate rises to $118.79 per hour and shows the potential savings if fleet is outsourced or competed through a managed competition.

[28] GBB telephone interviews with Sacramento private third-parties who provide similar services

Table 36 – Fleet Department Labor Rate

		Effective hourly Rate	
$40 vehicle base charge	$90,659	$2.83	
10% outside repair mark-up	$125,565	$3.92	
Labor expense	$3,139,409	$98.00	
23% parts mark-up	$449,754	$14.04	
Total effective hourly rate		$118.79	
FY 2010 actual calculated labor hours		32,035	
	Hourly Rate	**Labor expense**	**Variance to Fleet Dept**
Fleet dept. effective hourly rate	$118.79	$3,805,387	-
Shop A effective hourly rate	$85.00	$2,722,957	$1,082,430
Shop B effective hourly rate	$100.00	$3,203,479	$601,908

The audit team is of the opinion that FD's costs appear excessive. Since it was beyond the scope of this DOU audit to also audit FD, the audit team suggests that FD be reviewed further and in more depth to determine if our opinion has merit, and if so, what steps should be taken for SWD to have access to a more efficient and less expensive fleet maintenance organization. The audit team notes that 15.5% of FD total costs are currently outsourced.

S. Consider a Managed Competition Approach for SWD Services

Since the audit team has estimated a potential for savings and efficiencies for residential services in the 15-20% range, or $6 to $8 million per year of the SWD's operating budget ($39 million), the audit team suggests that the City consider a parallel path for SWD to also compete for continued residential services with the private sector under a "managed competition." Generally, a managed competition would allow both the City and private sector providers to respond to a request for proposal to provide a defined City service or program. The advantages of including a managed competition track is that it will provide motivation for SWD to focus on implementing changes suggested here as well as prepare it to propose new approaches to deliver the services requested. In so doing, the City can compare SWD's new costs with those provided by the private proposers and determine if significant savings can be achieved. Either way, the City can realize the savings sooner. The audit team suggests that this process start in FY12 so that it could be implemented in FY13 if necessary. Improvements made by SWD in FY12 can be compared to the pricing offered by private service providers.

The managed competition should be managed outside of SWD since SWD will need to respond. With the results of both SWD efforts to increase efficiency and lower residential collection costs, the outside manager would prepare a report analyzing the results and make a recommendation for implementation in FY13. A target date for reporting to the City Council on this would be by April 2, 2012.

To conduct a managed competition, the audit team suggests that both the group conducting the process and SWD have access to separate outside resources to help each with the process. The audit team estimates that approximately $200,000 should be allocated for these purposes. Presented in Table 37 is a timeline for conducting this process.

Table 37 -
Example Timeline for SWD to Plan and Implement Changes and Conduct A Managed Competition

Description Month/Year	7/11	8/11	9/11	10/11	11/11	12/11	1/12	2/12	3/12	4/12
1. SWD Efficiency Plan and Implement										
2. City Auditor Prepare/Issue RFP for Managed Competition										
3. RFP Open										
4. Proposals Received/Evaluated										
5. City Auditor Reports Results of Managed Competition and SWD Efficiency										
6. Negotiations with Union										
7. City Auditor Reports to City Council										
8. Council Decides for FY13										

T. Planning and Implementing a New Business Plan for SWD

Outlined in this audit are a number of significant changes where SWD could modify the services they deliver to reduce costs, improve efficiency, and increase revenues. Planning and implementing these changes will require direction from Council, cooperation of various City departments, and, most of all, the willingness of SWD management and its cadre of staff to implement any changes.

The audit team is suggesting efficiencies that could result in reductions in force. These can be accomplished over time through attrition or reassigning staff to expanded services (e.g., increased commercial services or operating garden refuse processing). Also, SWD will need to make sure that staff, especially drivers, receive the proper training to adjust their driving habits to follow path routes and use current and new technology and equipment. And, if they do not, SWD will need to make sure that appropriate personnel actions are taken as part of making the 'plan' become reality.

Another important element in accomplishing these changes could be how the current union agreements are modified to provide incentives for employees who contribute to a new level of efficiency. The audit team does have a concern that current labor practices could keep SWD from being competitive in the managed competitions referred to herein for residential and commercial services.

The audit team also encourages that there be added emphasis for tracking and reporting performance in SWD. For example, the audit team suggests that SWD move away from the paper time sheets and automate to a system that will better track attendance and time, while improving the accuracy of allocating labor to the line of business that employees work and producing more accurate rates for each service offered. An automated system will control labor costs, minimize compliance risk, and improve workforce productivity. This can be a simple time keeping system or as automated as the use of computers in the vehicles to track time and communicate back with the City's payroll program (PeopleSoft).

The audit team also encourages SWD to issue performance information summaries to SWD employees so they can see how and what they are doing and compare this to targets and prior performance in previous months (and year). Regular performance feedback generally provides the indirect benefit of creating positive results, as it creates a way to see if one can do better than before.

Also important would be a program for managers and supervisors to continually improve their management skills and help them to personally develop and advance their careers. A front line supervisor's average span of control is 9.5 employees. This is a good number for the type of service they are managing. An investment that would sharpen their skills in the use of technologies and the subject areas of human resources, regulatory compliance, organized labor and operations efficiency should serve SWD well over time.

The audit recommends that City Council provide direction to the City Manager as to the need for further analysis of the secondary tier of potential cost savings/efficiency opportunities as identified above (i.e., the "Additional Operational Efficiencies and Cost Savings").

Appendix A

Solid Waste Rates Approved for FY2010 and FY2011

CITY OF SACRAMENTO			
DEPARTMENT OF UTILITIES			
Description	Level of Service	FY10 Rates	FY11 Rates
I. GARDEN REFUSE COLLECTION (LAWN & GARDEN)			
Non-Containerized			
Single family residence	Weekly	12.41	13.71
Two family residence	Weekly	19.03	21.03
Multi-Family Residential Units			
3-5 units	Weekly	20.63	22.80
6-10 units	Weekly	27.59	30.49
11-25 units	Weekly	34.49	38.11
26-50 units	Weekly	41.39	45.74
Containerized			
Single family residence (1 to 4 units)	Weekly - Per unit	9.37	10.35
Additional can	Weekly - Per unit	5.16	5.70
Note: Lawn and Garden loose in the street (non-containerized) collection is a periodic service. Service is generally provided on a weekly basis throughout the year, with exception of "leaf season" where fewer collections may occur.			
II. STREET SWEEPING			
Single family residence	Quarterly	1.34	1.34
Two family residence	Quarterly	2.12	2.12
Multi-Family Residential Units			
3-5 units	Quarterly	3.80	3.80
6-50 units	Quarterly	4.10	4.10
51 units and over	Quarterly	4.38	4.38
Miscellaneous Services			
Ad Hoc Street Sweeping Requests	Per hour	303.40	303.40
III. RECYCLING SERVICES			
Commingled 32, 64, or 96 gallon can	Weekly - Per Unit	4.58	5.13
Note: Disabled Service is provided to a qualified residence at same rates as non-disabled.			
Note: Bin service is available to residential customers at the Non-Residential/Commercial rates.			
IV. GARBAGE COLLECTION SERVICE			
Auto-lift 96 gallon	Weekly - Per unit	19.90	21.49
Additional Auto-lift 96 gallon	Weekly - Per unit	16.79	18.13
Auto-lift 64 gallon	Weekly - Per unit	16.35	17.66
Additional Auto-lift 64 gallon	Weekly - Per unit	14.20	15.34

Auto-lift 32 gallon	Weekly - Per unit	12.41	13.40
Additional Auto-lift 32 gallon	Weekly - Per unit	12.27	13.25
Extra bag (5 - 6 bags)	Per pickup	11.62	12.55
Extra bag (3 - 4 bags)	Per pickup	9.03	9.75
Extra bag (1 - 2 bags)	Per pickup	7.74	8.36
Note: Disabled Service is provided to a qualified residence at same rates as non-disabled.			
Collection on special call (autolift) 96-gallon	Per pickup	34.21	36.95
Collection on special call additional 96-gallon can or extra bags (5 - 6 bags)	Per pickup	18.08	19.53
Collection on special call (autolift) 64-gallon	Per pickup	31.00	33.48
Collection on special call additional 64-gallon can or extra bags (3 - 4 bags)	Per pickup	15.81	17.07
Collection on special call (autolift) 32-gallon	Per pickup	27.76	29.98
Collection on special call additional 32-gallon can or extra bags (1 - 2 bags)	Per pickup	14.20	15.34
Dormant Service (Fee to stop garbage & recycling charges temporarily)	One-time	64.56	69.72
Dormant Service Fee (vacant residences)	Monthly	6.00	6.48
Manual Service 32 gal or less non-curb*	1 pickup/wk	29.91	32.30
	2 pickups/wk	59.25	63.99
	3 pickups/wk	77.79	84.01
	Additional can/pickup	14.46	15.62
Manual Service 33-40 gal non-curb*	1 pickup/wk	32.61	35.22
	2 pickups/wk	65.28	70.50
	3 pickups/wk	87.09	94.06
	Additional can/pickup	18.74	20.24
Manual Service 32 gal or less curbside	1 pickup/wk	20.48	22.12
	2 pickups/wk	41.00	44.28
	3 pickups/wk	60.94	65.82
	Additional can/pickup	10.38	11.21
Manual Service 33-40 gal curbside	1 pickup/wk	22.66	24.47

	2 pickups/wk	45.38	49.01
	3 pickups/wk	68.03	73.47
	Additional can/pickup	13.34	14.41
Manual Service Collection on special call - 40 gal or less	per pickup	40.48	43.72
Each additional can	per pickup	15.29	16.51
Note: Bin service is available to residential customers at the			
Non-Residential/Commercial rates.			
** "Non-curb" is defined as container placement more than 6 feet from curb.*			
V. OLD SACRAMENTO SERVICE COURTS			
The property adjacent to each service court will be billed for solid waste service			
utilizing the following criteria:			
Parcel size	25%		
Square footage of building	50%		
Front footage of building	25%		
Commercial 6 yd compact unit	1 pickup	703.99	760.31
	2 pickups	963.72	1,040.82
	3 pickups	1,223.45	1,321.33
	4 pickups	1,615.76	1,745.02
	5 pickups	1,741.14	1,880.43
	6 pickups	2,129.84	2,300.23
	Special call/ daily	130.41	140.84
	Special call/ Sunday	193.64	209.13
Commercial 8 yd bin loose	per pickup per week	238.81	257.91
Commercial 8 yd bin compacted	per pickup per week	371.46	401.18
VI. SPECIAL GARBAGE COLLECTION SERVICES (BOTH RES. & COMM.)			
Bins			
1 cubic yard	per pickup	57.61	62.22
2 cubic yards	per pickup	75.23	81.25
3 cubic yards	per pickup	92.61	100.02
4 cubic yards	per pickup	110.01	118.81
5 cubic yards	per pickup	127.39	137.58
6 cubic yards	per pickup	144.76	156.34
Bins/Sunday			
1 cubic yard	Sunday pickup	103.66	111.95
2 cubic yards	Sunday pickup	135.43	146.26
3 cubic yards	Sunday pickup	166.70	180.04
4 cubic yards	Sunday pickup	198.00	213.84
5 cubic yards	Sunday pickup	229.28	247.62
6 cubic yards	Sunday pickup	260.58	281.43
Deliver bin and pickup			

1 cubic yard	per pickup	115.17	124.38
2 cubic yards	per pickup	150.48	162.52
3 cubic yards	per pickup	185.22	200.04
4 cubic yards	per pickup	220.00	237.60
Compactors			
3 cubic yards	per pickup	117.84	127.27
4 cubic yards	per pickup	156.72	169.26
5 cubic yards	per pickup	195.91	211.58
6 cubic yards	per pickup	235.08	253.89
Compactors/Sunday			
3 cubic yards	Sunday pickup	176.74	190.88
4 cubic yards	Sunday pickup	235.08	253.89
5 cubic yards	Sunday pickup	293.84	317.35
6 cubic yards	Sunday pickup	352.61	380.82
Special cleanups/per hour (per worker)		58.10	62.75
Out of City limits charge for commercial bins/roll-offs services		64.56	69.72
Roll-off containers (inert materials)			
10 cubic yard	per pickup	247.91	267.74
20 cubic yards	per pickup	277.62	299.83
25 cubic yards	per pickup	322.81	348.63
30 cubic yards	per pickup	368.01	397.45
35 cubic yards	per pickup	410.63	443.48
40 cubic yards	per pickup	471.31	509.01
Roll-off containers/Sunday			
10 cubic yard	Sunday pickup	283.67	306.36
20 cubic yards	Sunday pickup	416.60	449.93
25 cubic yards	Sunday pickup	484.05	522.77
30 cubic yards	Sunday pickup	551.48	595.60
35 cubic yards	Sunday pickup	616.94	666.30
40 cubic yards	Sunday pickup	684.40	739.15
Compacted Roll-off container			
10 cubic yard	per pickup	328.71	355.01
20 cubic yards	per pickup	517.56	558.96
25 cubic yards	per pickup	612.66	661.67
30 cubic yards	per pickup	706.38	762.89
35 cubic yards	per pickup	801.51	865.63
40 cubic yards	per pickup	895.21	966.83
Compacted Roll-off container/Sunday			
10 cubic yard	Sunday pickup	645.63	697.28
20 cubic yards	Sunday pickup	807.04	871.60
25 cubic yards	Sunday pickup	968.45	1,045.93
30 cubic yards	Sunday	1,319.66	1,425.23

	pickup		
35 cubic yards	Sunday pickup	1,455.25	1,571.67
40 cubic yards	Sunday pickup	1,592.13	1,719.50
Special waste hauling			
10 cubic yards	per pickup	485.87	524.74
20 cubic yards	per pickup	713.53	770.61
25 cubic yards	per pickup	829.05	895.37
30 cubic yards	per pickup	944.58	1,020.15
35 cubic yards	per pickup	1,056.68	1,141.21
40 cubic yards	per pickup	1,172.24	1,266.02

CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES
SOLID WASTE RATES APPROVED FOR FY2010 AND FY2011

Description	Level of Service	FY10 Rates	FY11 Rates
I. GARDEN REFUSE COLLECTION (LAWN & GARDEN)			
Non-Containerized			
Multi-Family Residential Units - 5 units and over	Weekly	48.29	53.36
2 cubic yards	Weekly	34.49	38.11
3 cubic yards	Weekly	41.39	45.74
4 cubic yards	Weekly	48.29	53.36
Containerized			
96 gal can	1 pickup/wk	9.37	10.35

Note: Lawn and Garden loose in the street (non-containerized) collection is a periodic service. Service is generally provided on a weekly basis throughout the year, with exception of "leaf season" where fewer collections may occur.

II. STREET SWEEPING			
Per commercial premise	Quarterly	4.38	4.38

III. RECYCLING SERVICES			
WITH GARBAGE SERVICES			
1 yard commingled bin	1 pickup/wk	28.75	32.20
2 yard commingled bin	1 pickup/wk	39.21	43.92
3 yard commingled bin	1 pickup/wk	52.28	58.55
4 yard commingled bin	1 pickup/wk	58.81	65.87
Multi-family/commercial commingled can	1 pickup/wk	13.07	14.64
WITHOUT GARBAGE SERVICES			
1 yard commingled bin	1 pickup/wk	36.60	40.99
2 yard commingled bin	1 pickup/wk	48.35	54.15
3 yard commingled bin	1 pickup/wk	60.12	67.33
4 yard commingled bin	1 pickup/wk	67.96	76.12
Multi-family/commercial commingled can	1 pickup/wk	13.07	14.64

IV. GARBAGE COLLECTION SERVICE			
Auto-lift 96 gallon	per pickup/wk	27.93	30.16
Additional Auto-lift 96 gallon	per pickup/wk	21.48	23.20
Auto-lift 64 gallon	per pickup/wk	25.13	27.14

Additional Auto-lift 64 gallon	per pickup/wk	19.59	21.16
Auto-lift 32 gallon	per pickup/wk	21.48	23.20
Additional Auto-lift 32 gallon	per pickup/wk	18.79	20.29
Automated collection on special call			
96-gallon automated can	per pickup	36.57	39.50
64-gallon automated can	per pickup	31.81	34.35
32-gallon automated can	per pickup	27.53	29.73
	Each add'l can	23.50	25.38
1 yd bin loose	per pickup/wk	68.88	74.39
1 yd bin compacted	per pickup/wk	142.88	154.31
2 yd bin loose	per pickup/wk	90.15	97.36
2 yd bin compacted	per pickup/wk	181.65	196.18
3 yd bin loose	per pickup/wk	111.42	120.33
3 yd bin compacted	per pickup/wk	160.24	173.06
4 yd bin loose	per pickup/wk	132.71	143.33
4 yd bin compacted	per pickup/wk	196.51	212.23
5 yd bin loose	per pickup/wk	154.00	166.32
5 yd bin compacted	per pickup/wk	209.23	225.97
6 yd bin loose	per pickup/wk	175.26	189.28
6 yd bin compacted	per pickup/wk	268.70	290.20
8 yd bin loose	per pickup/wk	248.36	268.23
8 yd bin compacted	per pickup/wk	424.95	458.95
10 yd roll-off box loose	per pickup/wk	409.59	442.36
10 yd roll-off box compacted	per pickup/wk	581.15	627.64
20 yd roll-off box loose	per pickup/wk	499.34	539.29
20 yd roll-off box compacted	per pickup/wk	967.79	1,045.21
25 yd roll-off box compacted	per pickup/wk	1,145.66	1,237.31
30 yd roll-off box loose	per pickup/wk	900.01	972.01
30 yd roll-off box compacted	per pickup/wk	1,319.66	1,425.23
35 yd roll-off box compacted	per pickup/wk	1,455.25	1,571.67
40 yd roll-off box loose	per pickup/wk	1,047.21	1,130.99
40 yd roll-off box compacted	per pickup/wk	1,592.13	1,719.50

Three (3) months continuous service is required for Commercial Bin Service

Trailer	5 pickups	499.37	539.32
Two-person route surcharge	per pickup/wk	23.97	25.89

Manual Cans Service 32 gal or less	per pickup/wk	36.39	39.30
Each additional can 32 gal or less	per pickup/wk	20.93	22.60
Manual Cans Service 33-40 gal	per pickup/wk	40.09	43.30
Each additional can 33-40 gal	per pickup/wk	26.18	28.27
Manual Cans Service 41-50 gal	per pickup/wk	48.15	52.00
Each additional can 41-50 gal	per pickup/wk	30.14	32.55
Manual Cans Service 51-60 gal	per pickup/wk	55.38	59.81
Each additional can 51-60 gal	per pickup/wk	35.19	38.01
Manual collection on special call 32 gal or less	per pickup	47.35	51.14
Each additional can 32 gal or less	per pickup	23.50	25.38

V. OLD SACRAMENTO SERVICE COURTS

The property adjacent to each service court will be billed for solid waste service utilizing the following criteria:

Parcel size	25%		
Square footage of building	50%		
Front footage of building	25%		
Commercial 6 yd compact unit	1 pickup	703.99	760.31
	2 pickups	963.72	1,040.82
	3 pickups	1,223.45	1,321.33
	4 pickups	1,615.76	1,745.02
	5 pickups	1,741.14	1,880.43
	6 pickups	2,129.84	2,300.23

VI. SPECIAL GARBAGE COLLECTION SERVICES (BOTH RESIDENTIAL & COMMERCIAL)			
Bins			
1 cubic yard	per pickup	57.61	62.22
2 cubic yards	per pickup	75.23	81.25
3 cubic yards	per pickup	92.61	100.02
4 cubic yards	per pickup	110.01	118.81
5 cubic yards	per pickup	127.39	137.58
6 cubic yards	per pickup	144.76	156.34
Bins/Sunday			
1 cubic yard	Sunday pickup	103.66	111.95
2 cubic yards	Sunday pickup	135.43	146.26
3 cubic yards	Sunday pickup	166.70	180.04
4 cubic yards	Sunday pickup	198.00	213.84
5 cubic yards	Sunday pickup	229.28	247.62
6 cubic yards	Sunday pickup	260.58	281.43
Deliver bin and pickup			
1 cubic yard	per pickup	115.17	124.38
2 cubic yards	per pickup	150.48	162.52
3 cubic yards	per pickup	185.22	200.04
4 cubic yards	per pickup	220.00	237.60
Compactors			
3 cubic yards	per pickup	117.84	127.27
4 cubic yards	per pickup	156.72	169.26
5 cubic yards	per pickup	195.91	211.58
6 cubic yards	per pickup	235.08	253.89
Compactors/Sunday			
3 cubic yards	Sunday pickup	176.74	190.88
4 cubic yards	Sunday pickup	235.08	253.89
5 cubic yards	Sunday pickup	293.84	317.35
6 cubic yards	Sunday pickup	352.61	380.82
Special cleanups/per hour (per worker)		58.10	62.75
Out of City limits charge for commercial bins/roll-offs services		64.56	69.72
Roll-off containers (inert materials)			
10 cubic yard	per pickup	247.91	267.74
20 cubic yards	per pickup	277.62	299.83
25 cubic yards	per pickup	322.81	348.63
30 cubic yards	per pickup	368.01	397.45
35 cubic yards	per pickup	410.63	443.48
40 cubic yards	per pickup	471.31	509.01
Roll-off containers/Sunday			
10 cubic yard	Sunday pickup	283.67	306.36

20 cubic yards	Sunday pickup	416.60	449.93
25 cubic yards	Sunday pickup	484.05	522.77
30 cubic yards	Sunday pickup	551.48	595.60
35 cubic yards	Sunday pickup	616.94	666.30
40 cubic yards	Sunday pickup	684.40	739.15
Compacted Roll-off container			
10 cubic yard	per pickup	328.71	355.01
20 cubic yards	per pickup	517.56	558.96
25 cubic yards	per pickup	612.66	661.67
30 cubic yards	per pickup	706.38	762.89
35 cubic yards	per pickup	801.51	865.63
40 cubic yards	per pickup	895.21	966.83
Compacted Roll-off container/Sunday			
10 cubic yard	Sunday pickup	645.63	697.28
20 cubic yards	Sunday pickup	807.04	871.60
25 cubic yards	Sunday pickup	968.45	1,045.93
30 cubic yards	Sunday pickup	1,319.66	1,425.23
35 cubic yards	Sunday pickup	1,455.25	1,571.67
40 cubic yards	Sunday pickup	1,592.13	1,719.50
Special waste hauling			
10 cubic yards	per pickup	485.87	524.74
20 cubic yards	per pickup	713.53	770.61
25 cubic yards	per pickup	829.05	895.37
30 cubic yards	per pickup	944.58	1,020.15
35 cubic yards	per pickup	1,056.68	1,141.21
40 cubic yards	per pickup	1,172.24	1,266.02

Appendix B
Public Education for More Recycling, Less Residue

A. Understanding the Challenges

In an effort to quickly reduce the costs of its solid waste management system, the City of Sacramento's Department of Utilities, Solid Waste Services, faces a number of challenges. Chief among these is the need to increase the quality and quantity of the recyclable materials collected in the City's residential and commercial programs, including reducing the current 30 percent residue rate in the City's recycling stream.

One key to increasing diversion and reducing contamination is to reinvigorate the City's public education and outreach for recycling, but City staff members face a lack of funding for public education and outreach. Compounding the lack of funding is the need to communicate to a large (and growing) segment of the population that speaks languages other than English. (At least nine languages are on some of the City's current signage.)

What can City staff do to jumpstart the City's recycling public education and outreach efforts? While the answer to the question "What will work?" is going to differ for every community, there are some common building blocks for any successful recycling program. This document first outlines those building blocks, including some "best practices" that may be appropriate in Sacramento. Many of these approaches work well in the commercial/institutional sector as well as with residential customers. It also provides examples of public education best practices from several communities that have low rates of contamination or have reduced residue rates by creating a recycling "buzz" with inexpensive or cost-free approaches.

B. Building Blocks for a Successful Recycling Campaign

The first, and perhaps most critical, best practice for any recycling campaign is to have a plan. This plan needs to include the following elements:

1. Determine your goals and objectives.

The overarching goal for Sacramento is to reinvigorate the City's recycling program. Some measurable objectives for Sacramento might include:

- Increase diversion by X percent by [year]
- Decrease contamination by X percent
- Increase participation in recycling by X percent
- Provide residential and business customers with accessible knowledge and tools to participate in recycling and feedback on their performance
- Reach residents and businesses that don't currently recycle or whose participation is low

2. Decide on your target audiences.
Given the City's fiscal constraints, it will be important not to spend precious resources preaching to the choir – those who already recycle and recycle appropriately. Focusing outreach strategies on neighborhoods where people sometimes recycle or where there is a high percentage of contamination in the recycling receptacles will be important.

Perhaps there are certain neighborhoods of types of businesses where collection crews have noticed more contamination than in other areas, or places where participation is low. These "low-hanging fruit" neighborhoods should be priority targets for public education. Other target audiences can be defined by customer groupings such as:

- Single-family homeowners
- Apartment residents
- School children
- Seniors
- Businesses (by type, e.g.: office buildings, restaurants, retail)
- Institutions (educational, healthcare)
- Nonprofit and government
- Tourists
- Media (who can help you get the word out)

3. Understand your target audiences.
The key to getting target audiences to participate in your program is to get to know them. What do they know (and not know) about recycling? What are their questions or concerns? What types of benefits do they associate with recycling? What are the barriers to their full participation? What types of messages are effective in motivating them to recycle (e.g., humorous, edgy, serious)? How do they like to receive recycling messages (e.g., TV, radio, print, movie ads, word of mouth). Do they go online and engage in social media? What events do they attend? Where do they shop? Do they prefer to receive messages in their native languages? Would incentives such as prizes or financial incentives motivate more recycling? Answers to these and other questions will help determine what messages you will use and how you will deliver them.

There are a number of low-cost ways to gather this information: focus groups, online surveys, intercept interviews on the street and in shopping areas. In addition, reaching community members through community organizations, neighborhood associations, civic groups, faith-based organizations, environmental organizations, and chambers of commerce can provide some answers to the questions posed above. While getting information about target audiences can be time-consuming, the process does not have to be expensive, and the results are worth the effort because they take the guesswork out of your public education planning.

4. Round up partners and sponsors.
If Sacramento does not have a volunteer recycling community, this is a great time to organize one. Citizens who have a strong interest in environmental issues and recycling are likely to enjoy the challenge of reinvigorating the program. In addition, private partners such as local businesses, nonprofits and media organizations may be able to provide financial support and/or avenues for distributing education materials.

5. Define your messages: back to the basics.
A new Harris poll, released in January 2011, reveals that American adults overall are now less likely than they were in summer of 2009 to be swayed by "green" messages, such as the concept of leaving a cleaner planet for future generations.[29] Those citizens who say they recycle always or often have stalled at 68 percent. One reason may be that in difficult economic times, environmental enthusiasm wanes as people focus on financial problems. The audit team's experience conducting focus group research in two California cities in 2008 revealed that messages that stress greenhouse gas reduction from recycling confuse and fail to resonate with residents or business solid waste managers. Given these findings, making assumptions that residents care about the environment and recycling and using "green" messaging may be less effective now than in previous years.

What messages will resonate? The answer can be found in the research conducted in step 3 and what you discover about your target audiences**.** Keeping messages simple and going back to basics are likely to work best in Sacramento: what to recycle; when to recycle; where to recycle and where to look for more information. A lighter, humorous tone is working well in many communities that are reinvigorating their recycling public education programs (see examples below). Due to the large population of non-native English speakers in Sacramento, relying on graphics and illustrations is likely to work better than text-heavy messages. There is no need to reinvent the wheel; gathering and borrowing ideas from other communities and such organizations as the Curbside Value Partnership (www.RecycleCurbside.org) can also help.

Once you decide on your messages, it is important to test them out on key target audiences. This can be done informally through focus groups or intercept interviews.

6. Develop your strategies and tactics: Some best practices.
To capture the attention of its residential and business customers – and make use of scarce dollars – many communities opt for short, bold campaigns that create "buzz." These campaigns often make use of the following strategic components, which constitute best practices in the public education arena:

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[29] http://www.harrisinteractive.com/NewsRoom/HarrisPolls/tabid/447/mid/1508/articleId/667/ctl/ReadCustom%20Default/Default.aspx

- Develop a new recycling slogan. ("Recycle Right" and "Recycle Clean" have been used in Phoenix, Arizona, and Frederick County, Maryland, to encourage proper recycling behavior and reduce contamination.) One option is to hold a contest in the community or in the school system for a new slogan.
- Develop basic messages about the dos and don'ts of recycling, using graphics and illustrations in a consistent fashion across all communication platforms.
- Convey these messages where target audiences will receive them, such as in public service advertising (print, radio and TV/cable), bus and bus shelter ads, movie theaters, billboards, bumper stickers, and banners at public events. Often, it is possible to negotiate with media companies for discounted or public service/no cost advertising.
- Launch an attention-grabbing contest or prize patrol, funded in part or whole by businesses or other sponsors. One community organized a "trashy fashion" contest in which fashion entries were required to comprise 75 percent recycled materials.
- Conduct grassroots outreach in neighborhoods where participation is low and contamination is high, through neighborhood associations, articles in neighborhood newsletters. Organize volunteers to help make presentations.
- Develop partnerships with local businesses to get the word out via stickers on pizza boxes and key messages on paper grocery bags.
- Partner with scout troops and other youth organizations to distribute recycling information door-to-door in select neighborhoods where participation is low and contamination is high.
- Conduct outreach to the chamber of commerce and business organizations.
- Have collection crews affix weather-proof stickers to residential recycling containers and to commercial receptacles, graphically showing the dos and don'ts of recycling.
- Affix signage with key messages on the City's recycling and trash collection trucks.
- Piggy-back off already scheduled events such as PTA meetings, fairs, festivals, sports events to conduct outreach.
- Determine if there is a local opinion leader or reputable local celebrity (e.g., a sports star) who can help champion the campaign.
- Purchase a catchy new url for the County's recycling web pages – one that reflects the key messages or slogan of the campaign; for example "www.recyclesacramento.org," which as of this writing is available. Now, the web site address is: http://www.cityofsacramento.org/utilities/solid-waste-recycling/, which is long and hard to remember.
- Revamp the City's recycling web pages with more graphics that show the dos and don'ts of recycling.
- Post videos about proper recycling behavior on the City's website. These videos can be inexpensively produced and uploaded using a Flip or other handheld video camera.
- Work with the City's school system to integrate recycling into the science curriculum.
- Develop a public relations strategy that uses free media to promote the campaign and recycling (e.g., press releases, op eds for the Sacramento Bee and other local media, campaign FAQs, press conference at the MRF to launch the campaign).
- Conduct an annual awards program for excellence in recycling among City businesses and institutions. Make the award at a City Council meeting.
- Publicize a list of businesses that are meeting the City's recycling goals.

7. Evaluate the program and communicate successes.
Often overlooked is the need for periodic evaluation of program implementation. Are objectives being met and are we approaching our goal? For any new strategies or tactics, it is important to measure success and impact against quantifiable benchmarks prior to implementation, such as tonnage, residue, participation and set-out rates, website hits, calls for customer service, etc. Providing feedback to customers on cost savings, tonnages recycled and positive program impacts is critical in order to reinforce positive behavior and correct any negative behavior.

C. Campaign Strategies from Other Communities
A number of California communities have achieved low residue rates. A few are highlighted here:

Alameda, California **www.cityofalameda.ca.gov/Go-Green/Recycling** Population served 71,201

Alameda reports that it has achieved a 68 percent diversion rate and its franchisee, Alameda County Industries, which collects and processes recyclables, reports a 19 percent residue rate. Some of Alameda's public education best practices include the following:

- Alameda's public education program uses a character named Ozzie, the residential recycling guru, during outreach and to provide information.
- The City makes excellent use of its website, which includes a "tongue in cheek" video with 1940 images that promotes recycling, civic pride and recycling guidelines, and even features a recycling pledge. http://www.alamedacountyindustries.com/alameda/customer_center/recycling_guide.html
- The City website includes a comprehensive, color-coded list of what materials are to be recycled in each of the three containers: blue for recycling, green for yard waste and organics, and gray for trash. Items that are hazardous waste or require other disposal are listed in red. http://www.alamedacountyindustries.com/alameda/customer_center/residential_containers.html
- Separate sections of the City's website target businesses, school kids and residential customers using eye-catching graphics.

San Francisco **www.sfrecycling.com** Population served 815,358
San Francisco is moving toward zero waste with a 75 percent diversion goal by 2010 and a zero waste goal by 2020. The residue rate is currently 15 percent. The City has a three-cart system: green cart for compostables, blue cart for recyclables and black cart for trash.

The City's program, named Recology, uses photographic images, clear website content and well-designed, downloadable documents to provide recycling information. Of note is the fact that the

recycling flyers and posters can be used with both residents and businesses – a cost-saving practice. Some of San Francisco's public education best practices include:

- Recycling poster, available for download on the Recology website that uses no words, just photos http://www.sfrecycling.com/pdf/recycling_poster_blue.pdf. This poster is appropriate for both residential and commercial/institutional customers.
- Recycling flyer, downloadable, for target audiences who speak Spanish, Chinese and English, which uses few words and identifies materials that can and cannot be recycled with photos, no words. This flyer works as well for residents as it does for businesses/institutions. http://www.sfrecycling.com/pdf/recycling_flyer_spanish_chinese.pdf
- Compost flyer that uses no words, just photos. http://www.sfrecycling.com/commercialCompost.htm
- Compost flyer for Spanish, Chinese and English-speaking residents, which uses few words but uses photos to show what can and cannot be composted. http://www.sfrecycling.com/pdf/compost_flyer_spanish_chinese.pdf
- Website lists of businesses that have achieved a recycling diversion rate of over 75 percent. http://www.sfrecycling.com/commercialServices.php
- A website page on special events recycling and the services Recology provides for collection bins and boxes as well as pictures that give recycling information. http://www.sfrecycling.com/special_events_recycling.htm

The following two communities have addressed their contamination issue by partnering with the Curbside Value Partnership and rebranding their recycling programs using new slogans, revised websites and clear, user-friendly information:

Phoenix, Arizona www.recyclecleanphoenix.org

In 2009, contamination in the recycling stream was costing Phoenix about $722,000 annually. Working with the Curbside Value Partnership, the City decided to tackle the contamination issue head-on with the Recycle Clean Phoenix campaign. The campaign asks residents: "What contaminates your stream?" and uses a memorable url to direct customers to the City's recycling web pages where visitors can sign up for a monthly newsletter. Campaign materials highlight the "yeps" and "nopes" of recycling, and a Facebook page allows customers to ask questions about recycling and comment on the contamination they observe.

Frederick County, Maryland www.learnmorerecyclebetter.org

Like Phoenix, Frederick County had a contamination problem. In October 2010, the County launched its "Learn More, Recycle Better" campaign for the County's 73,000 households. A centerpiece of the campaign was the three-and-a-half month "Recycle Right" contest, through which staff randomly selected households that displayed proper recycling set-outs. Those selected received

prizes that included a goodie bag with a t-shirt and shopping tote and entry into a drawing for a $50 gift card prize. Residents could also receive prizes for signing up for the e-newsletter and ordering a larger recycling cart. The campaign also included a revamped website with a memorable url: www.learnmorerecyclebetter.org. Although a number of languages are spoken in Frederick County, which has a growing Hispanic and Latino population, because the County is an "English only" jurisdiction, all campaign materials are in English, but make heavy use of graphics and visuals. Annmarie Creamer, County recycling outreach program coordinator, confirms that she has received no complaints or negative comments about the English-only materials. Initial results of the campaign are not yet available.

A number of campaigns and public education best practices from other communities around the country are highlighted on the Curbside Value Partnership website: www.recyclecurbside.org/content/u/education_campaigns

RecycleBank www.recyclebank.com

Sacramento is familiar with RecycleBank's incentive-based recycling systems, having launched a program in the South Meadowview neighborhood in May 2010. RecycleBank, which on March 10, 2011, was named No. 4 on the Wall Street Journal's list of the Top 50 Start-Ups, reports that it has more than 2 million members in over 300 communities across 29 states and in the United Kingdom. RecycleBank reports that its communities double, even triple, recycling rates. Two Michigan communities, Rochester Hills and Westland, have both seen tremendous success with their enhanced recycling programs with RecycleBank. In Rochester Hills, recycling rates are up 241 percent, and in Westland, 458 percent.[30] Some of RecycleBank's larger communities include Houston, Texas; Ann Arbor, Michigan; Chattanooga, Tennessee; Los Angeles California; and Philadelphia, Pennsylvania (www.phillyrecyclingpays.com/ -- the original RecycleBank community in 2005; and see: http://usmayors.org/mwma/uploads/2010Mwmaphillyrecycling.pdf, a presentation about how Philadelphia and RecycleBank have recently modified their offering). Is this a program that could be expanded citywide in Sacramento?

D. A Note on Public Education Budgets

The typical rule of thumb for public education budgets is to allocate $3 per household for new or rebranded programs and $1 annually for maintenance. However, if a community is able to secure financial or in-kind support through partnerships with businesses, organizations or the media, these figures can be lower. How the budget is allocated will vary by community and its priorities. Given the current situation in Sacramento, a $3 per household level investment is needed once a new program design is developed. This should be a priority for developing and launching in FY12.

[30] http://www.recyclebank.com/corporateinfo/index/pressreleasearticle/id/72

Appendix C – List of Acronyms

Abbreviation	Description
CIP	Capital Improvement Plan
CMMS	Computerize Maintenance Management System
DOU	Department of Utilities
FD	Department of General Services Fleet Division
FWTP	Fairbairn Water Treatment Plant
GIS	Geographic Information System
IWMP	Industrial Waste Monitoring and Pre-treatment
KPMs	Key Performance Metrics
LITS	"Loose in the Streets" (garden refuse)
O&M	Operations & Maintenance
SCADA/HMI	Supervisory Control and Data Acquisition / Human-Machine Interface
SMUD	Sacramento Municipal Utility District
SRRE	Source Reduction and Recycling Element
SRWTP	Sacramento River Water Treatment Plant
SWD	Solid Waste Division
WFF	Workforce Flexibility
WMRP	Water Meter Replacement Program
WTP	Water Treatment Plant