CITY OF

RICHMOND

DEPARTMENT OF PUBLIC UTILITIES

Cost of Service and Rate Design Study

March 13th, 2013

RAFTELIS
FINANCIAL CONSULTANTS, INC.

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Executive Summary

Raftelis Financial Consultants, Inc. (RFC), in consultation with Concentric Energy Advisors, Inc. (Concentric), Greeley and Hansen (G&H), Tyrone Dickerson, CPA, and Shina Omokanwaye and Associates (SOA Financial) (collectively, the Project Team), was engaged by The City of Richmond (City) Department of Public Utilities (DPU) to perform a comprehensive cost of service (COS) and rate design study (Study). The primary objectives of the study were to evaluate the City's existing and projected cost basis for utility operations and make appropriate recommendations for rate structure adjustments that will sufficiently address operating and capital revenue requirements and meet the City's most important pricing objectives. The work plan included the following major components:

- Evaluating the revenue sufficiency and cost equity of the City's existing rate structure for providing water, wastewater, and gas services;
- Recommending cost justified water, wastewater and gas rates that are consistent with industry pricing standards and practices, and that fully support system operations and maintenance (O&M), asset repair and replacement, system improvements, debt service, debt service coverage, and reserve requirements.
- Reviewing the City's most recent stormwater utility rate study;
- Developing an affordability program to help ensure the affordability of water and wastewater service by providing support for economically disadvantaged customers; and
- Communicating the basis and merits of the recommended utility rate changes to the DPU and the City staff, Council, existing customers, and other relevant stakeholders.

The Executive Summary highlights the principle findings and recommendations of the Study. The following additional sections provide detailed discussions of the Study process and recommendations to address the objectives of the Study:

- Section I: Introduction
- Section II: Rate Setting Process
- Section III: Water and Wastewater Revenue Requirements
- Section IV: Water and Wastewater Cost Allocations
- Section V: Water and Wastewater Rate Options and Customer Impacts
- Section VI: Stormwater
- Section VII: Affordability Program

It should be noted that the cost of service analysis for the gas utility is provided in a separate report.

A. Section II: Rate Setting Process

The Project Team utilized a systematic approach for rate setting, designed around a process tailored specifically to the DPU's goals and objectives for the Study. The approach began with multiple workshops and interactive discussions with key DPU and City Staff to provide a foundation for

identifying and prioritizing the DPU's most important objectives in pricing for water, wastewater, and gas services. These pricing objectives, in particular, affordability, cost of service based allocations, and revenue stability, were used as focal points during the development of the cost of service analysis and rate design components of the Study.

B. Section III: Water and Wastewater Revenue Requirements

The Project Team worked closely with DPU Staff to develop an appropriate projection of revenue requirements based on a recommended strategy of recovering enough costs through rates and charges to ensure financial sufficiency and the ability to provide safe and reliable services. Revenue requirements include all O&M and capital costs incurred by the DPU to operate the water and wastewater utilities. Revenue requirements not only represent the minimum cash needs of the utility but also the liquidity and debt service coverage requirements.

For the DPU's water and wastewater utilities, revenue requirements are comprised of four main components: operating expenses, depreciation, payment in-lieu of taxes (PILOT), and a return. Each of these revenue requirements were built up separately for the water and wastewater utilities. These revenue requirements are inclusive of the costs associated with providing water and wastewater service to not only the DPU's retail customers but also its wholesale customers, Chesterfield, Hanover, Henrico, and Goochland Counties. In order to solely calculate rates for the DPU's retail customers, the costs associated with providing services to the wholesale customer were backed out of the water and wastewater system revenue requirements, consistent with the terms of the wholesale contracts.

In general, the revenue requirements used in this study were escalated based on either FY 2012 actual or FY 2013 budgeted costs with projected adjustments, to formulate a COS test year of FY 2014. This test year incorporates assumptions to account for the effects of inflation, decreased demand, increased operating costs, and anticipated capital costs. After adjusting for the test year, total net water revenue requirements equal $50,052,060, while total net wastewater revenue requirements equal $67,926,802.

The water and wastewater industry as a whole has recently experienced a decline in per capita consumption. This is due, in large part, to economic conditions, a general awareness and initiative of resource conservation, and the development and implementation of low-flow fixtures and appliances. The decline in per capita consumption also exists in the DPU's service area. As a result, the Project Team took this trend into account, along with the DPU's historical billing data, in order to determine a reasonable forecast of demand.

Based on the projected revenue requirements and forecast of demand, the DPU will need to generate additional revenue to meet test year revenue requirements. For the water utility, projected user charge revenue (fixed charge and volumetric rates) will need to increase by approximately 8.8%. For the wastewater utility, projected user charge revenue (fixed charge and volumetric rates) will need to increase by approximately 6.4%. The additional revenue needs reflect both increasing costs and anticipated declines in consumption. Exhibit ES.1 summarizes the additional revenue needs.

Exhibit ES.1 – Projected Additional Revenue Needs

	FY 2014		
	Existing Rates	Test Year Revenue Requirements	% Change
Water User Charge Revenue	$46,017,515	$50,052,060	8.8%
Wastewater User Charge Revenue	$63,827,107	$67,926,802	6.4%

It is important to note that all rate structure alternatives discussed in Section 5 include the additional revenue needs identified above.

C. Section IV: Water and Wastewater Cost Allocations

The cost allocation approach utilized in this Study is consistent with industry pricing standards as prescribed by the American Water Works Association (AWWA) and the Water Environment Federation (WEF). The appropriate level of detail required for a cost of service analysis is contingent on utility pricing objectives, system characteristics, and the accuracy and availability of data necessary to support the analysis. Based on detailed discussions with DPU Staff, as well as consideration for the DPU's pricing objectives, it was determined that water and wastewater revenue requirements should be allocated into functional components consistent with the most significant cost causative characteristics of the customer base. The water components included source of supply and treatment, distribution, transmission, storage, pumping, meter, customer service, and administration and general, while the wastewater components included billed volume, combined sewer overflow (CSO), infiltration and inflow (I&I), meter, customer service, administration and general, and also treatment parameters including biological oxygen demand, suspended solids, nitrogen, phosphorous, and grease. These treatment parameters were used in the evaluation of the DPU's industrial strength surcharges.

The functional water costs were then allocated to their cost components in accordance with how the DPU's facilities are designed. Water cost components included volume-based allocations (i.e. base, max day, and peak hour) and meter-based allocations (i.e. meter, readiness to serve, customer service, and administration and general). Specifically, water cost components related to the functional aspects of the system include water source of supply and treatment, distribution, transmission, storage, and pumping were assigned based on a base-extra capacity cost allocation approach. This approach allocates a portion of these costs to serving a base demand, maximum-day demand, and maximum-hour demand. The Project Team worked closely with DPU staff to determine reasonable allocations factors for each of these components.

Wastewater cost components included volume-based allocations (i.e. volume and strength) and meter-based allocations (i.e. meter, customer service, and administration and general). The volumetric components were used to calculate commodity rates and the meter components were used to determine fixed monthly costs to be recovered from each meter size. The most challenging aspect of

wastewater cost allocation relates to appropriate recovery of wet weather costs including combined sewers and, in particular, I&I, as the demands placed on the system are not a consequence of a directly measurable service.

The allocation of water and wastewater functional costs to cost components will vary based upon the goal of a targeted rate structure, and subsequent impacts, that the DPU is trying to implement. The Project Team prepared water and wastewater rate options which were presented to the DPU with an array of rate and impact combinations for consideration.

D. Section V: Water and Wastewater Rates and Customer Impacts

Throughout the Study the Project Team had extensive discussions with key DPU Staff members related to the identification of pricing objectives and their relationship with alternative rate design. As a result, the Project Team was able to target several rate structure alternatives that were most applicable to the DPU's operation, customer characteristics, and available data, and that address as many of DPU's pricing objectives as possible.

The general approach in terms of cost recovery for both water and wastewater was to allocate account related costs including customer service, billing and collection, and meter reading on a per account basis. For all other costs, there are several mechanisms within each of the rate components that can be varied to provide different rate results and customer impacts. These mechanisms for water are the amount of functional component costs allocated to a readiness-to-serve (RTS) cost component, which is recovered on a fixed basis based meter size, and whether to maintain class-based volumetric rates or transition into a single uniform rate for all customer classes. The primary variable used to provide different wastewater rate scenarios is the percent allocation of wet weather costs, particularly CSO costs, to the volume and fixed cost components, with the fixed component being recovered based on meter size. In all alternatives presented, the Project Team recommends transitioning wastewater volumetric rates away from class-based differentiation to a single uniform rate for all customer classes and recovering the cost of I&I in the fixed charge on an equivalent meter basis.

Exhibit ES.2 presents an overview of the three water and wastewater rate alternatives and the assumptions built into each of them.

Exhibit ES.2 – Alternative Rate Structure Assumptions

	Water	Wastewater
Alternative 1	20% RTS; Class Based Volumetric Rates	CSO: 75% Volume, 25% RTS / Wet Weather; Uniform Volumetric Rates
Alternative 2	30% RTS; Class Based Volumetric Rates	CSO: 60% Volume, 40% RTS / Wet Weather; Uniform Volumetric Rates
Alternative 3	20% RTS; Uniform Volumetric Rates	CSO: 100% Volume, 0% RTS / Wet Weather; Uniform Volumetric Rates

After extensive discussion with DPU Staff and City management it was determined that Alternative 3 was the most appropriate rate structure to address the DPU's key pricing objectives of affordability, utilizing cost of service based allocations, and maintaining an adequate level of revenue stability. Although affordability and maintaining revenue stability are often times competing pricing objectives, Alternative 3 provides the most appropriate balance to these offsetting forces for the DPU and its customer base, while maintaining consistency with cost of service principles.

The focus on affordability and cost of service based allocations will aid in providing relief to some low-income customers while ensuring the entire DPU customer base is paying its fair share for services rendered. At the same time, maintaining a level of stability in the revenue stream will support the DPU in preserving its sound financial position, credit, and access to capital markets at favorable rates. Additionally, a shift of revenue recovery from a fixed to variable basis will foster additional resource conservation and provide DPU residential customers, in particular, with more control over the cost of services through efficient usage.

Exhibit ES.3 presents Alternative 3 water rates compared to the existing water rates. Monthly service charges decreased anywhere from approximately 41 percent to approximately 58 percent, depending on meter size. All volumetric components increase, but not equally. Notably, residential customers will see an increase of $1.58 per Ccf, while industrial customers will see an increase of $0.25 per Ccf. However, it should be noted that the amount of revenue recovered from each customer class is comparable to the proportionality of the current rate structure. Although the recommended rates will shift from class-based volumetric rates to a uniform volumetric rate, the primary difference is in how costs are recovered within each class.

Exhibit ES.4 presents Alternative 3 wastewater rates compared to the DPU's existing wastewater rates. Monthly service charges decreased anywhere from approximately 51 percent to approximately 67 percent, depending on meter size. All volumetric components increase, but not equally. Notably, residential customers will see an increase of $3.23 per Ccf, while industrial customers will see an increase of $0.86 per Ccf. Similar to the proposed water charges, it should be noted that the amount of revenue recovered from each customer class is comparable to the proportionality of the current rate structure. Although the recommended rates will shift from class-based volumetric rates to a uniform volumetric rate, the primary difference is in how costs are recovered within each class.

Since most of the DPU's customers purchase both water and wastewater services, the Project Team prepared an example customer impact schedule for a combined bill assuming both Alternative 3 water and wastewater rates are implemented. See Exhibit ES.5 for details.

Exhibit ES.3 – Recommended Water Rates

	Existing	Proposed	$ Delta
Monthly Service Charge			
5/8"	$ 19.68	$ 11.56	*$ (8.12)*
3/4"	29.53	15.68	*(13.85)*
1"	49.21	23.92	*(25.29)*
1.5"	98.41	44.50	*(53.91)*
2"	157.46	69.21	*(88.25)*
3"	295.24	135.09	*(160.15)*
4"	492.06	209.20	*(282.86)*
6"	984.12	415.08	*(569.04)*
8"	1,574.59	662.12	*(912.47)*
10"	2,263.47	950.35	*(1,313.12)*
Volumetric Charges (Ccf)			
Residential	$ 1.63	$ 3.21	*$ 1.58*
Commercial	2.26	3.21	*0.95*
Industrial	2.96	3.21	*0.25*
State & Federal	3.05	3.21	*0.16*
Municipal	1.90	3.21	*1.31*

Exhibit ES.4 – Recommended Wastewater Rates

	Existing	Proposed	$ Delta
Monthly Service Charge			
5/8"	$ 29.72	$ 14.55	*$ (15.17)*
3/4"	44.58	19.41	*(25.17)*
1"	74.30	29.13	*(45.17)*
1.5"	148.60	53.43	*(95.17)*
2"	237.75	82.59	*(155.16)*
3"	445.79	160.34	*(285.45)*
4"	742.98	247.82	*(495.16)*
6"	1,485.97	490.82	*(995.15)*
8"	2,377.54	782.41	*(1,595.13)*
10"	3,417.72	1,122.60	*(2,295.12)*
Volumetric Charges (Ccf)			
Residential	$ 2.59	$ 5.82	*$ 3.23*
Commercial	4.27	5.82	*1.55*
Industrial	4.96	5.82	*0.86*
State & Federal	4.75	5.82	*1.07*
Municipal	3.40	5.82	*2.42*

Exhibit ES.5 – Customer Impacts (Water and Wastewater Monthly Bill)

	Low Volume Customer					
	Usage (ccf)	Meter Size	Existing	Proposed	*Delta ($)*	*Delta (%)*
Residential	2	5/8"	$ 57.83	$ 44.17	*$ (13.67)*	*-24%*
Commercial	2	5/8"	$ 62.47	$ 44.17	*$ (18.30)*	*-29%*
Municipal	2	5/8"	$ 60.01	$ 44.17	*$ (15.84)*	*-26%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Customer					
	Usage (ccf)	Meter Size	Existing	Proposed	*Delta ($)*	*Delta (%)*
Residential	6	5/8"	$ 74.70	$ 80.27	*$ 5.58*	*7%*
Commercial	14	5/8"	$ 147.40	$ 161.51	*$ 14.11*	*10%*
Municipal	40	1"	$ 335.67	$ 414.10	*$ 78.43*	*23%*
Industrial	3,500	4"	$ 28,962.04	$ 32,049.44	*$ 3,087.40*	*11%*
State & Federal	240	1.5"	$ 2,119.01	$ 2,264.27	*$ 145.26*	*7%*

	High Volume Customer					
	Usage (ccf)	Meter Size	Existing	Proposed	*Delta ($)*	*Delta (%)*
Residential	15	5/8"	$ 112.64	$ 161.51	*$ 48.87*	*43%*
Commercial	200	2"	$ 1,701.81	$ 1,957.08	*$ 255.27*	*15%*
Municipal	150	2"	$ 1,190.81	$ 1,505.76	*$ 314.95*	*26%*
Industrial	7,500	4"	$ 60,650.04	$ 68,155.06	*$ 7,505.02*	*12%*
State & Federal	1,000	3"	$ 8,541.03	$ 9,321.84	*$ 780.81*	*9%*

E. Section VI: Stormwater Utility

The DPU recently conducted a review of its stormwater rates and charges and does not anticipate recommended changes in FY 2014.

F. Section VII: Affordability

The City funds utility operating and capital costs through customer charges for services based on approved rates and charges. The rates and charges have increased over the years and are expected to increase further in the future. The expected trend of increasing rates and the potential hardship it may impose on low income residents has generated a strong interest in implementing a more comprehensive Customer Affordability Program (CAP) to provide some relief to economically disadvantaged customers.

The DPU currently has an existing CAP called "MetroCare", which provides some relief to economically disadvantaged customers on their gas bills. The program is fully funded through voluntary customer contributions and employee fundraising activities, and administered by the United Way. The DPU is seeking to implement a more comprehensive CAP that will provide assistance to more economically disadvantaged customers and include assistance with water and wastewater bills. It should be noted that the process of implementing an expanded CAP will likely mature over time. Although the DPU is considering many options to address affordability issues and concerns, there are significant technical,

administrative, and implementation related issues that must be considered prior to moving forward with various program activities.

Section 7 of this report sets forth CAP structure alternatives that would provide more affordability assistance initially with water and wastewater bills and target a wider range of economically disadvantaged customers in the City. The alternatives for review include a fixed subsidy, variable subsidy, and subsistence level of consumption based subsidy. In each case, the Project Team recommends an overall CAP structure that "piggy backs" on the City's Department of Development Services' Energy Assistance Program for eligibility verification and administration. The DPU should consider implementation of a simplistic water and wastewater CAP initially. Once actual program data is available, and if necessary, a more tailored program structure could be developed.

I. Introduction

A. Historical Background

The City of Richmond (City) Department of Public Utilities (DPU) provides water, wastewater, gas, stormwater, and electric street lighting services to a diverse mix of residential, commercial, industrial, institutional, and wholesale customers. The DPU serves more than 500,000 customers within the City and outside the greater metropolitan region. The DPU is operated as an Enterprise Fund with a goal of generating sufficient revenues through user rates and charges to meet all operating and capital expenditures. The DPU reports to the City Council (Council).

Water Utility

The City is one of the largest providers of potable water services in the Commonwealth of Virginia. The City's raw water source is the James River, and its treatment capacity is 132 million gallons per day (MGD). Retail service is provided to approximately 62,000 customers. Wholesale services are provided to Henrico, Chesterfield, and Hanover counties. The total service population exceeds 500,000. Water is delivered through a network infrastructure of pumping stations, transmission lines, and distribution lines.

Wastewater Utility

The City is also one of the largest providers of wastewater services in the region, and its treatment facility is the largest of its kind in the Commonwealth of Virginia, with treatment capacity of 70 MGD. Retail service is provided to approximately 59,000 customers. Wholesale service is provided to Chesterfield, Goochland, and Henrico counties. The wastewater system includes 1,500 miles of sanitary sewer, pumping stations, interceptor sewers, retention basins, and a 44 million gallon reservoir used to manage wet weather flows.

The DPU operates its wastewater utility in an efficient and effective manner, and has an ongoing commitment to protect and improve water quality and aquatic life in the James River. The City has made significant investments in its treatment facility to meet this commitment and maintain compliance with regulations, and is also engaged in a combined sewer overflow (CSO) control plan with the United States Environmental Protection Agency (EPA) to protect the river from untreated wastewater that overflows during heavy rain.

It should be that the terminologies of wastewater and sewer are used interchangeably in this report.

Gas Utility

The City provides natural gas services to customers both within and outside the City limits. Details related to the Gas Utility are provided in a separate report.

Stormwater Utility

The City recently implemented its stormwater utility in July of 2009. Funds generated are used to implement a comprehensive stormwater quality management plan as required by the EPA and Virginia Department of Conservation and Recreation. Initial services have included cleaning, maintenance, and repair of 178 miles of drainage pipes on a bi-yearly cleaning schedule. The City has obtained a Virginia Stormwater Management Program (VSMP) General Permit for Municipal Separate Storm Wastewaters (MS4), and compliance is required within five years.

B. Scope of Services

The City engaged Raftelis Financial Consultants, Inc. (RFC), in association with Concentric Energy Advisors, Inc. (Concentric), Greeley and Hansen (G&H), Tyrone Dickerson, CPA, and Shina Omokanwaye and Associates (SOA Financial) (collectively, the Project Team), to perform a comprehensive cost of service and rate design study (Study). The primary objective of the Study was to evaluate the City's existing and projected cost basis for utility operations and make appropriate recommendations for rate structure adjustments that will sufficiently address operating and capital revenue requirements and meet the City's most important pricing objectives. The work plan included the following major components:

- Evaluating the revenue sufficiency and cost equity of the City's existing rate structure for providing water, wastewater, and gas services;
- Recommending cost justified water, wastewater and gas rates that are consistent with industry pricing standards and practices, and that fully support system operations and maintenance (O&M), asset repair and replacement, system improvements, debt service, debt service coverage, and reserve requirements.
- Reviewing the City's most recent stormwater utility rate study and providing reactions and comments;
- Developing an affordability program to help ensure the affordability of water and wastewater service by providing support for economically disadvantaged customers; and
- Communicating the basis and merits of the recommended utility rate changes to the DPU and the City staff, Council, existing customers, and other relevant stakeholders.

C. Report Organization

This report is organized in eight sections to efficiently discuss the process used to address the Study objectives, which includes extensive analytics for multiple utilities. Section 3 provides a general overview of the rate setting process. Section 4, Section 5, and Section 6 address the water and wastewater utilities; Section 7 addresses the stormwater utility; and Section 8 provides a detailed discussion on the affordability program. Documentation for the results of the gas cost of service analysis is provided in a separate report.

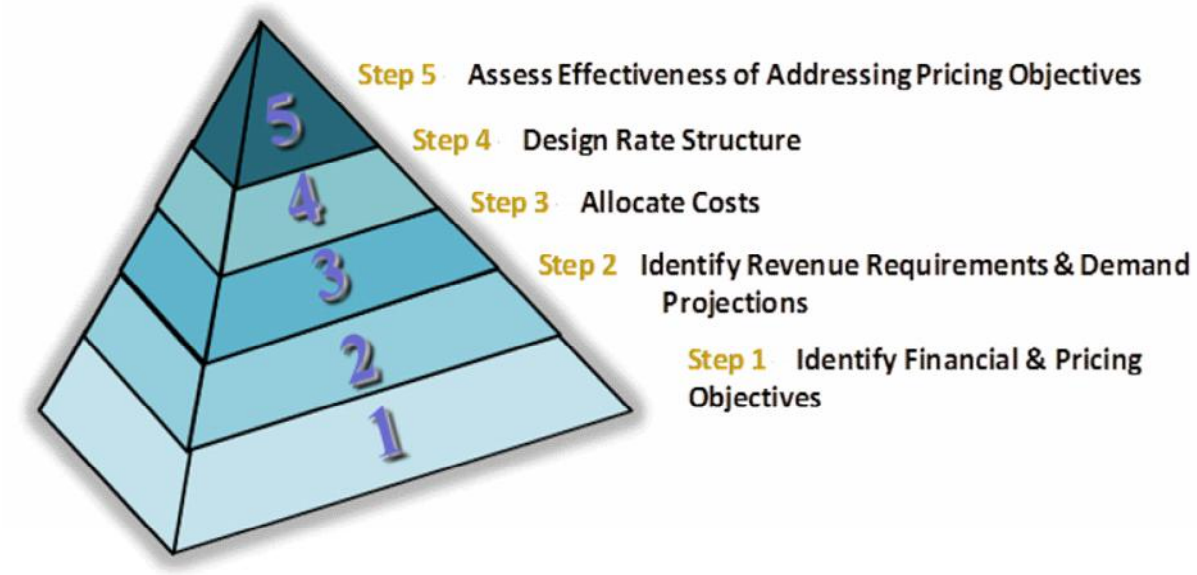
II. Rate Setting Process

A. Overview

The Project Team utilized a systematic approach for rate setting designed around a five-step process (see Exhibit 3.1) tailored specifically to the City's goals and objectives. The approach begins with multiple workshops and inter-active discussions with City and DPU staff that provide a foundation for identifying and prioritizing the City's most important objectives in pricing for utility services. These pricing objectives are used as focal points during the development of the revenue requirements, cost of service analysis, and rate design components of the Study.

The following summarizes the rate setting process used in the Study. Detailed discussion of the revenue requirements, cost of service analysis, and rate design elements of this process are included in Section 3, Section 4, and Section 5 of this report, respectively.

Exhibit 3.1 – Rate Setting Process



B. Staff Engagement Workshops

The Project Team conducted a Pricing Objectives workshop with City and DPU staff to identify the City's most important pricing objectives and discuss the related implications of the overall rate setting process. The workshop was designed to review alternative objectives that can drive utility pricing structures and the various approaches to determining revenue requirements and allocating costs. During the workshop, the Project Team also discussed the advantages and disadvantages of the City's current rate structures as well as rate structure alternatives. The purpose of this discussion was to identify alternative rate structures that were the most applicable to the City's operation, customer characteristics, available data, and that address as many of the City's pricing objectives as possible.

C. Identify Pricing Objectives

The first step in the rate setting process is the identification of pricing objectives. During the Pricing Objectives Workshop, City and DPU staff reviewed and discussed the implications and relative importance of various pricing objectives. The list of pricing objectives identified is provided in Exhibit 3.2.

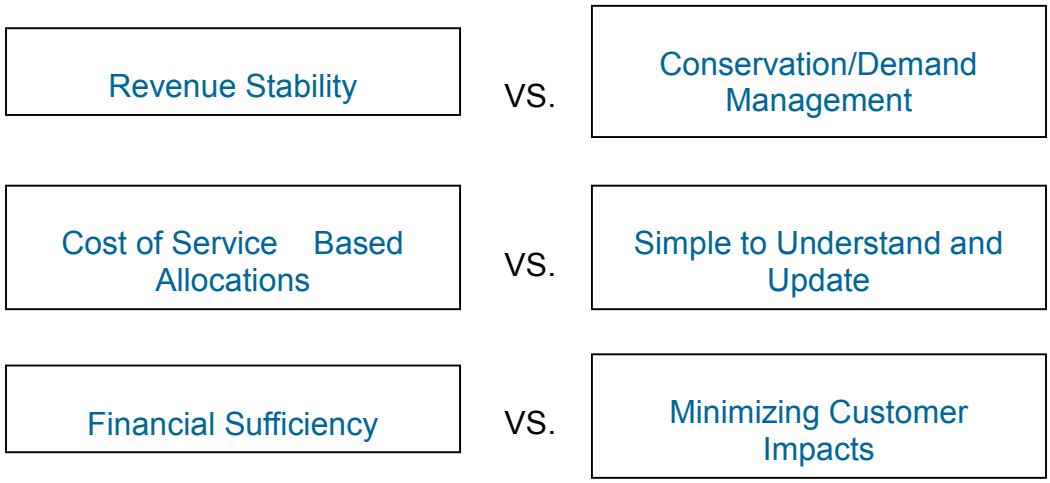
Exhibit 3.2 – Pricing Objectives

Pricing Objective	Description
Financial Sufficiency	The rate structure should be designed to recover the full cost of operations and provide adequate revenues to ensure the long-term, efficient operation of the utilities.
Defensibility	The rate structure should be consistent with accepted practice, industry standards, and local and state statutes.
Cost of Service Based Allocations	The rate structure should ensure that each customer class is contributing equitably towards revenue requirements based upon the costs of providing service to each customer class.
Minimization of Customer Impacts	The rate structure should be developed such that adverse rate impacts on each customer class are minimized.
Affordability to Disadvantaged Customers	The rate structure should incorporate practices or procedures that help ensure that economically disadvantaged customers can afford utility service.
Revenue Stability	The rate structure should provide for a steady and predictable stream of revenues to the District such that the District is capable of meeting its current financial requirements.
Rate Stability	The rate structure should minimize dramatic rate increases or decreases over the planning period.

Simple to Understand and Update	The rate structure should be easy for customers to understand, utilizing a moderate level of educational tools. In addition, the rate structure should be able to be effectively maintained by staff in future years.
Ease of Implementation	The rate structure should be compatible with existing billing system. In addition, the rate structure should allow for the continuation of existing management and system reports.
Conservation/Demand Management	The rate structure should encourage conservation as well as assist in managing system demand.
Economic Development	The rate structure should incorporate a preferential rate that may be used to attract economic development.
Equitable Contributions from New Customers	New customers should be responsible for the capital costs of providing these customers service.

Each pricing objective was discussed in detail and consideration was given to the competing nature of some of the pricing objectives. For example, the need to generate revenue sufficient to recover the City's full cost of providing utility services may conflict with minimizing customer impacts. Or, the desire to develop detailed rate structures for various customer classes may be difficult for customers to understand and accept. Several examples of competing pricing objectives are presented in Exhibit 3.3

Exhibit 3.3 – Examples of Competing Pricing Objectives



Workshop participants were then asked to prioritize and select the objectives they believe are most important to the City. The Project Team had each workshop participant classify each objective as "Essential," "Very Important," "Important," or "Least Important" (classifying only three objectives each as Essential or Very Important). The responses were tallied and the results are shown in Exhibit 3.4. It should be noted that while some objectives were ranked lower, it was understood by workshop participants that any viable alternative rate structure would attempt to exemplify as many of the pricing objectives as possible, with an emphasis on the top ranked objectives. I was also agreed that the objectives of financial sufficiency and defensibility were foundational pricing objectives that would be recognized in any rate design. As a result, these objectives were excluded from the prioritization exercise.

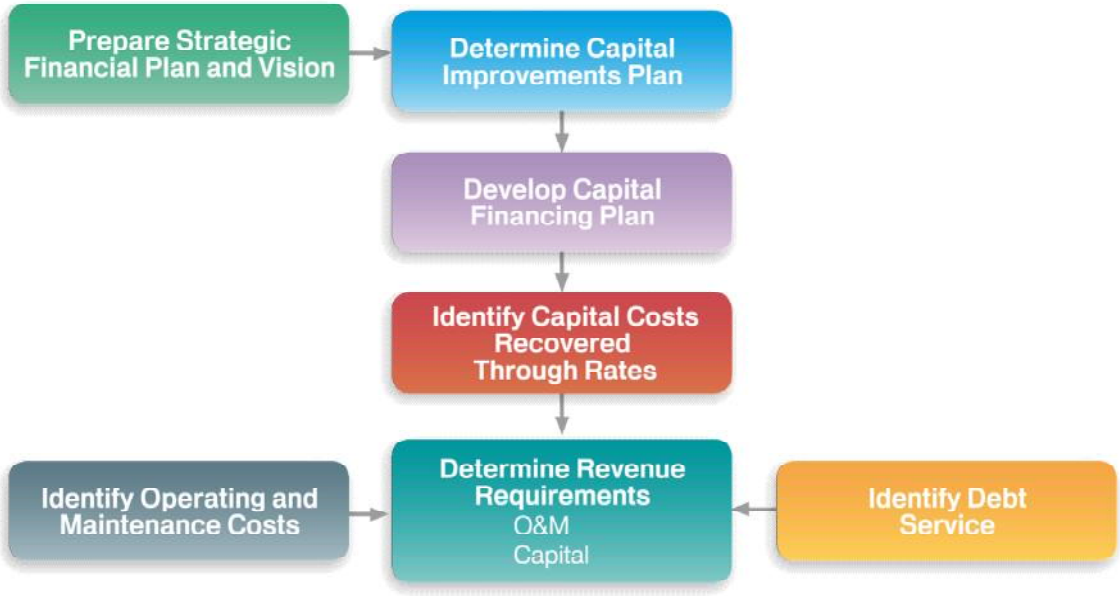
Exhibit 3.4 – Results of Pricing Objectives Exercise

1) Affordability*
2) Cost of Service Based Allocations*
3) Revenue Stability*
4) Rate Stability
5) Conservation / Demand Management
6) Ease of Implementation
7) Simple to Understand / Update
8) Economic Development
9) Minimization of Customer Impacts
10) Equitable Contributions from New Customers

D. Identify Revenue Requirements and Demand Projections

The next step in the rate setting process is identification of revenue requirements for the test year. Revenue requirements include all O&M and capital costs incurred by the City to operate the water and wastewater, and gas utilities. Revenue requirements not only represent the minimum cash needs of the utility but also the liquidity and debt service coverage requirements. Exhibit 3.5 summarizes the methodology for determining the DPU's revenue requirements for the test year.

Exhibit 3.5 – Methodology for Determining Revenue Requirements

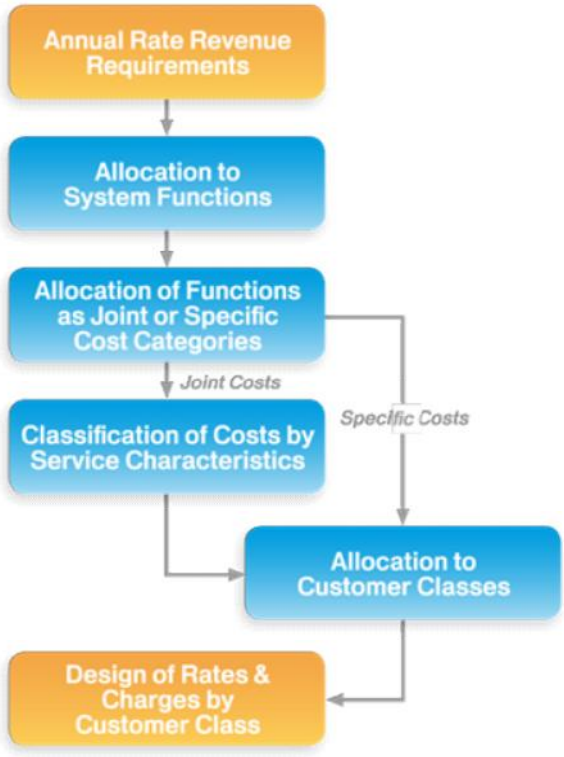


A critical element in developing rate recommendations, particularly for the water and wastewater utilities, is the projection of customer demand. Due to a number of factors, such as the prevalence and use of high efficiencies fixtures, price elasticity, climate change, economic conditions, and a broader awareness of resource conservation, per capita water consumption has decreased significantly locally, regionally, and nationally over the past decade. Although the DPU's current water and wastewater rate structure includes relatively high fixed charges for services, to the extent that alternative rate structures consider shifting the balance of fixed versus volumetric revenue recovery, developing a projection of demand that considers the declining trends in consumption becomes even more important. As will be discussed in Section 3, historical demand and account data for the DPU's customers was reviewed in detail, and consideration was given to potential additional implications related to rate design, to determine a reasonable forecast of demand for the test year.

E. Allocation of Costs

Once the revenue requirements have been identified, the next step is to allocate costs in a manner consistent with industry standards and practices. The purpose of this step is to determine the actual cost of serving different customers classes and to evaluate whether or not the current rate structure recovers this cost in an equitable manner. The cost of service allocation requires three steps: (1) functional allocation of revenue requirements; (2) behavioral cost classifications; and (3) allocation to customer classes. Exhibit 3.6 provides an overview of this process.

Exhibit 3.6: Cost Allocation Process



Section 4 describes the cost allocation process for the water and wastewater utilities.

F. Design Rate Structure

Once the pricing objectives were prioritized and after data related to cost and usage characteristics were reviewed, the Project Team developed conceptual rate designs that addressed as many of the pricing objectives as possible. Exhibit 3.7 provides examples of how alternative pricing objectives can influence rate design. For example, a utility provider, such as the City, which identified affordability as its top pricing objective, will need to carefully consider its balance of affordability issues with fixed charges and the desire to maintain revenue stability.

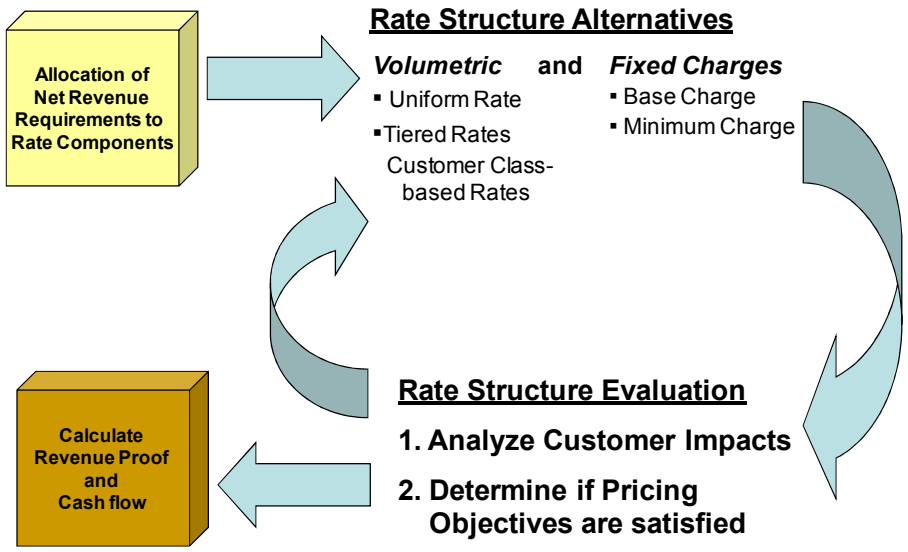
Exhibit 3.7 – Rate Structure Alternatives Based on Pricing Objectives

The conceptual rate designs were developed based on the Project Team's extensive experience and input from City and DPU staff, to ensure the resulting rate structure options were reasonable and could be implemented effectively.

G. Assess Effectiveness of Addressing Pricing Objectives

The final step in the rate setting process is to compare the results of each alterative rate structure relative to the pricing objectives identified in Step 1. The resulting rates and customer impacts for each alternative were compared to each of the pricing objectives in order to determine the effectiveness of each rate structure. This step assists in identifying the rate structure that best addresses the pricing objectives and policies of the utility. The evaluation process is summarized in Exhibit 3.8.

Exhibit 3.8 – Evaluation of Process for Rate Structure Alternatives



III. Water and Wastewater Revenue Requirements

A. Overview

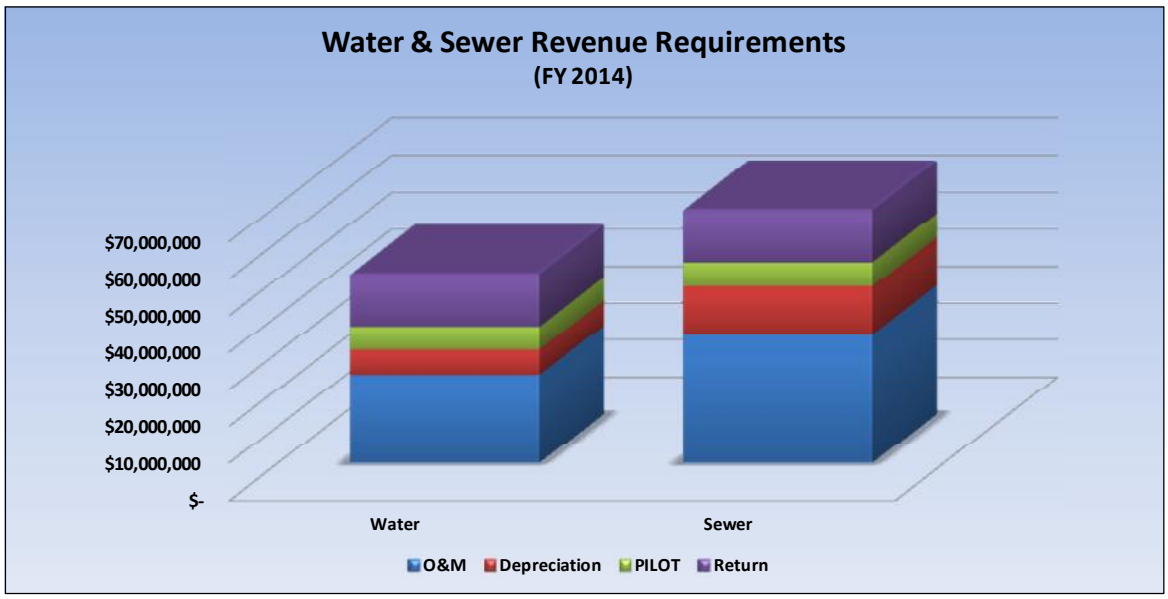
Recovering an appropriate level of revenue requirements through rates and charges ensures a utility's financial sufficiency and ability to provide safe and reliable services. Revenue requirements include all O&M and capital costs incurred by the DPU to operate the water and wastewater utilities. Revenue requirements not only represent the minimum cash needs of the utility but also the liquidity and debt service coverage requirements.

For the DPU's water and wastewater utilities, revenue requirements are comprised of four main components: operating expenses, depreciation, payment in-lieu of taxes (PILOT), and a return. Each of these revenue requirements were built up separately for the water and wastewater utilities. These revenue requirements are inclusive of the costs associated with providing water and wastewater service to not only the DPU's retail customers but also its wholesale customers: Chesterfield, Hanover, Henrico, and Goochland Counties. In order to solely calculate rates for the DPU's retail customers, the costs associated with providing services to the Wholesale customer were backed out of the water and wastewater system revenue requirements consistent with the terms of the wholesale contracts. It should be noted that any reference to revenue requirements in the remainder of this report shall refer to those net of wholesale costs.

In general, the revenue requirements used in this study were escalated based on either FY 2012 actual costs or FY 2013 budgeted costs with projected adjustments, to formulate a COS test year of FY 2014. This test year incorporates assumptions to account for the effects of inflation, decreased demand, increased operating costs, and anticipated capital costs. After adjusting for the test year, total water revenue requirements equal $51,558,906, while total wastewater revenue requirements equal $68,900,414.

Exhibit 3.1 presents the test year forecast of revenue requirements.

Exhibit 3.1 – Test Year Revenue Requirements (FY 2014)



Once the revenue requirements were developed, miscellaneous, or non-rate, revenues such as water connection charges and wastewater strong waste charges were used to offset the total revenue requirements, determining the net revenue requirements to be recovered from water and wastewater rates.

The following subsections will present the detail behind each of the four revenue requirement components referred to previously: operating expenses, depreciation, PILOT, and return

B. Operating Expenses

The DPU's water and wastewater operating expenses were incorporated into a Cost of Service Model (Model), developed as part of this study, based on information taken from the DPU's FY 2013 operating budget. For the purpose of estimating FY 2014 operating costs, the Project Team conducted an independent review of historical changes in the DPU's water and wastewater operating costs. After discussion with DPU staff related to estimated costs, it was concluded that an across the board 3 percent increase was reasonable to develop test year, FY 2014, O&M costs. However, it should be noted that at the time of this report the DPU has not finalized its FY 2014 Budget. Once the new budget is finalized, and if there is a material change in projected operating costs compared what is included in this report, the Project Team can issue an addendum to the report based on the approved budget. Additionally, it should be also be noted that although over the past several years inflation (as measured by the Consumer Price Index) has been lower than historical averages, the potential for future inflation in excess of the 3 percent estimate is plausible. Due to the commodity intensive nature of the water and wastewater industry, particularly the use of chemicals and electricity, which have increased more significantly than general inflation over the past decade, the DPU should re-visit these estimates for inflation annually as part of its financial planning and rate setting process.

Utilizing these escalation criteria, the Project Team is projecting water and wastewater O&M costs of $24,025,025 and $34,936,737, respectively, for the test year. It should be noted that these total amounts incorporate costs associated with the implementation of an affordability program. Currently, these costs are estimated to be $550,000 and $750,000 for water and wastewater, respectively. See section 7 for a detailed description and analysis of the affordability program.

Exhibit 3.2 presents the test year forecasts of water and wastewater operating expenses.

Exhibit 3.2 – Test Year Water & Wastewater Operating Expenses (FY 2014)

	Water	Wastewater
Facilities Management	$ 2,085,792	$ 4,279,665
Homeland Security	307,247	258,828
Basin Maintenance	-	-
Drainage Maintenance	-	-
Water Testing	464,796	-
Water Pumping	3,809,442	-
Water Treatment	3,659,861	-
Collection Systems	-	4,532,520
CSO Control	-	1,138,856
Environmental Management	-	616,933
Pre-Treatment	-	530,255
Floodwall	-	-
Wastewater Treatment	-	12,313,001
Mains & Services	-	-
Water Leak Repair	6,185,472	-
Technical Services	600,515	524,468
Customer Care & Cust. Serv. Admin	1,247,042	1,197,750
Commercial Meter Shop	195,997	188,248
Credit & Collections	697,788	644,411
Customer Billing & Exceptions	423,366	406,659
Field & New Services	522,967	887,671
Meter Reading	169,787	163,066
Communications & Marketing	161,430	272,192
Administration	276,407	465,939
Financial Management	2,013,423	4,664,237
Human Resources	111,769	188,402
Management Information Systems	541,924	913,634
Rate Stabilization	-	-
Affordability	550,000	750,000
Subtotal: Operating Expenses	$ 24,025,025	$ 34,936,737

C. Depreciation

The Project Team conducted an independent review of the DPU's FY 2012 fixed asset and current depreciation records for water and wastewater. The FY 2012 fixed assets were adjusted based on a projection of gross plant in service for the test year, FY 2014, assuming that all water and wastewater

projects that are projected to be completed by the end of FY 2014 would be depreciated and included in the rate base for revenue requirements.

Exhibits 3.3 and 3.4 present an overview of the test year depreciation expenses for water and wastewater, respectively.

Exhibit 3.3 – Test Year Water Depreciation Expenses (FY 2014)

Source of Supply Plant	$	787,677
Pump Station Plants		517,869
Water Treatment Plant		719,334
Transmission & Distribution		4,542,128
General Plant		217,742
Subtotal: Water Assets	$	6,784,748

Exhibit 3.4 – Test Year Wastewater Depreciation Expenses (FY 2014)

Collection System	$	6,456,201
WWTP		6,517,364
Subtotal: Wastewater Assets	$	12,973,565

D. Taxes

As required by City Charter, the DPU is responsible for recovering a PILOT in its water and wastewater user rates and charges. The DPU operates as an Enterprise Fund, responsible for all of its costs through collections of user fees. The purpose of the PILOT reflects the City's goal of treating the DPU in a manner similar to a privately owned company. The components of the PILOT include an estimated federal income tax, gross receipts tax, and real estate and personal property tax. Similar to projected operating costs, the projected PILOT in the test year (FY 2014) is based on the current budget (FY 2013) with a 3.0% adjustment. Exhibit 3.5 and Exhibit 3.6, respectively, summarize the projected water and wastewater PILOT payments for the test year.

Exhibit 3.5 – Test Year Water PILOT (FY 2014)

Federal Income Tax	$	2,197,814
Gross Receipts Tax		1,348,084
Real Estate and Personal Property Tax		2,712,727
Subtotal: PILOT	$	6,258,625

Exhibit 3.6 – Test Year Wastewater PILOT (FY 2014)

Federal Income Tax	$	1,067,183
Gross Receipts Tax		1,406,131
Real Estate and Personal Property Tax		4,157,192
Subtotal: PILOT	$	6,630,506

E. Return

The return component of the water and wastewater revenue requirements allows the DPU to cover its cost of financing, maintain adequate debt service coverage, limit system leverage, and maintain reasonable level of reserves. This yields not only financial solvency but also an increased ease of access to capital with a greater probability of favorable borrowing terms. The City's water and wastewater utilities are capital intensive and require significant investment to provide for system re-capitalization, increased regulatory requirements, and sufficient capacity. Both systems have outstanding debt service obligations and are facing additional funding needs in FY 2014. Specifically, the DPU anticipates funding $68.0 million in water projects and $43.0 million in wastewater projects through an expected revenue bond sale in the spring of 2013. The level of return incorporated in the cost of service analysis is based on target debt service coverage of at least 1.25 for both the water and wastewater utilities, including the incremental cost of the anticipated bond sale. This level of coverage is consistent with debt service coverage requirements identified in the DPU's current Rate and Financial Planning Model. In order to meet this level of debt service coverage, a return of $14,490,508 and $14,359,606 was required, for water and wastewater respectively. It should be noted that the projected debt service coverage assumes a $3.6 million transfer from reserves for rate stabilization. Based on the projected rate base in FY 2014, these amounts translate into returns of approximately 4.6% and 3.8%, respectively, for the water and wastewater utilities.

F. Demand

Customer demand is a foundational element of any rate design and COS analysis. In order to set rates that are equitable, provide sufficient revenue, and address a utility's pricing objectives, it is necessary to have a thorough understanding of customer demand characteristics. The DPU staff provided the Project Team with three years of detailed customer billing data which was reviewed for usage patterns among customer classes and trends over time.

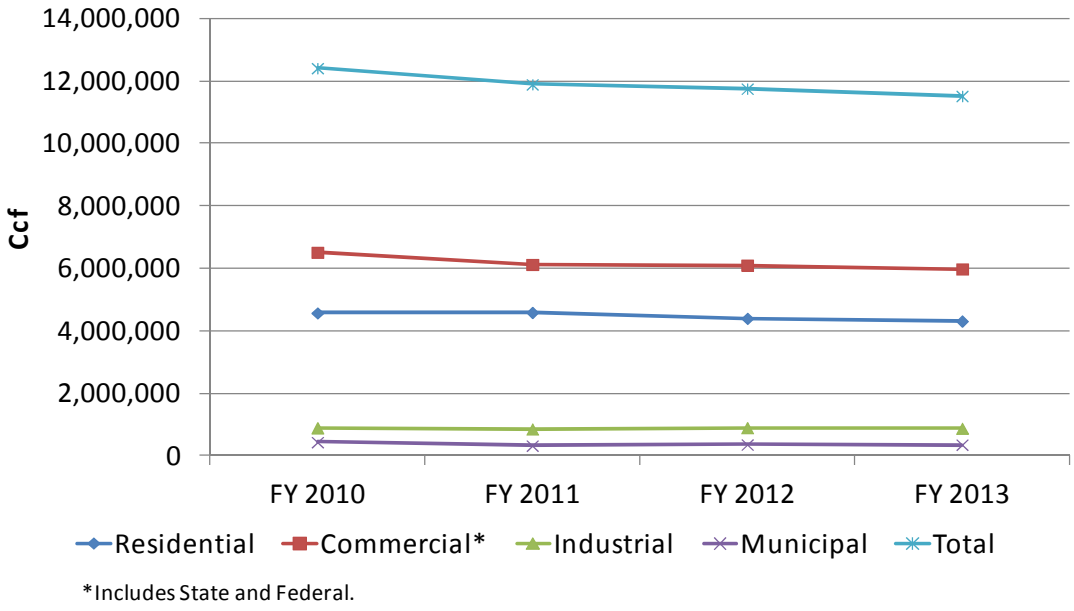
The water and wastewater industry as a whole has recently experienced a decline in per capita consumption. This is due, in large part, to economic conditions, a general awareness and initiative of resource conservation, and the development and implementation of low-flow fixtures and appliances. The Project Team took this trend into account, along with the DPU's actual billing data, in order to determine a reasonable forecast of demand.

As noted previously, the Project Team compiled and analyzed three years of water and wastewater billing data for each customer class. Consistent with recent industry trends, the DPU has also been experiencing a consistent decline in consumption. In the aggregate, the DPU's water retail consumption decreased on average by approximately 2.7% annually. Wastewater retail consumption decreased by approximately 3.8% annually. However, for both water and wastewater retail consumption, it appeared that the rate of decline slowed in FY 2012. Taking into account these recent trends, as well as recognizing a potential shift of user charges from a fixed to volumetric component, the Project Team concluded that a decrease of 2% annually for water and wastewater consumption was appropriate for all customer classes in order to forecast demand for the test year, FY 2014. The Project Team determined this forecasted percent change was a reasonably conservative estimate, given all available

information and potential changes in rate design. However, it should be noted that one of the implications of a change to a more volumetric rate structure can be increased variability in revenue collection. Although the DPU's retail water and wastewater service area is relatively urban with more limited elective consumption associated with irrigation, for example, it will become increasingly important for the DPU to review its projections of demand annually to decrease the risk of revenue insufficiency.

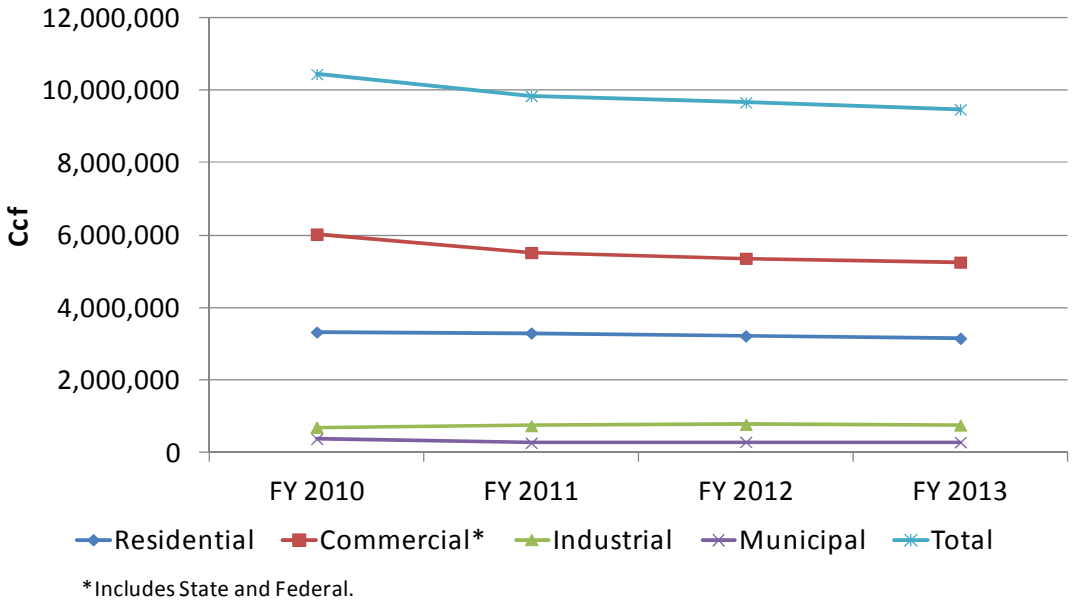
Exhibits 3.7 and 3.8 show historical and forecasted demand patterns for water and wastewater, respectively.

Exhibit 3.7 – Billed Retail Water Consumption



*Includes State and Federal.

Exhibit 3.8 – Billed Retail Wastewater Consumption



*Includes State and Federal.

In addition to forecasting water and wastewater customer demand, the Project Team also used the DPU's detailed billing data to perform a water-only peaking factor analysis. Peaking factors demonstrate the degree of variation in usage patterns for customer classes and the corresponding strain placed on the system as a whole due to providing the capacity necessary to adequately address peak demands. In order to appropriately gauge the strain customer classes place on the DPU's system, historical class-based monthly peaking factors were reviewed and analyzed to develop ratios for max-day and max-hour allocations, using class-based and system wide peaking data as well as industry standards. After reviewing the results of this analysis, the Project Team determined that there were not significant differentiations of max-day peaking factors between customer classes. On average, the max-day peaking factor was 1.64, with a standard deviation of only 0.07.

Exhibit 3.9 presents water class-based max-day peaking factors and descriptive statistics.

Exhibit 3.9 - Class-Based Max Day Peaking Factors

Customer Class	Max Day Peaking Factor
Residential	1.60
Commercial	1.71
Municipal	1.71
Industrial	1.54
State and Federal	1.62
Average	1.64
Standard Deviation	0.07
Maximum	1.71
Minimum	1.54

G. Additional Revenue Needs

Based on the projected customers and billable demand discussed above, the DPU will need to generate additional revenue to meet test year revenue requirements. For the water utility, projected user charge revenue (fixed charge and volumetric rates) for FY 2014 assuming no changes in rates is $46,017,515. This is net of $1,506,846 in projected revenue offsets[1]. Projected test year revenue requirements are $50,052,060, which is also net of $1,506,846 in projected revenue offsets. Thus, the DPU will need to increase water user charge revenue by approximately 8.8% in order to generate sufficient revenues in FY 2014 (see Exhibit 3.10). For the wastewater utility, projected user charge revenue (fixed charge and volumetric rates) for FY 2014 assuming no changes in rates is $63,827,107. This is net of $1,036,109 in projected revenue offsets[2]. Projected test year revenue requirements are $67,926,802, which is also net of $1,036,109 in projected revenue offsets. Thus, the DPU will need to increase wastewater user charge revenue by approximately 6.4% in order to generate sufficient revenues in FY 2014 (see Exhibit 3.10).

Exhibit 3.10 Projected Additional Revenue Needs

	FY 2014		
	Existing Rates	Test Year Revenue Requirements	% Change
Water User Charge Revenue	$46,017,515	$50,052,060	8.8%
Wastewater User Charge Revenue	$63,827,107	$67,926,802	6.4%

The additional revenue needs reflect both increasing costs and anticipated declines in consumption. It is important to note that all rate structure alternatives discussed in Section 5 include the additional revenue needs identified above.

[1] Includes revenue from connection fees, late payment fees, and private fire protection fees.
[2] Includes revenue from strong waste charges, septic tank fees, and other miscellaneous charges.

IV. Water and Wastewater Cost Allocations

A. Cost of Service Overview

The basic principle in the establishment of cost of service rates is to achieve general fairness in the recovery of costs from various classes of customers. The approach used in this Study is based on the principles endorsed by the American Water Works Association (AWWA) and the Water Environment Federation (WEF); which allows the DPU to demonstrate rates have not been set in an arbitrary or capricious manner and one class of customer is not subsidizing another to an unjustifiable extent, or in a manner that is not approved and supported by the DPU. Costs have been allocated between customer classes based on their estimated demand requirements and recognizing the different costs associated with serving different customer classes.

Exhibit 4.1 and 4.2 outline the general steps taken to complete the water and wastewater cost of service studies, respectively.

Exhibit 4.1 – Water Cost of Service Analysis

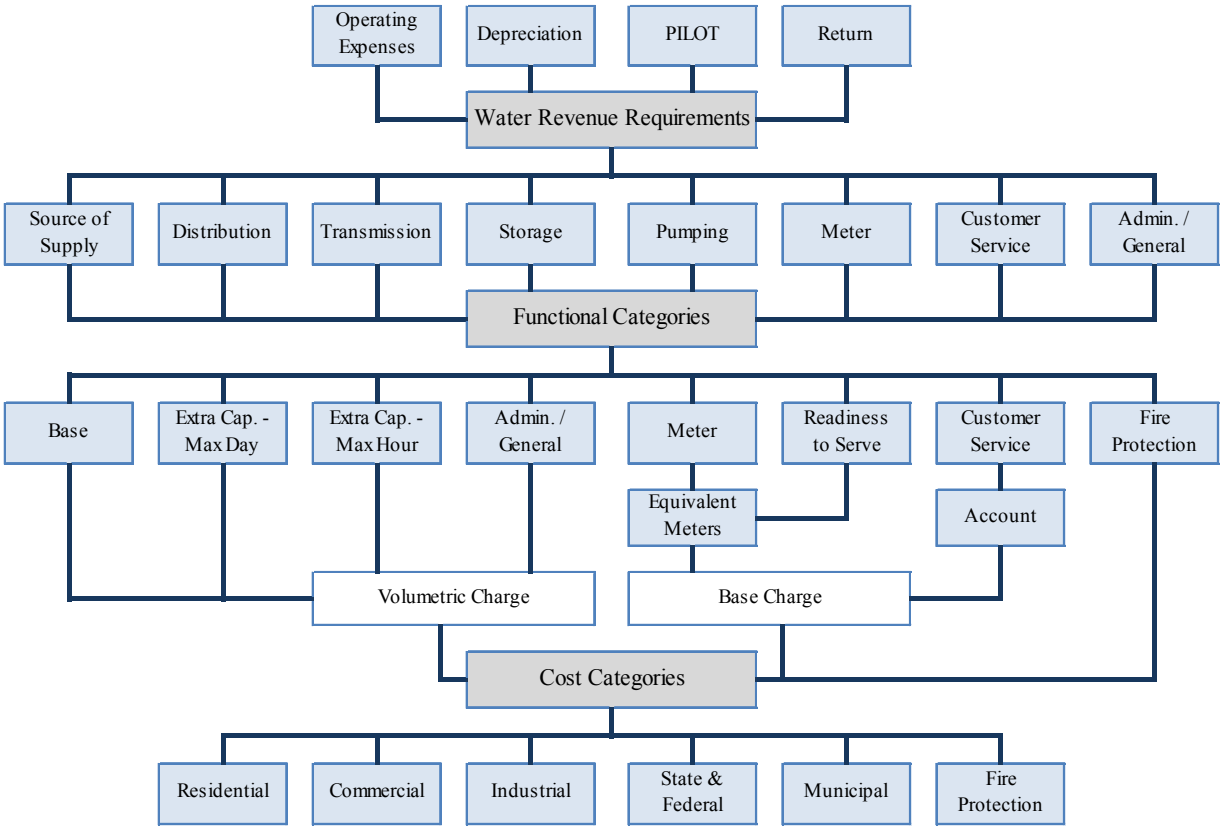
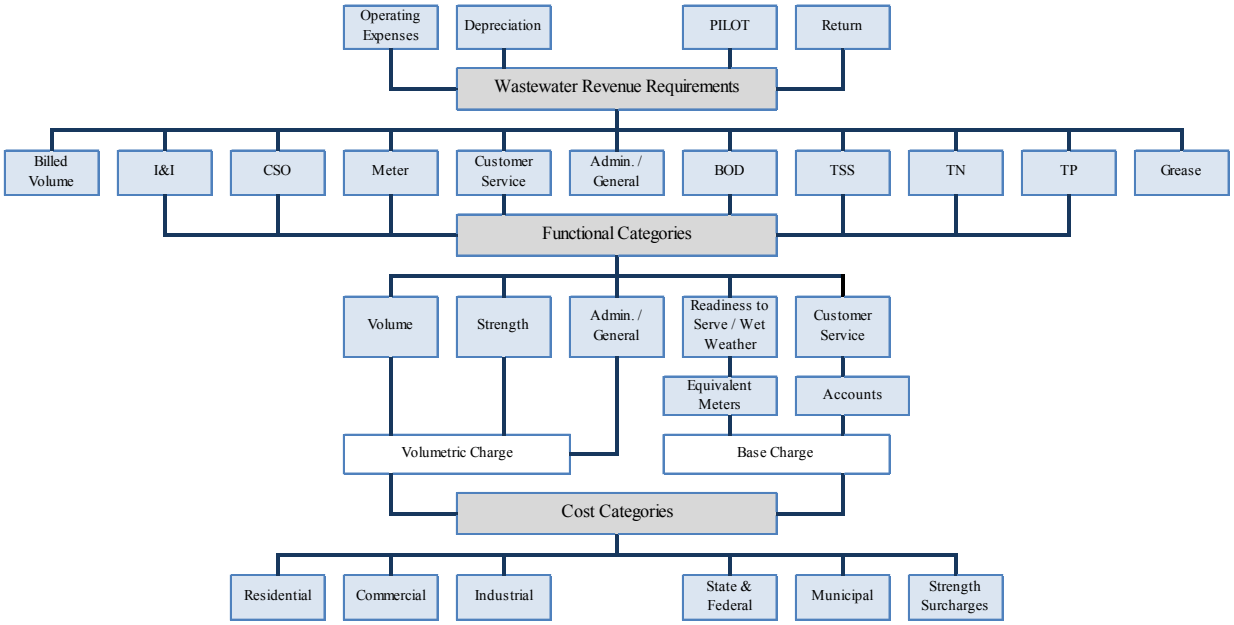


Exhibit 4.2 – Wastewater Cost of Service Analysis



B. Functional Cost Centers

Once the revenue requirements, referred to in Section 3, were developed for the test year, the Project Team then allocated these costs proportionately to water and wastewater customers based on how they use the system. The appropriate level of detail required for a cost of service analysis is contingent on utility pricing objectives, system characteristics, and the accuracy and availability of data necessary to support the analysis. Based on detailed discussions with DPU Staff, as well as consideration for the DPU's pricing objectives, as discussed in Section 2.C, it was determined that water and wastewater revenue requirements should be allocated into functional components consistent with the most significant cost causative characteristics of the customer base. The water components included supply/treatment, distribution, transmission, storage, pumping, meter, customer service, and administration and general, while the wastewater components included billed volume, CSO, infiltration and inflow (I&I), meter, customer service, administration and general, and also treatment parameters including biological oxygen demand, suspended solids, nitrogen, phosphorous, and grease. These treatment parameters were used in the evaluation of the DPU's industrial strength surcharges.

Exhibits 4.3 and 4.4 present the resulting allocation of revenue requirements to functional components for water and wastewater, respectively.

Exhibit 4.3 – Allocation of Water Revenue Requirements to Functional Costs

Source of Supply & Treatment	$	11,430,884
Distribution		15,606,264
Transmission		7,323,596
Storage		104,290
Pumping		5,456,163
Meter		365,783
Customer Service		2,420,493
Admin / General		7,344,586
Subtotal: Functional Costs	$	50,052,060

Exhibit 4.4 – Allocation of Wastewater Revenue Requirements to Functional Costs

Billed Volume	$	12,604,485
I&I		8,702,029
CSO		22,706,760
Meter		351,314
Customer Service		3,408,684
Admin / General		4,011,405
BOD		3,424,713
TSS		3,634,674
TN		6,722,087
TP		468,741
Grease		1,829,414
Subtotal: Functional Costs	$	67,864,305

Referring to Exhibit 4.3, the water functional costs were developed based on budgeting cost detail provided by DPU staff and included consideration such as the size and length of piping infrastructure to distribute costs between the water transmission and distribution systems. Referring to Exhibit 4.4, wastewater functional costs were also provided, in part, based on budgeted cost detail; however, certain functional cost centers including, in particular, CSO and I&I required additional analysis by the Project Team. These two cost centers are discussed in more detail below.

Combined Sewer Overflow Systems

Portions of the City's wastewater service area include sewers which collect both sanitary wastewater and stormwater runoff; these sewers are commonly known as combined sewers. As is typical of combined sewers, during certain wet weather events some of the combined wastewater overflows into local waterways. These points of overflow are known as CSOs. The City is responsible for the CSOs within its service area, which includes meeting both National Pollution Discharge Elimination System ("NPDES") requirements and the federal CSO Policy. Although the City has completed a number of CSO capital improvements since its inception, it is faced with the task of making additional improvements to

the system to further reduce CSO discharges. The CSO cost allocations identified in this report are based on information provided from members of the Project Team and DPU staff with extensive knowledge of the wastewater system.

Infiltration and Inflow

Infiltration can be described as extra water that enters the City's wastewater system through separated joints and pipe cracks, which often occur at or near the customer's point of connection. Inflow can be described as extra water, typically stormwater, flowing into the wastewater system from above ground sources such as leaky manhole covers or private property drainage spouts connected illegally to the system. As noted above, portions of the City's system include sewers that collect both sanitary and stormwater runoff, which are called combined sewers, and this also increases the level of flow in the wastewater system. The costs allocations identified in this report for I&I are also based on information from members of the Project Team and DPU staff with extensive knowledge of the wastewater system. Information used to support the allocations includes various analytics regarding dry weather versus wet weather flows.

C. Cost Classifications

Water

The aforementioned functional water costs were then allocated to their cost components in accordance with how the DPU's facilities are designed. Water cost components included volume-based allocations (i.e. base, max-day, and max-hour) and meter-based allocations (i.e. meter, readiness to serve, customer service, and administration and general). Specifically, water cost components related to the functional aspects of the system including water source of supply and treatment, distribution, transmission, storage, and pumping were assigned based on a base-extra capacity cost allocation methodology. This approach allocates a portion of these costs to serving a base level of demand, maximum-day level of demand, and maximum–hour level of demand. The Project Team worked closely with DPU staff to determine reasonable allocation factors for each of these components, which were consistent with industry standards and practices and utilized flow data from DPU water production facilities.

An aspect of the cost classifications that warrants additional discussion is the Readiness-to-serve (RTS) component. Since the majority of utility costs are fixed, it is reasonable to recover a portion of these costs on a fixed basis since the utility must maintain capacity in the system regardless of the level of demand. The appropriate level of RTS is contingent on the utility's pricing objectives.

Wastewater

Wastewater cost components included volume-based allocations (i.e. volume and strength) and meter-based allocations (i.e. meter, customer service, and administration and general). The volumetric components were used to calculate commodity rates and the meter components were used to determine fixed monthly costs to be recovered from each meter size. The most challenging aspect of wastewater cost allocations relates to the appropriate recovery of wet weather costs including combined sewers, and in particular, I&I, as the demands placed on the system are not a consequence of

a directly measurable service. The EPA, through use of the 1972 Water Pollution Control Act (Clean Water Act), issued guidelines stating that wet weather costs can be recovered from customers in proportion to contributed wastewater volumes, number of connections, land area, property valuations, or in some combination of these factors. The most common approaches used are through a combination of contributed wastewater volumes and number of connections. Contributed flow correlates wet weather costs to flow volume and pipe size and can recognize a greater level of inflow from larger parcels through manhole covers, for example. Customer connections are also an accepted approach for assessing the responsibility of wet weather costs, as engineering studies have shown there is more significant potential for infiltration from residential customers through illegal drains, cracked pipes, and unsealed joints occurring as a result of simplistic, un-engineered connections that are not inspected. Larger commercial, industrial, and institutional customer connections are typically engineered and inspected. Ultimately, the appropriate level of wet weather cost recovery on a fixed versus volumetric basis is contingent on the utility's pricing objectives.

The allocation of water and wastewater functional costs to cost components will vary based upon the targeted rate structure, and subsequent impacts, that the DPU is trying to implement. The Project Team has prepared water and wastewater rate options to present the DPU with an array of rate and impact combinations for consideration.

V. Water and Wastewater Rate Options and Customer Impacts

A. Existing Rates

The process to develop water rates began with an evaluation of the City's existing rate structure as it relates to the pricing objectives identified. The Model was used to determine the system's revenue requirements, to perform a comprehensive cost of service analysis, to calculate and analyze alternative rate structures, and to determine customer bill impacts, financial sufficiency and appropriateness of the alternative rate structures.

The DPU's customers are currently charged for water service based on a rate structure with two components: a fixed monthly base charge and a volumetric rate based on the quantity of water consumed. The fixed base charge is based on meter size (increasing charges for increasing meter sizes). The volumetric component includes separate rates for the residential, commercial, industrial, state & federal, and municipal customer classes. All customer classes are charged for consumption based on a uniform rate structure, with all usage being billed at the same rate within each respective class.

Exhibit 5.1 shows the DPU's existing water rate structure.

Exhibit 5.1 – Existing Water Rates

Monthly Service Charge		
5/8"	$	19.68
3/4"		29.53
1"		49.21
1.5"		98.41
2"		157.46
3"		295.24
4"		492.06
6"		984.12
8"		1,574.59
10"		2,263.47
Volumetric Charges (Ccf)		
Residential	$	1.63
Commercial		2.26
Industrial		2.96
State & Federal		3.05
Municipal		1.90

The DPU's customers are also charged for wastewater service based on a rate structure with two components: a fixed monthly base charge and a volumetric rate based on billed wastewater flows. The billed wastewater flows are estimated based on winter quarter water usage. The fixed base charge is based on meter size (increasing charges for increasing meter sizes). The volumetric component includes separate rates for the residential, commercial, industrial, state & federal, and municipal classes,

although all customer classes are charged for consumption based on a uniform rate structure, with all usage being billed at the same rate within each respective class.

Exhibit 5.2 shows the DPU's existing wastewater rate structure.

Exhibit 5.2 – Existing Wastewater Rates

Monthly Service Charge		
5/8"	$	29.72
3/4"		44.58
1"		74.30
1.5"		148.60
2"		237.75
3"		445.79
4"		742.98
6"		1,485.97
8"		2,377.54
10"		3,417.72
Volumetric Charges (Ccf)		
Residential	$	2.59
Commercial		4.27
Industrial		4.96
State & Federal		4.75
Municipal		3.40

B. Water and Wastewater Rate Alternatives

Using the direction inferred from the pricing objectives exercise and discussion with key DPU and City staff, emphasis was placed on maintaining some level of revenue sufficiency and stability while at the same time providing relief to low-income customers. These two objectives yield almost polar opposite solutions, in that as more revenue is generated from a fixed component, revenue stability is enhanced while low-income customers are less able to decrease their bill by conserving water. The Project Team has generated three alternatives each for water and wastewater that yields a balance between the DPU's most important pricing objectives.

The general approach in terms of cost recovery for both water and wastewater was to allocate account related costs including customer service, billing and collection, and meter reading on a per account basis. For all other costs, there are several mechanisms within each of the rate components that can be varied to provide different rate results and customer impacts. These mechanisms for water are the amount of functional component costs allocated to a RTS cost component, which is recovered on a fixed basis, based on meter size, and whether to maintain class-based volumetric rates or transition into a single uniform rate for all customer classes. The primary variable used to provide different wastewater rate scenarios is the percent allocation of CSO costs to the volume and fixed cost components, with the fixed component being recovered based on meter size. In all alternatives presented, the Project Team recommends transitioning wastewater volumetric rates away from class-based differentiation to a single uniform rate for all customer classes and recovering the cost of I&I based on equivalent meters.

Exhibit 5.3 presents an overview of the three water and wastewater rate alternatives and the assumptions built into each of them.

Exhibit 5.3 – Alternative Rate Structure Assumptions

	Water	Wastewater
Alternative 1	20% RTS; Class Based Volumetric Rates	CSO: 75% Volume, 25% RTS / Wet Weather; Uniform Volumetric Rates
Alternative 2	30% RTS; Class Based Volumetric Rates	CSO: 60% Volume, 40% RTS / Wet Weather; Uniform Volumetric Rates
Alternative 3	20% RTS; Uniform Volumetric Rates	CSO: 100% Volume, 0% RTS / Wet Weather; Uniform Volumetric Rates

C. Alternative 1 – Water and Wastewater Rates

As noted in Exhibit 5.3, water Alternative 1 assumes 20 percent of source of supply and treatment, distribution, transmission, storage, and pumping functional component costs are allocated to the RTS component of the base charge, while the remaining 80 percent is allocated to the base, max-day, and max-hour cost components. Water Alternative 1 also assumes class based volumetric rates.

Exhibit 5.4 presents water Alternative 1 rates compared to the existing water rates. Monthly service charges decrease anywhere from approximately 41 percent to approximately 58 percent, depending on meter size. Contrary to the monthly service charge, the volumetric charges increased across the board for each customer class. Notably, residential customers will see an increase of $1.49 per Ccf, while industrial customers will see almost no increase at all of $0.03 per Ccf. Exhibit 5.5 presents the customer impact schedule associated with implementing Alternative 1 water rates. It should be noted that included in the percentage increase shown in Exhibit 5.5 is an embedded increase in revenue of approximately 8.8% (see Section 4).

Exhibit 5.4 – Water Alternative 1 – Existing and COS Rate Comparison

Monthly Service Charge	Existing	COS	Delta ($)	Delta (%)
5/8"	$ 19.68	$ 11.56	*$ (8.12)*	*-41.24%*
3/4"	29.53	15.68	*(13.85)*	*-46.89%*
1"	49.21	23.92	*(25.29)*	*-51.40%*
1.5"	98.41	44.50	*(53.91)*	*-54.78%*
2"	157.46	69.21	*(88.25)*	*-56.05%*
3"	295.24	135.09	*(160.15)*	*-54.24%*
4"	492.06	209.20	*(282.86)*	*-57.48%*
6"	984.12	415.08	*(569.04)*	*-57.82%*
8"	1,574.59	662.12	*(912.47)*	*-57.95%*
10"	2,263.47	950.35	*(1,313.12)*	*-58.01%*
Volumetric Charges (Ccf)				
Residential	$ 1.63	$ 3.12	*$ 1.49*	*91.11%*
Commercial	2.26	3.32	*1.06*	*46.97%*
Industrial	2.96	2.99	*0.03*	*1.11%*
State & Federal	3.05	3.15	*0.10*	*3.34%*
Municipal	1.90	3.33	*1.43*	*75.31%*

Exhibit 5.5 – Water Alternative 1 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	2	5/8"	$ 22.94	$ 17.79	*$ (5.15)*	*-22%*
Commercial	2	5/8"	$ 24.20	$ 18.21	*$ (5.99)*	*-25%*
Municipal	2	5/8"	$ 23.48	$ 18.23	*$ (5.25)*	*-22%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	6	5/8"	$ 29.46	$ 30.26	*$ 0.80*	*3%*
Commercial	15	5/8"	$ 53.58	$ 61.39	*$ 7.81*	*15%*
Municipal	40	1"	$ 125.21	$ 157.15	*$ 31.94*	*26%*
Industrial	3,500	4"	$ 10,852.06	$ 10,684.02	*$ (168.04)*	*-2%*
State & Federal	240	1.5"	$ 830.41	$ 800.98	*$ (29.43)*	*-4%*

	High Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	15	5/8"	$ 44.13	$ 58.29	*$ 14.16*	*32%*
Commercial	200	2"	$ 609.46	$ 733.52	*$ 124.06*	*20%*
Municipal	150	2"	$ 442.46	$ 568.83	*$ 126.37*	*29%*
Industrial	7,500	4"	$ 22,692.06	$ 22,655.24	*$ (36.82)*	*0%*
State & Federal	1,000	3"	$ 3,345.24	$ 3,287.07	*$ (58.17)*	*-2%*

As noted in Exhibit 5.3, wastewater Alternative 1 assumes 75 percent of CSO related functional component costs are allocated to the volume cost component, while the remaining 25 percent is allocated to the wet weather of the base charge which is escalated by meter size. Again, all wastewater alternatives assume uniform based volumetric rates.

Exhibit 5.6 presents Wastewater Alternative 1 rates compared to the DPU's existing wastewater rates. Monthly service charges decrease anywhere from approximately 31 percent to approximately 47 percent, depending on meter size. Contrary to the monthly service charge, the volumetric charges increased across the board for each customer class. Notably, residential customers will see an increase of $2.63 per Ccf, while industrial customers will see an increase of $0.26 per Ccf. Exhibit 5.7 presents the customer impact schedule associated with implementing Alternative 1 wastewater rates. It should be noted that included in the percentage increase shown in Exhibit 5.7 is an embedded increase in revenue of approximately 6.4% (see Section 4).

Exhibit 5.6 – Wastewater Alternative 1 – Existing and COS Rate Comparison

Monthly Service Charge	**Existing**	**COS**	**Delta ($)**	**Delta (%)**
5/8"	$ 29.72	$ 20.64	*$ (9.08)*	*-30.54%*
3/4"	44.58	28.55	*(16.03)*	*-35.96%*
1"	74.30	44.36	*(29.94)*	*-40.29%*
1.5"	148.60	83.90	*(64.70)*	*-43.54%*
2"	237.75	131.34	*(106.41)*	*-44.76%*
3"	445.79	257.86	*(187.93)*	*-42.16%*
4"	742.98	400.19	*(342.79)*	*-46.14%*
6"	1,485.97	795.54	*(690.43)*	*-46.46%*
8"	2,377.54	1,269.97	*(1,107.57)*	*-46.58%*
10"	3,417.72	1,823.47	*(1,594.25)*	*-46.65%*
Volumetric Charges (Ccf)				
Residential	$ 2.59	$ 5.22	*$ 2.63*	*101.86%*
Commercial	4.27	5.22	*0.95*	*22.16%*
Industrial	4.96	5.22	*0.26*	*5.20%*
State & Federal	4.75	5.22	*0.47*	*9.89%*
Municipal	3.40	5.22	*1.82*	*53.35%*

Exhibit 5.7 – Wastewater Alternative 1 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	2	5/8"	$ 34.89	$ 31.08	*$ (3.81)*	*-11%*
Commercial	2	5/8"	$ 38.27	$ 31.08	*$ (7.18)*	*-19%*
Municipal	2	5/8"	$ 36.53	$ 31.08	*$ (5.44)*	*-15%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	6	5/8"	$ 45.24	$ 51.96	*$ 6.73*	*15%*
Commercial	15	5/8"	$ 93.82	$ 98.94	*$ 5.13*	*5%*
Municipal	40	1"	$ 210.46	$ 253.16	*$ 42.70*	*20%*
Industrial	3,500	4"	$ 18,109.98	$ 18,670.19	*$ 560.21*	*3%*
State & Federal	240	1.5"	$ 1,288.60	$ 1,336.70	*$ 48.10*	*4%*

	High Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	15	5/8"	$ 68.51	$ 98.94	*$ 30.43*	*44%*
Commercial	200	2"	$ 1,092.35	$ 1,175.34	*$ 82.99*	*8%*
Municipal	150	2"	$ 748.35	$ 914.34	*$ 165.99*	*22%*
Industrial	7,500	4"	$ 37,957.98	$ 39,550.19	*$ 1,592.21*	*4%*
State & Federal	1,000	3"	$ 5,195.79	$ 5,477.86	*$ 282.07*	*5%*

Since most of the DPU's customers purchase both water and wastewater services, the Project Team prepared a customer impact schedule for a combined bill assuming both Alternative 1 water and wastewater rates are implemented. See Exhibit 5.8 for details.

Exhibit 5.8 – Water and Wastewater Alternative 1 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	2	5/8"	$ 57.83	$ 48.88	*$ (8.95)*	*-15%*
Commercial	2	5/8"	$ 62.47	$ 49.29	*$ (13.17)*	*-21%*
Municipal	2	5/8"	$ 60.01	$ 49.31	*$ (10.70)*	*-18%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	6	5/8"	$ 74.70	$ 82.22	*$ 7.52*	*10%*
Commercial	14	5/8"	$ 147.40	$ 160.33	*$ 12.94*	*9%*
Municipal	40	1"	$ 335.67	$ 410.31	*$ 74.64*	*22%*
Industrial	3,500	4"	$ 28,962.04	$ 29,354.20	*$ 392.16*	*1%*
State & Federal	240	1.5"	$ 2,119.01	$ 2,137.68	*$ 18.67*	*1%*

	High Volume Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	15	5/8"	$ 112.64	$ 157.23	*$ 44.59*	*40%*
Commercial	200	2"	$ 1,701.81	$ 1,908.86	*$ 207.05*	*12%*
Municipal	150	2"	$ 1,190.81	$ 1,483.18	*$ 292.37*	*25%*
Industrial	7,500	4"	$ 60,650.04	$ 62,205.42	*$ 1,555.38*	*3%*
State & Federal	1,000	3"	$ 8,541.03	$ 8,764.93	*$ 223.90*	*3%*

D. Alternative 2 – Water and Wastewater Rates

As noted in Exhibit 5.3, water Alternative 2 assumes 30 percent of source of supply and treatment, distribution, transmission, storage, and pumping functional component costs are allocated to the RTS component of the base charge, while the remaining 70 percent is allocated to the base, max-day, and max-hour cost components. Water Alternative 2 also assumes class based volumetric rates.

Exhibit 5.9 presents Alternative 2 water rates compared to the existing water rates. Monthly service charges decrease anywhere from approximately 21 percent to approximately 38 percent, depending on meter size. The volumetric charges for the residential, commercial, and municipal classes all increased, while the industrial and state and federal charges decreased. Notably, residential customers will see an increase of $1.17 per Ccf, while industrial customers will see a decrease of $0.27 per Ccf. Exhibit 5.10 presents the customer impact schedule associated with implementing Alternative 2 water rates. It should be noted that included in the percentage increase shown in Exhibit 5.10 is an embedded increase in revenue of approximately 8.8%.

Exhibit 5.9 – Water Alternative 2 – Existing and COS Rate Comparison

Monthly Service Charge	Existing	COS	Delta ($)	Delta (%)
5/8"	$ 19.68	$ 15.50	*$ (4.18)*	*-21.23%*
3/4"	29.53	21.59	*(7.94)*	*-26.90%*
1"	49.21	33.76	*(15.45)*	*-31.40%*
1.5"	98.41	64.19	*(34.22)*	*-34.77%*
2"	157.46	100.71	*(56.75)*	*-36.04%*
3"	295.24	198.08	*(97.16)*	*-32.91%*
4"	492.06	307.63	*(184.43)*	*-37.48%*
6"	984.12	611.93	*(372.19)*	*-37.82%*
8"	1,574.59	977.09	*(597.50)*	*-37.95%*
10"	2,263.47	1,403.11	*(860.36)*	*-38.01%*
Volumetric Charges (Ccf)				
Residential	$ 1.63	$ 2.80	*$ 1.17*	*71.82%*
Commercial	2.26	2.98	*0.72*	*31.92%*
Industrial	2.96	2.69	*(0.27)*	*-9.00%*
State & Federal	3.05	2.83	*(0.22)*	*-7.12%*
Municipal	1.90	2.99	*1.09*	*57.34%*

Exhibit 5.10 – Water Alternative 2 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	2	5/8"	$ 22.94	$ 21.10	*$ (1.84)*	*-8%*
Commercial	2	5/8"	$ 24.20	$ 21.46	*$ (2.74)*	*-11%*
Municipal	2	5/8"	$ 23.48	$ 21.48	*$ (2.00)*	*-9%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	6	5/8"	$ 29.46	$ 32.31	*$ 2.85*	*10%*
Commercial	15	5/8"	$ 53.58	$ 60.22	*$ 6.64*	*12%*
Municipal	40	1"	$ 125.21	$ 153.34	*$ 28.13*	*22%*
Industrial	3,500	4"	$ 10,852.06	$ 9,735.38	*$ (1,116.68)*	*-10%*
State & Federal	240	1.5"	$ 830.41	$ 744.09	*$ (86.32)*	*-10%*

	High Volume Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	15	5/8"	$ 44.13	$ 57.51	*$ 13.38*	*30%*
Commercial	200	2"	$ 609.46	$ 696.97	*$ 87.51*	*14%*
Municipal	150	2"	$ 442.46	$ 549.12	*$ 106.66*	*24%*
Industrial	7,500	4"	$ 22,692.06	$ 20,509.95	*$ (2,182.11)*	*-10%*
State & Federal	1,000	3"	$ 3,345.24	$ 3,031.01	*$ (314.23)*	*-9%*

As noted in Exhibit 5.3, wastewater Alternative 2 assumes 60 percent of CSO related functional component costs are allocated to the volume cost component, while the remaining 40 percent is allocated to the wet weather component of the base charge. Again, all wastewater alternatives assume uniform based volumetric rates.

Exhibit 5.11 presents Alternative 2 wastewater rates compared to the DPU's existing wastewater rates. Monthly service charges decreased anywhere from approximately 18 percent to approximately 34 percent, depending on meter size. Contrary to the monthly service charge, the volumetric charges increased across the board for each customer class, except for the industrial class. Notably, residential customers will see an increase of $2.28 per Ccf, while industrial customers will see a decrease of $0.09 per Ccf. Exhibit 5.12 presents the customer impact schedule associated with implementing Alternative 2 Wastewater rates. It should be noted that included in the percentage increase shown in Exhibit 5.12 is an embedded increase in revenues of approximately 6.4%.

Exhibit 5.11 – Wastewater Alternative 2 – Existing and COS Rate Comparison

Monthly Service Charge	**Existing**	**COS**	**Delta ($)**	**Delta (%)**
5/8"	$ 29.72	$ 24.30	*$ (5.42)*	*-18.24%*
3/4"	44.58	34.04	*(10.54)*	*-23.65%*
1"	74.30	53.51	*(20.79)*	*-27.99%*
1.5"	148.60	102.18	*(46.42)*	*-31.24%*
2"	237.75	160.60	*(77.15)*	*-32.45%*
3"	445.79	316.36	*(129.43)*	*-29.03%*
4"	742.98	491.60	*(251.38)*	*-33.83%*
6"	1,485.97	978.38	*(507.59)*	*-34.16%*
8"	2,377.54	1,562.51	*(815.03)*	*-34.28%*
10"	3,417.72	2,243.99	*(1,173.73)*	*-34.34%*
Volumetric Charges (Ccf)				
Residential	$ 2.59	$ 4.87	*$ 2.28*	*88.32%*
Commercial	4.27	4.87	*0.60*	*13.97%*
Industrial	4.96	4.87	*(0.09)*	*-1.85%*
State & Federal	4.75	4.87	*0.12*	*2.53%*
Municipal	3.40	4.87	*1.47*	*43.07%*

Exhibit 5.12 – Wastewater Alternative 2 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	2	5/8"	$ 34.89	$ 34.04	*$ (0.85)*	*-2%*
Commercial	2	5/8"	$ 38.27	$ 34.04	*$ (4.23)*	*-11%*
Municipal	2	5/8"	$ 36.53	$ 34.04	*$ (2.49)*	*-7%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	6	5/8"	$ 45.24	$ 53.52	*$ 8.28*	*18%*
Commercial	15	5/8"	$ 93.82	$ 97.35	*$ 3.54*	*4%*
Municipal	40	1"	$ 210.46	$ 248.31	*$ 37.85*	*18%*
Industrial	3,500	4"	$ 18,109.98	$ 17,536.60	*$ (573.38)*	*-3%*
State & Federal	240	1.5"	$ 1,288.60	$ 1,270.98	*$ (17.62)*	*-1%*

	High Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	15	5/8"	$ 68.51	$ 97.35	*$ 28.84*	*42%*
Commercial	200	2"	$ 1,092.35	$ 1,134.60	*$ 42.25*	*4%*
Municipal	150	2"	$ 748.35	$ 891.10	*$ 142.75*	*19%*
Industrial	7,500	4"	$ 37,957.98	$ 37,016.60	*$ (941.38)*	*-2%*
State & Federal	1,000	3"	$ 5,195.79	$ 5,186.36	*$ (9.43)*	*0%*

Since most of the DPU's customers purchase both water and wastewater services, the Project Team prepared a customer impact schedule for a combined bill assuming both Alternative 2 water and wastewater rates are implemented. See Exhibit 5.13 for details.

Exhibit 5.13 – Water and Wastewater Alternative 2 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	2	5/8"	$ 57.83	$ 55.14	*$ (2.69)*	*-5%*
Commercial	2	5/8"	$ 62.47	$ 55.50	*$ (6.96)*	*-11%*
Municipal	2	5/8"	$ 60.01	$ 55.52	*$ (4.49)*	*-7%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	6	5/8"	$ 74.70	$ 85.83	*$ 11.13*	*15%*
Commercial	14	5/8"	$ 147.40	$ 157.57	*$ 10.18*	*7%*
Municipal	40	1"	$ 335.67	$ 401.64	*$ 65.97*	*20%*
Industrial	3,500	4"	$ 28,962.04	$ 27,271.98	*$ (1,690.06)*	*-6%*
State & Federal	240	1.5"	$ 2,119.01	$ 2,015.08	*$ (103.93)*	*-5%*

	High Volume Customer					
	Usage (ccf)	Meter Size	Existing	COS	*Delta ($)*	*Delta (%)*
Residential	15	5/8"	$ 112.64	$ 154.86	*$ 42.22*	*37%*
Commercial	200	2"	$ 1,701.81	$ 1,831.56	*$ 129.75*	*8%*
Municipal	150	2"	$ 1,190.81	$ 1,440.21	*$ 249.40*	*21%*
Industrial	7,500	4"	$ 60,650.04	$ 57,526.56	*$ (3,123.48)*	*-5%*
State & Federal	1,000	3"	$ 8,541.03	$ 8,217.37	*$ (323.66)*	*-4%*

E. Alternative 3 – Water and Wastewater Rates

As noted in Exhibit 5.3, water Alternative 3 assumes 20 percent of source of supply and treatment, distribution, transmission, storage, and pumping functional component costs are allocated to the readiness to serve component of the base charge, while the remaining 80 percent is allocated to the base, max day, and max hour cost components. Unlike Alternatives 1 and 2, Alternative 3 assumes uniform based volumetric rates.

Exhibit 5.14 presents Alternative 3 water rates compared to the existing water rates. Monthly service charges decreased anywhere from approximately 41 percent to approximately 58 percent, depending on meter size. All volumetric components increased, but as seen previously in other Alternatives, not equally. Notably, residential customers will see an increase of $1.58 per Ccf, while industrial customers will see an increase of $0.25 per Ccf. Exhibit 5.15 presents the customer impact schedule associated with implementing Alternative 3 water rates. It should be noted that included in the percentage increase shown in Exhibit 5.15 is an embedded increase in revenue of approximately 8.8%.

Exhibit 5.14 – Water Alternative 3 – Existing and COS Rate Comparison

Monthly Service Charge	Existing	COS	Delta ($)	Delta (%)
5/8"	$ 19.68	$ 11.56	*$ (8.12)*	*-41.24%*
3/4"	29.53	15.68	*(13.85)*	*-46.89%*
1"	49.21	23.92	*(25.29)*	*-51.40%*
1.5"	98.41	44.50	*(53.91)*	*-54.78%*
2"	157.46	69.21	*(88.25)*	*-56.05%*
3"	295.24	135.09	*(160.15)*	*-54.24%*
4"	492.06	209.20	*(282.86)*	*-57.48%*
6"	984.12	415.08	*(569.04)*	*-57.82%*
8"	1,574.59	662.12	*(912.47)*	*-57.95%*
10"	2,263.47	950.35	*(1,313.12)*	*-58.01%*
Volumetric Charges (Ccf)				
Residential	$ 1.63	$ 3.21	*$ 1.58*	*96.71%*
Commercial	2.26	3.21	*0.95*	*41.88%*
Industrial	2.96	3.21	*0.25*	*8.32%*
State & Federal	3.05	3.21	*0.16*	*5.13%*
Municipal	1.90	3.21	*1.31*	*68.76%*

Exhibit 5.15 – Water Alternative 3 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	2	5/8"	$ 22.94	$ 17.98	*$ (4.96)*	*-22%*
Commercial	2	5/8"	$ 24.20	$ 17.98	*$ (6.22)*	*-26%*
Municipal	2	5/8"	$ 23.48	$ 17.98	*$ (5.50)*	*-23%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	6	5/8"	$ 29.46	$ 30.80	*$ 1.34*	*5%*
Commercial	15	5/8"	$ 53.58	$ 59.66	*$ 6.08*	*11%*
Municipal	40	1"	$ 125.21	$ 152.17	*$ 26.96*	*22%*
Industrial	3,500	4"	$ 10,852.06	$ 11,431.62	*$ 579.56*	*5%*
State & Federal	240	1.5"	$ 830.41	$ 814.04	*$ (16.37)*	*-2%*

	High Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	15	5/8"	$ 44.13	$ 59.66	*$ 15.53*	*35%*
Commercial	200	2"	$ 609.46	$ 710.49	*$ 101.03*	*17%*
Municipal	150	2"	$ 442.46	$ 550.17	*$ 107.71*	*24%*
Industrial	7,500	4"	$ 22,692.06	$ 24,257.24	*$ 1,565.18*	*7%*
State & Federal	1,000	3"	$ 3,345.24	$ 3,341.49	*$ (3.75)*	*0%*

As noted in Exhibit 5.3, wastewater Alternative 3 assumes 100 percent of CSO related functional component costs are allocated to the volume cost component, while no costs are allocated to wet weather component of the base charge. Again, all wastewater alternatives assume uniform based volumetric rates.

Exhibit 5.16 presents Alternative 3 wastewater rates compared to the DPU's existing wastewater rates. Monthly service charges decreased anywhere from approximately 51 percent to approximately 67 percent, depending on meter size. Contrary to the monthly service charge, the volumetric charges increased across the board for each customer class. Notably, residential customers will see an increase of $3.23 per Ccf, while industrial customers will see an increase of $0.86 per Ccf. Exhibit 5.17 presents the customer impact schedule associated with implementing Alternative 3 wastewater rates. It should be noted that included in the percentage increase shown in Exhibit 5.17 is an embedded increase in revenues approximately 6.4%.

Exhibit 5.16 – Wastewater Alternative 3 – Existing and COS Rate Comparison

Monthly Service Charge	**Existing**	**COS**	**Delta ($)**	**Delta (%)**
5/8"	$ 29.72	$ 14.55	*$ (15.17)*	*-51.05%*
3/4"	44.58	19.41	*(25.17)*	*-56.46%*
1"	74.30	29.13	*(45.17)*	*-60.80%*
1.5"	148.60	53.43	*(95.17)*	*-64.05%*
2"	237.75	82.59	*(155.16)*	*-65.26%*
3"	445.79	160.34	*(285.45)*	*-64.03%*
4"	742.98	247.82	*(495.16)*	*-66.64%*
6"	1,485.97	490.82	*(995.15)*	*-66.97%*
8"	2,377.54	782.41	*(1,595.13)*	*-67.09%*
10"	3,417.72	1,122.60	*(2,295.12)*	*-67.15%*
Volumetric Charges (Ccf)				
Residential	$ 2.59	$ 5.82	*$ 3.23*	*125.06%*
Commercial	4.27	5.82	*1.55*	*36.20%*
Industrial	4.96	5.82	*0.86*	*17.29%*
State & Federal	4.75	5.82	*1.07*	*22.53%*
Municipal	3.40	5.82	*2.42*	*70.98%*

Exhibit 5.17 – Wastewater Alternative 3 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	2	5/8"	$ 34.89	$ 26.19	*$ (8.70)*	*-25%*
Commercial	2	5/8"	$ 38.27	$ 26.19	*$ (12.08)*	*-32%*
Municipal	2	5/8"	$ 36.53	$ 26.19	*$ (10.34)*	*-28%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	6	5/8"	$ 45.24	$ 49.47	*$ 4.23*	*9%*
Commercial	15	5/8"	$ 93.82	$ 101.85	*$ 8.03*	*9%*
Municipal	40	1"	$ 210.46	$ 261.93	*$ 51.47*	*24%*
Industrial	3,500	4"	$ 18,109.98	$ 20,617.82	*$ 2,507.84*	*14%*
State & Federal	240	1.5"	$ 1,288.60	$ 1,450.23	*$ 161.63*	*13%*

	High Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	15	5/8"	$ 68.51	$ 101.85	*$ 33.34*	*49%*
Commercial	200	2"	$ 1,092.35	$ 1,246.59	*$ 154.24*	*14%*
Municipal	150	2"	$ 748.35	$ 955.59	*$ 207.24*	*28%*
Industrial	7,500	4"	$ 37,957.98	$ 43,897.82	*$ 5,939.84*	*16%*
State & Federal	1,000	3"	$ 5,195.79	$ 5,980.34	*$ 784.55*	*15%*

Since most of the DPU's customers purchase both water and wastewater services, the Project Team prepared a customer impact schedule for a combined bill assuming both Alternative 3 water and wastewater rates are implemented. See Exhibit 5.18 for details.

Exhibit 5.18 – Water and Wastewater Alternative 3 – Customer Impacts

	Low Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	2	5/8"	$ 57.83	$ 44.17	*$ (13.67)*	*-24%*
Commercial	2	5/8"	$ 62.47	$ 44.17	*$ (18.30)*	*-29%*
Municipal	2	5/8"	$ 60.01	$ 44.17	*$ (15.84)*	*-26%*
Industrial	na	na	na	na	na	na
State & Federal	na	na	na	na	na	na

	Average Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	6	5/8"	$ 74.70	$ 80.27	*$ 5.58*	*7%*
Commercial	14	5/8"	$ 147.40	$ 161.51	*$ 14.11*	*10%*
Municipal	40	1"	$ 335.67	$ 414.10	*$ 78.43*	*23%*
Industrial	3,500	4"	$ 28,962.04	$ 32,049.44	*$ 3,087.40*	*11%*
State & Federal	240	1.5"	$ 2,119.01	$ 2,264.27	*$ 145.26*	*7%*

	High Volume Customer					
	Usage (ccf)	**Meter Size**	**Existing**	**COS**	***Delta ($)***	***Delta (%)***
Residential	15	5/8"	$ 112.64	$ 161.51	*$ 48.87*	*43%*
Commercial	200	2"	$ 1,701.81	$ 1,957.08	*$ 255.27*	*15%*
Municipal	150	2"	$ 1,190.81	$ 1,505.76	*$ 314.95*	*26%*
Industrial	7,500	4"	$ 60,650.04	$ 68,155.06	*$ 7,505.02*	*12%*
State & Federal	1,000	3"	$ 8,541.03	$ 9,321.84	*$ 780.81*	*9%*

F. Recommendations

After extensive discussion with DPU Staff it was determined that Alternative 3 was the most appropriate rate structure to address the DPU's key pricing objectives of affordability, utilizing cost of service based allocations, and maintaining an adequate level of revenue stability. Although affordability and maintaining revenue stability are often times competing pricing objectives, Alternative 3 provides the most appropriate balance to these offsetting forces for the DPU and its customer base, while maintaining consistency with cost of service principles.

The focus on affordability and cost of service based allocations will aid in providing relief to some low-income customers while ensuring the entire DPU customer base is paying its fair share for services rendered. At the same time, maintaining a level of stability in the revenue stream will support the DPU in preserving its sound financial position, credit, and access to capital markets at favorable rates. Additionally, a shift of revenue recovery from a fixed to variable basis will foster additional resource conservation and provide DPU residential customers, in particular, with more control over the cost of services through efficient usage.

Alternative 3 shifts a significant amount of the DPU's revenue recovery to a volumetric versus fixed basis compared to the current rate structure. In terms of water rates, the current structure recovers approximately 43% of retail user charge revenues on a fixed basis versus only approximately 22% in Alternative 3. For wastewater rates, the current structure recovers approximately 43% of retail user charge revenue on a fixed basis versus only approximately 18% in Alternative 3. However, the

justification supporting the recommended rates provides a sound basis for the allocation of cost recovery between fixed and variable components. For water rates, the recovery of costs associated with customer service, billing, collection, and meter reading on a per account basis is appropriate, as DPU incurs the same amount of these costs for each customer regardless of size. The 20% allocation of capacity related cost for RTS recovers a reasonable amount of fixed costs (e.g. debt service) on an equivalent meter basis consistent with industry standards and practices. Finally, since there did not appear to be significant variability in peaking factors amongst customer classes, the need for, and justification of, class based volumetric rates is limited.

Similarly, for wastewater rates, the recovery of customer service related costs on a per account basis is also appropriate. Additionally, the allocation of I&I costs on an equivalent meter basis provides a reasonable balance recognizing that a significant portion of these costs come from residential customers. The recommendation of a uniform volumetric rate is also reasonable and appropriate. In most cases, the only reason to have different wastewater volumetric rates by customer class is to recognize differences in the level of wastewater strength. Although this may be an option for consideration in the future, the DPU does not have data available to determine wastewater strength across all customer classes. This information is tracked and maintained for a small number of industrial customers, which are assessed a cost for higher strength waste through the DPU surcharge program.

Although the recommended rates impact revenue stability, the effect should be mitigated, to some extent, by the DPU's relatively urban service area with more limited elective consumption compared to other suburban utilities. However, as noted previously, it will become increasingly important for the DPU to review its projections of demand annually to reduce the risks of revenue insufficiency from declining consumption and maintain adequate and appropriate levels of reserves.

VI. Stormwater Utility

The DPU recently reviewed its stormwater utility rates and charges. The stormwater utility is facing significant challenges in terms of meeting funding needs and new permit requirements, and will need to support a number of new programs, including:

- Proportional allocation of pretreatment costs;
- Cost recovery of Floodwall Division budget;
- Virginia Stormwater Management Program (VSMP) permitting;
- Capital improvement projects associated with Chesapeake Bay Total Maximum Daily Load (TMDL) compliance;
- Incremental operating costs related to funding the capital program; and
- Additional allocation of overhead costs associated with the City's General Fund (curb/gutter, street sweeping, and leaf collection).

Although funding needs for the stormwater utility are expected to increase significantly in FY 2015, the DPU does not anticipate making any adjustments in stormwater rates and charges for the upcoming fiscal year (FY 2014). The DPU will continue to review various rate structures, capital financing, and billing system options, to determine the most appropriate funding structure and forecast of revenue requirements which will ensure regulatory compliance, minimize customer impacts, and provide an equitable distribution of cost recovery.

VII. Affordability Program

A. Background

The City funds utility operating and capital costs through customer charges for services based on approved rates and charges. The rates and charges have increased over the years and expected to increase further in the future. The expected trend of increasing rates and the potential hardship it may impose on low income residents have generated a strong interest in implementing a more comprehensive Customer Affordability Program (CAP) to provide some relief to economically disadvantaged customers.

The DPU currently has an existing CAP called "MetroCare" which provides some relief to economically disadvantaged customers on their gas bills. The program is fully funded through voluntary customer contributions and employee fundraising activities, and administered by the United Way. The DPU is seeking to implement a more comprehensive CAP that will provide assistance to more economically disadvantaged customers and include assistance with water and wastewater bills. It should be noted that the process of implementing an expanded CAP will likely mature over time. Although the DPU is considering many options to address affordability issues and concerns, there are significant technical, administration, and implementation issues that must be considered prior to moving forward with various program activities.

This section sets forth CAP structure alternatives that would provide more affordability assistance initially with water and wastewater bills and target a wider range of economically disadvantaged customers in the City. The DPU will continue to review opportunities, if appropriate, to expand the CAP to include stormwater services; however, it is not anticipated that this will be implemented by FY 2014. Throughout the industry, utilities are recognizing that a comprehensive affordability program is necessary to mitigate the burden caused by rate structures that are targeted at generating adequate revenues to provide desired levels of service. To this end, the DPU intends to implement a CAP program in the near future. This document discusses alternatives for structuring an affordability program as well as specific considerations for the DPU as it incorporates affordability into its pricing objectives.

B. Current Residential Water and Wastewater Billing Rates

The City bills customers for water and wastewater services on a monthly basis. The current water, wastewater, and gas rates for FY 2013 are as follows:

Water

Type of Charge	Charge Per Ccf	Fixed Monthly Fee
Monthly Service Charge for 5/8" Meter	N/A	$ 19.68
Volume Charge for the first 2,000 Ccf	$ 1.630	
Volume Charge for over 2,000 Ccf	$ 1.630	

Wastewater

Type of Charge	Charge Per Ccf	Fixed Monthly Fee
Monthly Service Charge for 5/8" Meter	N/A	$ 29.72
Volume Charge for the first 2,000 Ccf	$ 2.586	
Volume Charge for over 2,000 Ccf	$ 2.586	

Gas

Type of Charge	Charge Per Ccf	Fixed Monthly Fee
Monthly Service Charge	N/A	$ 11.05
Volume Charge for the first 500 Ccf	$ 0.470	
Purchased Gas Cost Charge	$ 0.500	

The high fixed component of the existing structure creates a relatively high cost per Ccf for low volume users.

C. Current CAP Structure

The current CAP provides a fixed level of assistance on gas bills to customers who successfully demonstrate meeting at least one of the following criteria:

- Has experienced an economic displacement;
- Experiencing economic hardship; or
- Other unusual circumstances.

The program is funded mostly through voluntary contributions that customers include with their payments. Customer monthly bills include a section for customers to indicate how much they are contributing to the fund in the period. Periodically, DPU employees organize fundraisers to help raise funds for the program.

Customers apply through United Way and eligible customers receive a credit on their gas bill for the assistance amount. The credit to the eligible customer is debited from the CAP fund.

The DPU maintains a fund account set aside for the program deposits and debits.

D. Program Considerations

Affordability programs have become a focal point throughout the water and wastewater industry. The City understands that many utilities are facing increased capital needs caused by aging infrastructure and regulatory requirements. At the same time, customer growth that mitigated the need for rate increases has abated due to moderating consumption patterns and slower economic growth. Municipal

utilities, in particular, are extremely sensitive to the financial hardship rate increases place on economically disadvantaged customers. Utilities have begun to realize that an effective affordability program is essential to address the needs of disadvantaged customers while rates increase to fund critical programs.

Addressing affordability needs requires consideration of several key issues such as how the program must be administered, who will be subsidized and to what extent, and how the program will be funded. In identifying a CAP that will achieve the City's objectives effectively and efficiently, the following key issues must be considered:

1. Program Structure and Scope
2. Criteria for Qualifying Customers
3. Level of Subsidy
4. Funding Source and Impact on Revenue
5. Legal and Administrative Requirements
6. Program Risks
7. Customer Acceptance

E. Program Structure and Scope Options

CAPs can be administered internally, externally by an outside program administrator, or a combination of both. An internally administered program can be costly for a utility since it requires more of the utility's resources (human and fixed capital). Outside program administration is certainly more cost effective, but the DPU might not control or influence who receives assistance and how much assistance they receive. The existing program provides assistance on a case by case basis. That is to say, assistance is distributed on an ad hoc basis and not targeted to the continuing needs of economically disadvantaged customers. In order to achieve the objective of a more comprehensive and further reaching CAP, the following CAP structure options would be considered and evaluated:

1. An in-house administered program structure
2. A "piggy-back" structure

In-house Administered Program Structure

An in-house administered program will be controlled and administered by the DPU with little or no involvement from outside organizations. An in-house administered program will require extensive administrative effort and relatively high cost, though it will presumably provide more program control. It will also entail a high level of administrative effort to certify and re-certify applicants.

"Piggy-Back" Structure

A "piggy-back" structure relies on an existing federal or state program for participant identification and eligibility determination. The federal or state program must satisfy the DPU's values, objectives, and quality standards. This structure involves little administrative effort and does not require the DPU to certify and re-certify applicants. A "piggy-back" structure will have a relatively lower administrative

burden and lower cost. However, it results in less direct program control. The DPU could potentially look at other complimentary services within City government to serve this function.

After careful investigation and discussions with management, the "piggy-back" structure was determined to be a favorable structure for a DPU CAP, given the factors considered. In identifying a suitable "piggy-back" structure, the following desirable attributes were sought:

- Eligibility requirement includes verification of the following:
  - Economic disadvantage (low-income)
  - Locality residence
  - Identity (requiring presentation of at least one photo ID)
- Stable, established, and well structured
- Equitable
- Secure and compatible database
- Similarly and consistently administered in other localities in the State
- Governmental oversight

Assessing the alternatives based on these attributes, the Richmond Department of Social Services' (DSS) Energy Assistance (EA) Program was found to be a suitable program for a DPU "piggy-back" CAP structure. The Richmond EA program is controlled by the state of Virginia and locally administered by Richmond DSS. The program provides assistance grants to help qualifying Virginia residents with their home heating bills. It is federally funded through the Low Income Energy Assistance Program (LIHEAP). Richmond EA has the following qualities that make it a desirable program for a DPU "piggy-back" CAP structure:

- Eligibility requirement includes verification of the following:
  - Qualification under income limit guidelines
  - Local residence (administered by local governments)
  - Identity (requiring presentation of at least one photo ID)
- Virginia State Program established in all localities
- Secure and compatible database
- Similarly and consistently administered in all Virginia State localities
- Governmental oversight

These qualities greatly satisfy the desired program attributes. Meetings with Richmond DSS management and state representatives confirmed these program attributes and their interest in working with the DPU to implement the program. Richmond DSS manager's interest in introducing water assistance to the program was clear based on the expectation that this type of relationship with the DPU will increase the overall value of Richmond EA program services. However, Richmond DSS management and a state level staff expressed confidentiality concerns regarding the sharing of information on EA assistance recipients. The state currently provides the DPU with information on EA recipients that are in the DPU's service area. The confidentiality concerns are mainly regarding EA assistance recipients outside of the DPU's service area population.

Richmond DSS expressed preference for a structure whereby they mainly refer potentially eligible CAP participants to the DPU.

Richmond EA program's income eligibility standards and some statistical information on Richmond's EA program are shown in Exhibits 1 and 2, respectively, below:

Discussions with DSS Regarding "Piggy-Back" Structure

Several discussion sessions were held with both Richmond DSS and the state representatives to determine the best way for the DPU and DSS to partner in establishing this CAP at the DPU. The main results of the discussions are as follows:

1. DSS will continue to provide the DPU with information on Energy Assistance recipients in the DPU's service area.
2. DSS has confidentiality concerns regarding sharing information on Energy Assistance recipients outside of those identified to be in the DPU's service area. The DPU prefers to have this information to identify additional eligible CAP participants for a more comprehensive CAP. For example, a DPU water utility EA customer who is not a DPU gas customer will not be on the list being provided to the DPU for application of EA credits.
3. DSS provided some program data on annual EA applications and approvals for the City.
4. The DPU and DSS would continue to work together to identify potential customers for the DPU CAP.

Exhibit 9.1 – Richmond EA Program Income Eligibility Standards (FY 2013)

Household Size	Maximum Monthly Income Standard	Household Size	Maximum Monthly Income Standard
1	$ 1,211	11	$ 5,501
2	$ 1,640	12	$ 5,930
3	$ 2,069	13	$ 6,359
4	$ 2,498	14	$ 6,788
5	$ 2,927	15	$ 7,217
6	$ 3,356	16	$ 7,646
7	$ 3,785	17	$ 8,075
8	$ 4,214	18	$ 8,504
9	$ 4,643	19	$ 8,933
10	$ 5,072	20	$ 9,362

Exhibit 9.2 – Virginia Energy Assistance (Fuel Applications and Approvals)

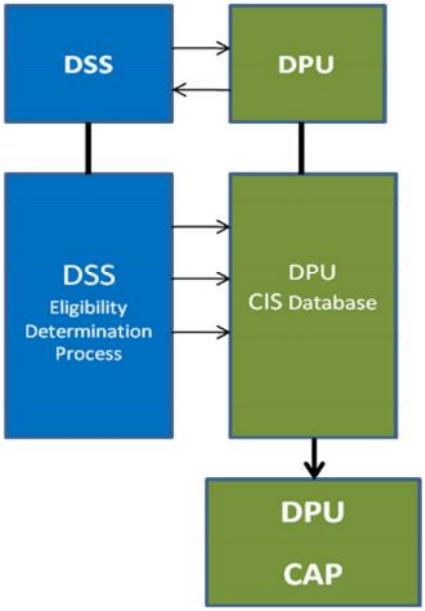
DSS Energy Assistance Program Period	Richmond City Applications (Fuel Only)	Richmond City Approvals (Fuel Only)
Total – FY2012	7,321	6,311
Total – FY2011	7,152	6,118
Total – FY2010	7,379	6,184
Total – FY2009	6,973	5,396
Total – FY2008	6,367	4,930

Proposed Program Structure and Flowchart

Under the Richmond DSS "piggy-back" CAP structure, DSS Energy Assistance recipients will automatically qualify for the DPU CAP. Richmond DSS and DPU staff could work together under a Memorandum of Understanding (MOU) to administer the CAP. The following brief program description and flowchart provides a better understanding of the potential scope and logistics of the proposed CAP structure:

- The DPU and DSS will work together to identify potential CAP participants.
- The DPU will identify the corresponding accounts within its Customer Information System (CIS).
- The DPU codes accounts with matching elements to receive CAP credit.
- The DPU will credit the accounts when billed.
- The DPU will be responsible for file updates.
- The DPU will be responsible for identifying CAP accounts in its CIS, providing and terminating CAP credits.
- The DPU and DSS will work together to identify opportunities to improve the effectiveness and efficiency of the program.

Exhibit 9.3 – Proposed CAP Flowchart



Criteria for Qualifying Customers

This consideration involves identifying the factors and elements to be used in determining who qualifies as a program participant. This may include factors such as personal identification, residency, income level, household size, property ownership, type of DPU account, etc. The Richmond DSS "piggy-back" CAP structure assumes that DSS' criteria will be adopted. However, additional criteria beyond those of DSS can be considered. Care should be taken to ensure that the criteria used are objective, legally defensible, and not overly burdensome to administer.

Subsidization Level

Another important consideration is the level of subsidization program participants (economically disadvantaged customers) should receive. This is an important consideration because each dollar of subsidization is a dollar of lost revenue that must be made up through other sources. Gas bills are typically subsidized through Federal and local energy assistance programs. For wastewater bills, the EPA provides some criteria for affordability of services. In Virginia, their guidance for consent decree negotiations says that service is unaffordable once water or wastewater services exceed one and a quarter percent of Median Household Income (MHI). For combined water and wastewater utilities, and for the purpose of the estimate in this report, two and a half percent of MHI is used. Of course, this is a macroeconomic measure that does not translate well to economically disadvantaged customers at or below the poverty level, particularly where a jurisdiction has both very high and relatively low incomes. For instance, in the case of the DPU, MHI is on the higher side due to the socioeconomic profile of the local districts, but there are still many households at or below the poverty level that may struggle to afford essential water and wastewater services.

Another approach is to set a fixed amount of water usage (or subsistence level of consumption) that program participants will be allowed without charge during a specific period of time (e.g. monthly). The

dollar equivalent of the volumetric credit or actual customer bill (whichever is less) can be applied to the accounts of the program participants. Estimation of program cost is relatively simpler under this approach.

Another common approach is the fixed dollar amount subsidy approach which provides a fixed amount of subsidy for all participants. This is usually more simple and easier to implement, and it is often used when initiating a CAP. For example, a utility creating a new CAP with limited information on participants may want to start the program by providing the same level of subsidy for all qualifying customers. As the utility develops a more detailed data set, it can adjust the program to provide assistance at a more granular level with additional consideration for specific customer income characteristics.

Ultimately, the DPU must seek a balance between the level of subsidization and the affordability program cost as measured in lost income to the utility.

Based on the information above, the following subsidy determination approaches are presented in this Study:

1. Fixed Dollar Subsidy (discussed above)
2. EPA 4% Affordability Guideline Based Subsidy (dollar based subsidy)
3. Subsistence Level of Consumption Standard Based Subsidy (consumption based subsidy)

Funding Source and Impact on Revenue

Both additional administrative controls and the need for increased subsidization will increase the cost of a more aggressive affordability program. As such, no program can be considered without a funding source. To help the DPU in its funding source decisions, some additional baseline information was developed.

Clearly, it is unlikely that voluntary customer contributions will be sufficient to fund a substantially more robust program. Exhibits 9.4 through 9.8 show the potential costs of different affordability program structures assuming varying levels of internal administration, customer subsidy, and participation. Cost estimates for three program structures are presented. These three program structures are classified as follows:

1. Program Structure 1 (Current)
2. Program Structure 2 (Expanded Participation – Moderate and Aggressive)

Program Structure 1 (Current): This assumes continuation of current CAP and little or no effort made to identify additional eligible customers. Currently, there are 1,434 active gas EA customers which represent about 1.3% of the total number of gas accounts. There are 103 MetroCare customers in 2012 (see Exhibit 9.4).

Program Structure 2 (Expanded Participation): This assumes two levels of participation expansion (Moderate and Aggressive) through working with DSS and implementing a public campaign program to identify and invite potentially qualifying customers to apply for the DPU CAP for water and wastewater

bills and available energy assistance programs for gas. The public campaign program will involve implementing some administrative process to enroll qualifying customers. The partnership with DSS will likely be established through a MOU with DSS.

These exhibits assume the subsidies apply only to qualifying DPU account holders.

Exhibit 9.4 – Program Structure 1 – Current and Projected CAP (MetroCare) Collections and Disbursements

Fiscal Year (FY)	Total Annual Collections	Annual Recipients	Admin Cost (estimated)	Total Annual Disbursements
2013-2015*	$ 61,112	108	10%	$ 49,408
FY 2011	$ 55,785	103	10%	$ 36,000
FY 2010	$ 56,358	117	10%	$ 45,000
FY 2009	$ 62,463	151	10%	$ 60,166

Exhibit 9.4 provides MetroCare cost 3-year projections and historical program costs over the last three years. The program has been scaled around the limited funding provided by voluntary contributions. Likewise, administration costs are also relatively low.

Program Structures 2 (Expanded Participation)

The following cost estimates assume different levels of participating customer accounts identified for water and wastewater CAP. Two levels of participating customer accounts are presented; one with a moderate expansion assumed and the other with an aggressive expansion assumed. For the moderate expansion, a participation rate of 2% (1,250) accounts is estimated and for the aggressive expansion, a participation rate of 4% (2,500) accounts is estimated. These participation rate estimates are based on industry experience. For comparison purposes, there are currently 1,121 LIHEAP customers that receive either water and/or wastewater services. As noted in Exhibit 9.2, in FY 2012 there were approximately 6,300 approved applications for fuel assistance, which includes gas, electric, and other forms of fuel. However, it is important to note that this figure includes customers both within and outside of the City. The moderate expansion of 1,250 customers is consistent with the current LIHEAP customers also applying for water and wastewater assistance. The aggressive expansion of 2,500 assumes the CAP program would capture double the amount of the moderate expansion which, in our experience, would be a significant amount of participants based on the water and wastewater service population. For example, several members of the Project Team recently implemented a comparable affordability

program for a utility more than twice the size of the DPU with similar demographics. In the first year of implementation approximately 3,000 customers received assistance.

For the purpose of illustration only, Exhibits 9.5 and 9.6 show the projected costs of a program constructed to cap a customer's annual bills at two and a half percent of poverty level income (per EPA guidelines).

Exhibit 9.5 – Scenario 1A: CAP Costs (Fixed Subsidy Based on 2.5% EPA Affordability Guideline)

Cost Estimation Factors	Moderate	Aggressive
Projected Qualifying Accounts	1,250	2,500
Estimated Average Annual Income Level of Qualifying Customers	$15,000	$15,000
Estimated Percentage of Customer Accounts	2.0%	4.0%
2.5% of Annual Income (EPA Affordability Guideline in Virginia)	$375.00	$375.00
Estimated Average Annual DPU Residential Bill (based on 2012 data)[3]	$ 896.40	$ 896.40
Estimated Annual Subsidy	$521.40	$521.40
Estimated CAP Cost (Lost Revenue)	$651,750	$1,303,500
Estimated DPU Administrative Cost	$40,000	$75,000
Estimated Total Program Cost	**$ 691,750**	**$ 1,378,500**

The estimated average income level of qualifying customers is for example purposes only. Average income levels for qualifying customers and qualification criteria will vary based on household members. The example above (Exhibit 9.5) provides a potential strategy for determining the average amount of subsidy required for qualifying customers. This subsidy could be distributed equally to all qualifying customers (fixed dollar subsidy). Alternatively, the DPU could utilize a sliding scale or other approach of providing varying levels of assistance based on household size and income. Eventually, it is conceivable a formulaic approach could be applied tailoring the level of support to customer specific income.

Based on the assumptions identified above, the average household bill exceeds 2.5 percent of poverty level income, so a subsidy would be required. If this level of subsidy were extrapolated over the total estimated accounts at or below the poverty level, subsidies would total approximately $ 0.65 and $1.30 million annually for the moderate and aggressive expansion assumptions, respectively. The DPU would probably incur additional administration costs to determine applicant eligibility and re-determine them annually. Again, solely for the purpose of illustration (as actual costs are not known), program

[3] Annual bill based on 6 Ccf average monthly consumption.

administration costs are estimated at $40,000 and $75,000 annually for the moderate and aggressive expansion assumptions, respectively, which is consistent with the administration cost percentages in the current program. Total program costs, given these assumptions, would be approximately $0.69 and $1.38 million annually for the moderate and aggressive expansion assumptions, respectively, or between approximately 0.7% and 1.4% of 2012 Operating Revenue.

Structuring a CAP in this manner provides a fixed subsidy, in dollar terms, to economically disadvantaged customers. Customers at the poverty level receive the same discount as customers with incomes of half the poverty level. As noted previously, another option is to provide a variable subsidy that increases as income levels drop. In other words, a customer at the poverty level may have 50% of their bill subsidized while a customer with a lower-than-poverty income gets a higher percentage subsidy. Exhibit 9.6 (1B and 1C) shows the potential cost of this type of program structure (assuming an even distribution of qualifying customers among the household salary range).

Exhibit 9.6 – Scenario 1B – CAP Costs (Variable Subsidy) – Moderate Expansion Assumption

Household Salary Range	Avg. Annual Residential Bill	Est. Annual Subsidy Needed*	Est. Number of Qualifying Customers*	Estimated Cost of Annual Assistance (Moderate)
$0 to $10,000	$ 896.40	90%	312	$ 251,709
$10,001 to $15,000	$ 896.40	60%	312	$ 167,806
$15,001 to $25,000	$ 896.40	30%	313	$ 84,172
$25,001 and above	$ 896.40	0%	313	$ 0
Total Estimated Annual Lost Revenue from Subsidy				$ 503,687
Estimated Additional Program Administration Cost				$ 45,000
				$ 548,687

*Assumed distribution.

Scenario 1C – CAP Costs (Variable Subsidy) – Aggressive Expansion Assumption

Household Salary Range	Avg. Annual Residential Bill	Est. Annual Subsidy Needed*	Est. Number of Qualifying Customers*	Estimated Cost of Annual Assistance
$0 to $10,000	$ 896.40	90%	625	$ 504,225
$10,001 to $15,000	$ 896.40	60%	625	$ 336,150
$15,001 to $25,000	$ 896.40	30%	625	$ 168,075
$25,001 and above	$ 896.40	0%	625	$ 0
Total Estimated Annual Lost Revenue from Subsidy				$ 1,008,450
Estimated Additional Program Administration Cost				$ 85,000
				$ 1,093,450

*Assumed distribution.

At an estimated cost of $0.55 and $1.09 million annually for the moderate and aggressive expansion assumptions, respectively, this program could cost up to 1% of 2012 Operating Revenue.

Another Affordability Program subsidy structure is the volumetric based structure mentioned earlier in this section. Under this subsidy structure, a subsistence level of water consumption is established and a fixed credit is provided based on this consumption level. This subsidy structure provides some protection to participants against rate increases since it is volumetric based. However, it will also increase the DPU's exposure to program cost increases. Exhibit 9.7 shows the potential cost of this type of subsidy structure if a 99 gals/day subsistence level of consumption is assumed for the total estimated qualifying customers.

Exhibit 9.8 - Scenario 2A – Based on Subsistence Level of Consumption (99 gallons/day)

Cost Estimation Factors	Moderate	Aggressive
Projected Qualifying Accounts	1,250	2,500
Assumed Gallons Per Day Credit	99	99
Assumed Rate Per 1,000 gallons	$ 6.00	$ 6.00
Estimated Annual Credit (Subsidy) per Participant	$216.81	$216.81
Estimated Average Annual DPU Residential Bill (2012)	$ 896.40	$ 896.40
Estimated CAP Cost (Lost Revenue)	$271,013	$542,025
Estimated DPU Administrative Cost	$30,000	$55,000
Estimated Total Program Cost	**$ 301,013**	**$ 597,025**

Scenario 2B (Exhibit 9.8) shows what the estimated program cost will be if a higher subsistence level of consumption (149 gals/day) is assumed. This illustrates the scalability of this approach in providing CAP subsidy.

Exhibit 9.8 - Scenario 2B – Based on Subsistence Level of Consumption (149 gallons/day)

Cost Estimation Factors	Moderate	Aggressive
Projected Qualifying Accounts	1,250	2,500
Assumed Gallons Per Day Credit	149	149
Assumed Rate Per 1,000 gallons	$ 6.00	$ 6.00
Estimated Annual Credit (Subsidy)	$326.31	$326.31
Estimated Average Annual DPU Residential Bill (2012)	$ 896.40	$ 896.40
Estimated CAP Cost (Lost Revenue)	$407,888	$815,775
Estimated DPU Admin Cost	$45,000	$85,000
Estimated Total Program Cost	**$ 452,888**	**$900,775**

It is clear that voluntary contributions are unlikely to provide adequate funding for a more aggressive affordability program. In addition, the funding source must be stable and have the ability to increase as utility rates increase. That is why most utilities rely on rate revenue to fund these types of programs. In effect, the lost revenue from subsidized customers must be made up by increasing rates on the customer base as a whole.

Exhibit 9.9 The following matrix summarizes the various CAP alternatives and associated cost estimates.

Exhibit 9.9 - Scenario 2B – CAP Approach Options and Cost Summary Matrix

CAP Subsidy Approach Options	Moderate	Aggressive
Current Structure	N/A	N/A
EPA 2.5% Affordability Guideline Based (Fixed Subsidy)	**$ 691,750**	**$ 1,378,500**
EPA 2.5% Affordability Guideline Based (Varying Subsidy)	**$ 548,687**	**$ 1,093,450**
Subsistence Level Consumption Based (99 gals/day)	**$ 301,013**	**$ 597,025**
Subsistence Level Consumption Based (149 gals/day)	**$ 452,888**	**$900,775**

F. Legal and Administrative Requirements

Review with the DPU Office of the General Counsel to determine if enabling legislation currently exists or will be required to implement the proposed CAP structure as currently conceived. It is important to determine if current legislation allows the use of rate revenues to fund CAP. The following legal considerations were identified:

- Confirming existence of or obtaining legislation or regulation
- Scope of legislation
- Period of legislation
- Additional flexibility to offer payment plans to customers

G. Program Risks

It is important to be aware of the risks that are associated with the proposed program. The following risks have been identified:

- Dependent on LIHEAP funding continuation for gas assistance – DSS EA is funded through LIHEAP and its funding has been declining recently.

- Exposure to DSS' database issues – Inconsistencies between DSS' and the DPU's databases might create data integrity issues.
- Changes in Authority – A change in authority in either organization might result in program termination or significant modification

Other considerations include:

- Administrative burden (e.g. CIS impact and liaison with DSS staff)
- Communication of information to the customer base

H. Customer Acceptance

Another important key issue to consider is the "buy-in" of customers into the program. Care should be taken to ensure the program is implemented and administered in a manner that will promote perceptions of equity amongst all customer classes.

I. Recommendations

The DPU has acknowledged that implementing a more comprehensive CAP that reaches an increased portion of economically disadvantaged customers will enrich its overall utility service. A CAP structure that can be comfortably absorbed within the DPU's operating budget and administrative structure will provide added value and is more desired. To this end, we recommend that the DPU directs management to evaluate and take action to implement an expended CAP as summarized below:

- Confirm existence of or pursue enactment of enabling legislation or regulation.
- Develop a CAP that "piggy-backs" on DSS to be used in tandem with the existing voluntary program.
- Fund the program using a combination of user rates, contributions, and grants
- Establish budget line item for CAP funding.
- Set subsidization level and structure through policy and ensure appropriate balance between the level of subsidization needed and the cost of providing the subsidy.
- Consider implementation of a more simplistic structure initially. Once actual program data is available, and if necessary, consider implementing a more tailored structure.
- Administer the CAP on an annual basis.

Appendix

Cost of Service Model Schedules

Schedule 1
City of Richmond Department of Public Utilities
Cost of Service Study
O&M Allocations

Water Operating Expenses	Combined	Richmond	Supply / Treatment	Distribution	Transmission	Storage	Pumping	Meter	Customer Service	Admin / General
Facilities Management	$ 3,715,511	$ 2,085,792	$ 1,042,896	$ 570,671	$ 263,646	$ 104,290	$ 104,290	$ -	$ -	$ -
Homeland Security	470,066	307,247	307,247	-	-	-	-	-	-	-
Water Testing	902,152	464,796	464,796	-	-	-	-	-	-	-
Water Pumping	7,044,717	3,809,442	-	-	-	-	3,809,442	-	-	-
Water Treatment	7,147,126	3,659,861	3,659,861	-	-	-	-	-	-	-
Water Leak Repair	7,288,070	6,185,472	-	4,230,850	1,954,622	-	-	-	-	-
Technical Services	659,018	600,515	-	-	-	-	-	-	-	600,515
Customer Care & Cust. Serv. Admin	1,254,189	1,247,042	-	-	-	-	-	-	1,247,042	-
Commercial Meter Shop	197,118	195,997	-	-	-	-	-	195,997	-	-
Credit & Collections	701,909	697,788	-	-	-	-	-	-	697,788	-
Customer Billing & Exceptions	425,821	423,366	-	-	-	-	-	-	423,366	-
Field & New Services	929,499	522,967	-	321,937	148,733	-	-	-	52,297	-
Meter Reading	170,750	169,787	-	-	-	-	-	169,787	-	-
Communications & Marketing	190,790	161,430	-	-	-	-	-	-	-	161,430
Administration	326,596	276,407	-	-	-	-	-	-	-	276,407
Financial Management	2,379,926	2,013,423	-	-	-	-	-	-	-	2,013,423
Human Resources	132,059	111,769	-	-	-	-	-	-	-	111,769
Management Information Systems	640,404	541,924	-	-	-	-	-	-	-	541,924
Affordability	550,000	550,000	-	-	-	-	-	-	-	550,000
Subtotal: Operating Expenses	$ 35,125,720	$ 24,025,025	$ 5,474,800 23.3%	$ 5,123,458 21.8%	$ 2,367,001 10.1%	$ 104,290 0.4%	$ 3,913,732 16.7%	$ 365,783 1.6%	$ 2,420,493 10.3%	$ 4,255,469 15.8%

Sewer Operating Expenses	Combined	Richmond	Billed Volume	CSO	I&I	Meter	Customer Service	Admin / General	BOD	TSS	TN	TP	Grease
Facilities Management	$ 4,481,324	$ 4,279,665	$ 911,373	$ 1,070,761	$ 629,204	$ -	$ -	$ -	$ 355,310	$ 377,364	$ 696,443	$ 48,156	$ 191,056
Homeland Security	271,024	258,828	55,119	64,758	38,053	-	-	-	21,489	22,822	42,120	2,912	11,555
Collection Systems	4,532,520	4,532,520	2,064,634	1,042,480	1,425,406	-	-	-	-	-	-	-	-
CSO Control	1,138,856	1,138,856	-	1,138,856	-	-	-	-	-	-	-	-	-
Environmental Management	646,004	616,933	175,218	-	120,969	-	-	-	68,311	72,551	133,896	9,258	36,732
Pre-Treatment	555,241	530,255	-	-	-	-	-	-	112,930	119,940	221,355	15,306	60,724
Wastewater Treatment	12,893,195	12,313,001	2,622,105	3,080,680	1,810,279	-	-	-	1,022,260	1,085,712	2,003,732	138,548	549,685
Technical Services	549,181	524,468	111,688	131,221	77,108	-	-	-	43,543	46,246	85,348	5,901	23,414
Customer Care & Cust. Serv. Admin	1,254,189	1,197,750	-	-	-	-	1,197,750	-	-	-	-	-	-
Commercial Meter Shop	197,118	188,248	-	-	-	188,248	-	-	-	-	-	-	-
Credit & Collections	674,776	644,411	-	-	-	-	644,411	-	-	-	-	-	-
Customer Billing & Exceptions	425,821	406,659	-	-	-	-	406,659	-	-	-	-	-	-
Field & New Services	929,499	887,671	-	-	-	-	887,671	-	-	-	-	-	-
Meter Reading	170,750	163,066	-	-	-	163,066	-	-	-	-	-	-	-
Communications & Marketing	285,018	272,192	-	-	-	-	272,192	-	-	-	-	-	-
Administration	487,894	465,939	-	-	-	-	-	465,939	-	-	-	-	-
Financial Management	4,884,018	4,664,237	993,269	1,166,980	685,744	-	-	-	387,238	411,274	759,025	52,483	208,224
Human Resources	197,280	188,402	40,121	47,138	27,699	-	-	-	15,642	16,613	30,659	2,120	8,411
Management Information Systems	956,685	913,634	194,562	228,589	134,324	-	-	-	75,852	80,561	148,678	10,280	40,787
Affordability	750,000	750,000	-	-	-	-	-	750,000	-	-	-	-	-
Subtotal: Operating Expenses	$ 36,280,393	$ 34,936,737	$ 7,168,088 21.0%	$ 7,971,461 23.3%	$ 4,948,787 14.5%	$ 351,314 1.0%	$ 3,408,684 10.0%	$ 1,215,939 1.4%	$ 2,102,575 6.2%	$ 2,233,083 6.5%	$ 4,121,256 12.1%	$ 284,965 0.8%	$ 1,130,587 3.3%

Schedule 2
City of Richmond Department of Public Utilities
Cost of Service Study
Revenue Offsets

Water Revenue Offsets	**FY 2013** *Budget*	**Supply / Treatment**	**Distribution**	**Transmission**	**Storage**	**Pumping**	**Meter**	**Customer Service**	**Admin / General**
Water Connection Charge	$ 630,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 630,000
Late Payment Fees	220,000	-	-	-	-	-	-	-	220,000
Connection Charges	165,000	-	-	-	-	-	-	-	165,000
Adjustment to Actual/Submitted	-	-	-	-	-	-	-	-	-
Billed/Unbilled	-	-	-	-	-	-	-	-	-
Fireline Protection Revenue	491,846	-	245,923	-	-	245,923	-	-	-
Other Charges (Late Payment & Return Check Fees)	-	-	-	-	-	-	-	-	-
Total: Water Revenue Offsets	**$ 1,506,846**	**$ -**	**$ 245,923**	**$ -**	**$ -**	**$ 245,923**	**$ -**	**$ -**	**$ 1,015,000**

Sewer Revenue Offsets	**FY 2013** *Budget*	**Billed Volume**	**CSO**	**I&I**	**Meter**	**Customer Service**	**Admin / General**	**BOD**	**TSS**	**TN**	**TP**	**Grease**
Strong Waste	$ 390,000	$ -	$ -	$ -	$ -	$ -	$ 390,000	$ -	$ -	$ -	$ -	$ -
Septic Tank	480,000	-	-	-	-	-	480,000	-	-	-	-	-
Cooling Towers	-	-	-	-	-	-	-	-	-	-	-	-
Alum Sludge	-	-	-	-	-	-	-	-	-	-	-	-
Rate Stabilization	-	-	-	-	-	-	-	-	-	-	-	-
FEMA Reimbursement	-	-	-	-	-	-	-	-	-	-	-	-
Adjustment to Actual		-	-	-	-	-	-	-	-	-	-	-
Billed/Unbilled		-	-	-	-	-	-	-	-	-	-	-
Services Charges/Other	166,109	-	-	-	-	-	166,109	-	-	-	-	-
Total: Sewer Revenue Offsets	**$ 1,036,109**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,036,109**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Schedule 3
City of Richmond Department of Public Utilities
Cost of Service Study
Depreciation Allocations

Water Assets Description	Total Plant in Service	Completed Not Classified	CWIP	Adjustments For CIP	Depreciable Plant in Service	Depr. 2014 (Est.)	Richmond	Supply / Treatment	Distribution	Transmission	Storage	Pumping	Meter	Customer Service	Admin / General
Source of Supply Plant	$ 44,353,749	$ 12,498,936	$ 16,914,484	$ 28,009,656	$ 101,776,825	$ 990,878	$ 787,677	$ 787,677	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pump Station Plants	$ 52,074,082	$ 34	$ 13,245,973	$ 12,417,395	$ 77,737,484	1,313,656	$ 517,869	$ -	$ -	$ -	$ -	$ 517,869	$ -	$ -	$ -
Water Treatment Plant	$ 99,328,545	$ 3,724,086	$ 7,736,521	$ 14,497,980	$ 125,287,132	$ 1,592,317	$ 719,334	$ 719,334	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transmission & Distribution	$ 233,006,134	$ 8,701,699	$ 24,408,456	$ 5,925,480	$ 272,041,770	$ 5,122,494	$ 4,542,128	$ -	$ 3,106,806	$ 1,435,322	$ -	$ -	$ -	$ -	$ -
General Plant	$ 1,794,877	$ -	$ 84,772	$ 4,471,081	$ 6,350,730	$ 303,364	$ 217,742	$ 217,742	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total: Water Assets	**$ 430,557,386**	**$ 24,924,755**	**$ 62,390,206**	**$ 65,321,593**	**$ 583,193,940**	**$ 9,322,709**	**$ 6,784,748**	**$ 1,724,752**	**$ 3,106,806**	**$ 1,435,322**	**$ -**	**$ 517,869**	**$ -**	**$ -**	**$ -**
							73%	25.4%	45.8%	21.2%	0.0%	7.6%	0.0%	0.0%	0.0%

Sewer Assets Description	Total Plant in Service	Non-Depreciable CWIP	Depreciable CWIP	Adjustments For CIP	Depreciable Plant in Service	Depr. 2014 (Est.)	Richmond	Billed Volume	CSO	I&I	Meter	Customer Service	Admin / General	BOD	TSS	TN	TP	Grease
Collection System	$ 326,816,424	$ 41,137,054	$ 6,750,000	$ -	$ 292,429,370	$ 6,572,838	$ 6,456,201	$ 820,204	$ 5,069,736	$ 566,262	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
WWTP	$ 163,263,438	$ 14,340,961	$ 84,019,875	$ -	$ 232,942,352	$ 6,970,442	$ 6,517,364	$ 1,520,471	$ 1,274,640	$ 1,049,720	$ -	$ -	$ -	$ 569,255	$ 603,464	$ 1,119,804	$ 79,126	$ 300,884
Total: Sewer Assets	**$ 490,079,862**	**$ 55,478,015**	**$ 90,769,875**	**$ -**	**$ 525,371,722**	**$ 13,543,281**	**$ 12,973,565**	**$ 2,340,675**	**$ 6,344,375**	**$ 1,615,982**	**$ -**	**$ -**	**$ -**	**$ 569,255**	**$ 603,464**	**$ 1,119,804**	**$ 79,126**	**$ 300,884**
								18.0%	48.9%	12.5%	0.0%	0.0%	0.0%	4.4%	4.7%	8.6%	0.6%	2.3%

Schedule 4
City of Richmond Department of Public Utilities
Cost of Service Study
PILOT and Social Security Tax Allocations

Water	Richmond	Supply / Treatment	Distribution	Transmission	Storage	Pumping	Meter	Customer Service	Admin / General
Federal Income Tax	$ 2,197,814	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,197,814
Gross Receipts Tax	1,348,084	-	-	-	-	-	-	-	1,348,084
Real Estate and Personal Property Tax	2,712,727	689,603	1,242,185	573,881	-	207,058	-	-	-
Subtotal: PILOT	$ 6,258,625	**$ 689,603**	**$ 1,242,185**	**$ 573,881**	**$ -**	**$ 207,058**	**$ -**	**$ -**	**$ 3,545,898**

Sewer	Richmond	Billed Volume	CSO	I&I	Customer Meter	Admin / Service	General	BOD	TSS	TN	TP	Grease
Federal Income Tax	$ 1,067,183	$ -	$ -	$ -	$ -	$ -	$ 1,067,183	$ -	$ -	$ -	$ -	$ -
Gross Receipts Tax	1,406,131	-	-	-	-	-	1,406,131	-	-	-	-	-
Real Estate and Personal Property Tax	4,157,192	750,036	2,032,964	517,818	-	-	-	182,410	193,371	358,825	25,355	96,414
Subtotal: PILOT	$ 6,630,506	**$ 750,036**	**$ 2,032,964**	**$ 517,818**	**$ -**	**$ -**	**$ 2,473,314**	**$ 182,410**	**$ 193,371**	**$ 358,825**	**$ 25,355**	**$ 96,414**

Schedule 5
City of Richmond Department of Public Utilities
Cost of Service Study
Return Allocations

Water	Combined	Richmond	Supply / Treatment	Distribution	Transmission	Storage	Pumping	Meter	Customer Service	Admin / General
Return (1)	$ 17,094,143	$ 14,490,508	$ 3,541,730	$ 6,379,738	$ 2,947,393	$ -	$ 1,063,429	$ -	$ -	$ 558,219

Sewer	Combined	Richmond	Billed Volume	CSO	I&I	Meter	Customer Service	Admin / General	BOD	TSS	TN	TP	Grease
Return (1)	$ 14,880,421	$ 14,359,606	$ 2,345,687	$ 6,357,960	$ 1,619,442	$ -	$ -	$ 1,358,261	$ 570,474	$ 604,756	$ 1,122,202	$ 79,295	$ 301,529

(1) Includes dividend payment to the city. The dividend payment is excluded for the prupose of calculating debt service coverage, but represents an annual cash need for the DPU.

Schedule 6
City of Richmond Department of Public Utilities
Cost of Service Study
Rate of Return Calculation

Water

Operating Income / (Loss)	**Combined**
Operating Revenues (Ex. Rate Stablization)	$ 68,240,300
Rate Stabilization	$ 3,600,000
Total: Operating Revenue	$ 71,840,300
Operating Revenue Deductions	
Operating Expenses	$ 35,125,720
Depreciation	9,322,709
Payment in Lieu of Taxes	
Federal Income Tax	2,197,814
Gross Receipts Tax	1,348,084
Real Estate and Personal Property Tax	3,710,050
Social Security Tax	-
Total: Revenue Deductions	$ 51,704,377
Operating Income / (Loss)	**$ 20,135,924**
Operating Income / (Loss) (Ex. Rate Stabilization)	**$ 16,535,924**
Rate Base	
Investment in Fixed Assets	
Net Fixed Assets	$ 439,650,638
Less: Cumulative Construction in Aid	-
Subtotal: Investment in Fixed Assets	$ 439,650,638
Working Capital	
Prepaid Expenses	$ -
Inventory	-
Stores Inventory	-
Cash Working Capital	-
Subtotal: Working Capital	$ -
Total: Rate Base	**$ 439,650,638**
Calculated Rate of Return	***4.58%***
Desired Rate of Return	***4.58%***
Delta	***0.00%***

Cash Flow Summary	
Operating Revenues	$ 71,840,300
Operating Expenses	42,381,668
Revenues Available for Debt Service	29,458,632
Projected Debt Service	23,525,145
Debt Service Coverage	**1.25**

3/13/2013

Schedule 6
City of Richmond Department of Public Utilities
Cost of Service Study
Rate of Return Calculation

Sewer

Operating Income / (Loss)	**Combined**
Operating Revenues	$ 69,976,340
Rate Stabilization	$ -
Total: Operating Revenue	$ 69,976,340
Operating Revenue Deductions	
Operating Expenses	$ 36,280,393
Depreciation	13,543,281
Payment in Lieu of Taxes	
Federal Income Tax	1,067,183
Gross Receipts Tax	1,406,131
Real Estate and Personal Property Tax	4,157,192
Social Security/Unemployment Tax	-
Total: Revenue Deductions	$ 56,454,180
Operating Income / (Loss)	**$ 13,522,160**
Operating Income / (Loss) (Ex. Rate Stabilization)	**$ 13,522,160**

Rate Base	
Investment in Fixed Assets	
Net Fixed Assets	$ 359,286,915
Less: Cumulative Construction in Aid	-
Subtotal: Investment in Fixed Assets	$ 359,286,915
Working Capital	
Prepaid Expenses	$ -
Inventory	-
Stores Inventory	-
Cash Working Capital	-
Subtotal: Working Capital	-
Total: Rate Base	**$ 359,286,915**
Actual Rate of Return	***3.76%***
Desired Rate of Return	***3.76%***
Delta	***0.00%***

Cash Flow Summary	
Operating Revenues	$ 69,976,340
Operating Expenses	42,910,899
Revenues Available for Debt Service	27,065,441
Projected Debt Service	21,579,436
Debt Service Coverage	**1.25**

3/13/2013

Schedule 7
City of Richmond Department of Public Utilities
Cost of Service Study
Revenue Proof

Combined	**Existing**		**COS**		**Delta**	
Revenues						
User Charge Revenue						
Retail Volume Charge	$ 62,264,691		$ 94,746,318		$ 32,481,627	
Retail Base Charge	$ 47,579,930		$ 23,232,543		$ (24,347,387)	
Subtotal: User Charge Revenue	$ 109,844,621		$ 117,978,862		$ 64,963,255	*7.4%*
Miscellaneous Revenue	$ 2,542,955		$ 2,542,955		$ -	
Total: Revenues	**$ 112,387,577**	#	**$ 120,521,817**		**$ 8,134,240**	
Revenue Requirements						
Operating Expenses	$ (58,961,762)		$ (58,961,762)		$ -	
Depreciation	(19,758,313)		(19,758,313)		-	
PILOT	(12,889,131)		(12,889,131)		-	
Return	(28,850,114)		(28,850,114)		-	
Total: Revenue Requirements	**$ (120,459,320)**		**$ (120,459,320)**		**$ -**	
Revenue Surplus/(Deficit)	**$ (8,071,743)**		**$ 62,497**		**$ 8,134,240**	

Water	**Existing**		**COS**		**Delta**	
Water Revenues						
User Charge Revenue						
Retail Volume Charge	$ 26,085,597		$ 39,281,543		$ 13,195,946	
Retail Base Charge	$ 19,931,917		$ 10,770,516		$ (9,161,401)	
Subtotal: User Charge Revenue	$ 46,017,515		$ 50,052,060		$ 26,391,893	*8.8%*
Miscellaneous Revenue	$ 1,506,846		$ 1,506,846		$ -	
Total: Water Revenues	**$ 47,524,361**		**$ 51,558,906**		**$ 4,034,545**	
Water Revenue Requirements						
Operating Expenses	$ (24,025,025)		$ (24,025,025)		$ -	
Depreciation	(6,784,748)		(6,784,748)		-	
PILOT	(6,258,625)		(6,258,625)		-	
Return	(14,490,508)		(14,490,508)		-	
Total: Water Revenue Requirements	**$ (51,558,906)**		**$ (51,558,906)**		**$ -**	
Revenue Surplus/(Deficit)	**$ (4,034,545)**		**$ -**		**$ 4,034,545**	
% of User Charges						

Schedule 7
City of Richmond Department of Public Utilities
Cost of Service Study
Revenue Proof

Wastewater	**Existing**	**COS**	**Delta**	
Sewer Revenues				
User Charge Revenue				
Retail Volume Charge	$ 36,179,094	$ 55,464,775	$ 19,285,681	
Retail Base Charge	$ 27,648,013	$ 12,462,027	$ (15,185,986)	
Subtotal: User Charge Revenue	$ 63,827,107	$ 67,926,802	$ 38,571,362	*6.4%*
Miscellaneous Revenue	$ 1,036,109	$ 1,036,109	$ -	
Total: Sewer Revenues	**$ 64,863,216**	**$ 68,962,911**	**$ 4,099,695**	
Sewer Revenue Requirements				
Operating Expenses	$ (34,936,737)	$ (34,936,737)	$ -	
Depreciation	(12,973,565)	(12,973,565)	-	
PILOT	(6,630,506)	(6,630,506)	-	
Return	(14,359,606)	(14,359,606)	-	
Total: Sewer Revenue Requirements	**$ (68,900,414)**	**$ (68,900,414)**	**$ -**	
Revenue Surplus/(Deficit)	**$ (4,037,198)**	**$ 62,497**	**$ 4,099,695**	

Schedule 8
City of Richmond Department of Public Utilities
Cost of Service Study
Revenue Requirements

Water

Revenue Requirements	Combined	Richmond	Supply / Treatment	Distribution	Transmission	Storage	Pumping	Meter	Customer Service	Admin / General
O&M	$ 35,125,720	$ 24,025,025	$ 5,474,800	$ 5,123,458	$ 2,367,001	$ 104,290	$ 3,913,732	$ 365,783	$ 2,420,493	$ 4,255,469
Depreciation	9,322,709	6,784,748	1,724,752	3,106,806	1,435,322	-	517,869	-	-	-
PILOT	7,255,948	6,258,625	689,603	1,242,185	573,881	-	207,058	-	-	3,545,898
Return	17,094,143	- 14,490,508	$ 3,541,730	$ 6,379,738	$ 2,947,393	$ -	$ 1,063,429	$ -	$ -	$ 558,219
Total: Revenue Requirements	**$ 68,798,519**	**$ 51,558,906**	**$ 11,430,884**	**$ 15,852,187**	**$ 7,323,596**	**$ 104,290**	**$ 5,702,087**	**$ 365,783**	**$ 2,420,493**	**$ 8,359,586**

Sewer

Revenue Requirements	Combined	Richmond	Flow: Billed Volume	Flow: CSO	Flow: I&I	Meter	Customer Service	Admin / General	BOD	TSS	TN	TP	Grease
O&M	$ 36,280,393	$ 34,936,737	$ 7,168,088	$ 7,971,461	$ 4,948,787	$ 351,314	$ 3,408,684	$ 1,215,939	$ 2,102,575	$ 2,233,083	$ 4,121,256	$ 284,965	$ 1,130,587
Depreciation	13,543,281	12,973,565	2,340,675	6,344,375	1,615,982	-	-	-	569,255	603,464	1,119,804	79,126	300,884
PILOT	6,715,347	6,630,506	750,036	2,032,964	517,818	-	-	2,473,314	182,410	193,371	358,825	25,355	96,414
Return	14,880,421	- 14,359,606	2,345,687	6,357,960	1,619,442	-	-	1,358,261	570,474	604,756	1,122,202	79,295	301,529
Total: Revenue Requirements	**$ 71,419,441**	**$ 68,900,414**	**$ 12,604,485**	**$ 22,706,760**	**$ 8,702,029**	**$ 351,314**	**$ 3,408,684**	**$ 5,047,514**	**$ 3,424,713**	**$ 3,634,674**	**$ 6,722,087**	**$ 468,741**	**$ 1,829,414**

Schedule 9
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Demand

Water (ccf)	*Forecast*	*Adjusted (1)*	4%
Residential			
All Usage	4,397,964	4,573,883	4%
Subtotal: Residential - In City	4,397,964	4,573,883	
Commercial			
All Usage	5,200,974	5,409,013	4%
Subtotal: Residential - Out City	5,200,974	5,409,013	
Industrial			
All Usage	894,968	930,767	4%
Subtotal: Commercial - In City	894,968	930,767	
State & Federal			
All Usage	927,977	965,096	4%
Subtotal: Commercial - Out City	927,977	965,096	
Municipal			
All Usage	357,888	372,204	4%
Subtotal: Industrial - In City	357,888	372,204	
Fire Protection			
All Usage	3,893,483	3,893,483	0%
Subtotal: Industrial - In City	3,893,483	3,893,483	
Total: Water	**15,673,254**	**16,144,445**	

Sewer (ccf)	*Forecast*	*Adjusted (1)*	-1%
Residential			
All Usage	3,218,318	3,186,135	-1%
Subtotal: Residential - In City	3,218,318	3,186,135	
Commercial			
All Usage	4,095,148	4,054,197	-1%
Subtotal: Residential - Out City	4,095,148	4,054,197	
Commercial - S & F			
All Usage	1,181,898	1,170,079	-1%
Subtotal: Residential - Out City	1,181,898	1,170,079	
Industrial			
All Usage	778,766	770,978	-1%
Subtotal: Commercial - In City	778,766	770,978	
Non-Residential			
All Usage	53,379	52,845	-1%
Subtotal: Commercial - Out City	53,379	52,845	
Municipal			
All Usage	298,784	295,796	-1%
Subtotal: Industrial - In City	298,784	295,796	
Total: Sewer	**9,626,293**	**9,530,030**	

(1) Adjusted for consistency with estimated revenues in FY 2013.

Schedule 10
City of Richmond Department of Public Utilities
Cost of Service Study
Peaking Factors

Total System	**System Demand (MGD)**	**Ratio to Average Day**	**Max Day Allocation**	**Peak Hour Allocation**	**Storage Allocation**
Average Day	51.45	1.00	55.9%	50.8%	50.8%
Max Day	92.04	1.79	44.1%	40.1%	0.0%
Peak Hour	101.31	1.97	0.0%	9.2%	49.2%

Residential	**FY 2010**	**FY 2011**	**FY 2012**	**3 Year Avg.**
Max Month (MM)	320,376	450,729	416,316	395,807
Annual Average (AA)	266,317	309,166	329,078	301,520
MM / AA	1.20	1.46	1.27	1.31
MD / MM	1.22	1.22	1.22	1.22
MD / AA	1.47	1.78	1.54	1.60

Commercial				
Max Month (MM)	557,858	630,857	661,070	616,595
Annual Average (AA)	400,463	438,131	481,767	440,120
MM / AA	1.39	1.44	1.37	1.40
MD / MM	1.22	1.22	1.22	1.22
MD / AA	1.70	1.76	1.67	1.71

Industrial				
Max Month (MM)	191,164	210,669	201,960	201,264
Annual Average (AA)	145,202	164,961	168,865	159,676
MM / AA	1.32	1.28	1.20	1.26
MD / MM	1.22	1.22	1.22	1.22
MD / AA	1.61	1.56	1.46	1.54

State & Federal				
Max Month (MM)	155,814	155,043	146,242	152,366
Annual Average (AA)	120,117	119,736	104,221	114,691
MM / AA	1.30	1.29	1.40	1.33
MD / MM	1.22	1.22	1.22	1.22
MD / AA	1.58	1.58	1.71	1.62

Municipal				
Max Month (MM)	22,315	22,452	23,197	22,655
Annual Average (AA)	17,474	15,027	16,069	16,190
MM / AA	1.28	1.49	1.44	1.40
MD / MM	1.22	1.22	1.22	1.22
MD / AA	1.56	1.82	1.76	1.71

Fire Protection				
Max Month (MM)	-	-	-	-
Annual Average (AA)	1	1	1	1
MM / AA	0.00	0.00	0.00	0.00
MD / MM	1.22	1.22	1.22	1.22
MD / AA	0.00	0.00	0.00	0.00

Schedule 11
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Accounts

Water

Residential	*Forecast*
Meter Size	
5/8"	50,982
3/4"	100
1"	700
1.5"	40
2"	10
3"	-
4"	-
6"	-
8"	-
10"	-
Subtotal: Residential	51,832
Commercial	
Meter Size	
5/8"	4,218
3/4"	43
1"	1,802
1.5"	835
2"	644
3"	68
4"	58
6"	25
8"	15
10"	-
Subtotal: Commercial	7,708
Industrial	
Meter Size	
5/8"	17
3/4"	-
1"	19
1.5"	11
2"	32
3"	2
4"	9
6"	6
8"	6
10"	-
Subtotal: Industrial	102
State & Federal	
Meter Size	
5/8"	242
3/4"	5
1"	85
1.5"	86
2"	105
3"	24
4"	34
6"	14
8"	6
10"	-
Subtotal: State & Federal	601

City of Richmond Department of Public Utilities
Cost of Service Study
Equivalent Customer Accounts

Water Equivalencies

Residential - In City	
Meter Size	
5/8"	50,982
3/4"	150
1"	1,750
1.5"	200
2"	80
3"	-
4"	-
6"	-
8"	-
10"	-
Subtotal: Residential - In City	53,162
Commercial	
Meter Size	
5/8"	4,218
3/4"	65
1"	4,505
1.5"	4,175
2"	5,152
3"	1,088
4"	1,450
6"	1,250
8"	1,200
10"	-
Subtotal: Commercial	23,103
Industrial	
Meter Size	
5/8"	17
3/4"	-
1"	48
1.5"	55
2"	256
3"	32
4"	225
6"	300
8"	480
10"	-
Subtotal: Industrial	1,413
State & Federal	
Meter Size	
5/8"	242
3/4"	8
1"	213
1.5"	430
2"	840
3"	384
4"	850
6"	700
8"	480
10"	-
Subtotal: State & Federal	4,146

Schedule 11
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Accounts

Municipal	
Meter Size	
5/8"	60
3/4"	-
1"	50
1.5"	79
2"	109
3"	8
4"	17
6"	7
8"	4
10"	-
Subtotal: Municipal	334
Fire Protection	
Meter Size	
5/8"	-
3/4"	-
1"	-
1.5"	15
2"	36
3"	51
4"	232
6"	542
8"	297
10"	4
12"	1
Subtotal: Fire Protection	1,178
Total: Water	**61,755**

City of Richmond Department of Public Utilities
Cost of Service Study
Equivalent Customer Accounts

Municipal	
Meter Size	
5/8"	60
3/4"	-
1"	125
1.5"	395
2"	872
3"	128
4"	425
6"	350
8"	320
10"	-
Subtotal: Municipal	2,675
Fire Protection	
Meter Size	
5/8"	-
3/4"	-
1"	-
1.5"	75
2"	288
3"	816
4"	5,800
6"	27,100
8"	23,760
10"	460
12"	216
Subtotal: Fire Protection	58,515
Total: Water	**143,013**

Sewer

Residential	*Adjusted*
Meter Size	
5/8"	49,742
3/4"	117
1"	688
1.5"	37
2"	15
3"	-
4"	-
6"	-
8"	-
10"	-
Subtotal: Residential	50,599

Sewer Equivalencies

Residential	
Meter Size	
5/8"	49,742
3/4"	176
1"	1,720
1.5"	185
2"	120
3"	-
4"	-
6"	-
8"	-
10"	-
Subtotal: Residential	51,943

Schedule 11
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Accounts

Commercial	
Meter Size	
5/8"	4,082
3/4"	43
1"	1,719
1.5"	747
2"	592
3"	59
4"	53
6"	10
8"	1
10"	-
Subtotal: Commercial	7,306
Industrial	
Meter Size	
5/8"	17
3/4"	-
1"	18
1.5"	11
2"	33
3"	7
4"	8
6"	5
8"	-
10"	-
Subtotal: Industrial	99
State & Federal	
Meter Size	
5/8"	238
3/4"	5
1"	77
1.5"	79
2"	98
3"	22
4"	28
6"	9
8"	-
10"	-
Subtotal: State & Federal	556
Municipal	
Meter Size	
5/8"	33
3/4"	-
1"	37
1.5"	71
2"	96
3"	8
4"	13
6"	3
8"	-
10"	-
Subtotal: Municipal	261
Total: Sewer	**58,821**

City of Richmond Department of Public Utilities
Cost of Service Study
Equivalent Customer Accounts

Commercial	
Meter Size	
5/8"	4,082
3/4"	65
1"	4,298
1.5"	3,735
2"	4,736
3"	944
4"	1,325
6"	500
8"	80
10"	-
Subtotal: Commercial	19,764
Industrial	
Meter Size	
5/8"	17
3/4"	-
1"	45
1.5"	55
2"	264
3"	112
4"	200
6"	250
8"	-
10"	-
Subtotal: Industrial	943
State & Federal	
Meter Size	
5/8"	238
3/4"	8
1"	193
1.5"	395
2"	784
3"	352
4"	700
6"	450
8"	-
10"	-
Subtotal: State & Federal	3,119
Municipal	
Meter Size	
5/8"	33
3/4"	-
1"	93
1.5"	355
2"	768
3"	128
4"	325
6"	150
8"	-
10"	-
Subtotal: Municipal	1,852
Total: Sewer Equivalencies	**77,620**

Schedule 12
City of Richmond Department of Public Utilities
Cost of Service Study
COS

Water	Total	Extra Capacity				Readiness to Serve	Fire Protection	Account	
		Base	Max Day	Max Hour	Meter			Customer Service	Admin / General
Source of Supply & Treatment	$ 11,430,884	$ 5,111,666	$ 4,033,041	$ -	$ -	$ 2,286,177	$ -	$ -	$ -
Distribution	15,606,264	6,340,174	5,002,320	1,142,517	-	3,121,253	-	-	-
Transmission	7,323,596	2,975,272	2,347,453	536,152	-	1,464,719	-	-	-
Storage	104,290	42,369	-	41,063	-	20,858	-	-	-
Pumping	5,456,163	2,216,612	1,748,879	399,439	-	1,091,233	-	-	-
Meter	365,783	-	-	-	365,783	-	-	-	-
Customer Service	2,420,493	-	-	-	-	-	-	2,420,493	-
Admin / General	7,344,586	7,344,586	-	-	-	-	-	-	-
Subtotal: Functional Costs	$ 50,052,060	**$ 24,030,678**	**$ 13,131,694**	**$ 2,119,171**	**$ 365,783**	**$ 7,984,239**	**$ -**	**$ 2,420,493**	**$ -**

	Annual Usage (ccf)	Average Daily Usage	Capacity Factor	Max Day Total Capacity	Extra Capacity	Capacity Factor	Max Hour Total Capacity	Extra Capacity
Residential	4,573,883	12,531	1.60	20,069	7,538	1.97	14,843	7,305
Commercial	5,409,013	14,819	1.71	25,329	10,510	1.97	20,695	10,186
Industrial	930,767	2,550	1.54	3,921	1,371	1.97	2,700	1,329
State & Federal	965,096	2,644	1.62	4,285	1,641	1.97	3,232	1,591
Municipal	372,204	1,020	1.71	1,748	728	1.97	1,434	706
Total	**12,250,962**	**33,564**		**55,352**	**21,788**		**42,904**	**21,117**

	Base Allocation	Max Day Allocation	Max Hour Allocation	Base	Max Day	Max Hour	Total
	37.3%	34.6%	34.6%	8,971,826	4,542,923	733,130	14,247,879
	44.2%	48.2%	48.2%	10,609,963	6,334,189	1,022,201	17,966,353
	7.6%	6.3%	6.3%	1,825,731	826,494	133,378	2,785,603
	7.9%	7.5%	7.5%	1,893,069	989,253	159,644	3,041,966
	3.0%	3.3%	3.3%	730,090	438,834	70,818	1,239,742
				$ 24,030,678	**$ 13,131,694**	**$ 2,119,171**	**$ 39,281,543**

Calculated Volumetric Charges	Unit Cost ($/ccf)	
Residential	$ 3.12	14,247,879
Commercial	$ 3.32	17,966,353
Industrial	$ 2.99	2,785,603
State & Federal	$ 3.15	3,041,966
Municipal	$ 3.33	1,239,742
Average Volumetric Rate	$ 3.21	

Calculated Service Charges	Fixed Monthly Charge	Meter Charge	Account Charge
5/8"	$ 11.56	$ 8.23	$ 3.33
3/4"	15.68	12.35	3.33
1"	23.92	20.59	3.33
1.5"	44.50	41.17	3.33
2"	69.21	65.88	3.33
3"	135.09	131.76	3.33
4"	209.20	205.87	3.33
6"	415.08	411.75	3.33
8"	662.12	658.79	3.33
10"	950.35	947.02	3.33

Schedule 12
City of Richmond Department of Public Utilities
Cost of Service Study
COS

Sewer	Total	Account: Volume	Strength	Meter	Customer Service	Admin/General
Billed Volume	$ 12,604,485	$ 12,604,485	$ -	$ -	$ -	$ -
I&I	8,702,029	-	-	8,702,029	-	-
CSO	22,706,760	22,706,760	-	-	-	-
Meter	351,314	-	-	351,314	-	-
Customer Service	3,408,684	-	-	-	3,408,684	-
Admin / General	4,011,405	4,011,405	-	-	-	-
BOD	3,424,713	-	3,424,713	-	-	-
TSS	3,634,674	-	3,634,674	-	-	-
TN	6,722,087	-	6,722,087	-	-	-
TP	468,741	-	468,741	-	-	-
Grease	1,829,414	-	1,829,414	-	-	-
Subtotal: Functional Costs	$ 67,864,305	**$ 39,322,650**	**$ 16,079,629**	**$ 9,053,343**	**$ 3,408,684**	**$ -**

Volumetric Rate Calculation	Annual Flows (ccf)	% Annual Flows	Volumetric Rev. Req.	Uniform Unit Cost (per ccf)		High Strength Surchage: BOD (lb)	TSS (lb)	TN (lb)	TP (lb)
Residential	3,186,135	33.4%	$ 18,522,410	$ 5.81		$ 3,424,713	$ 3,634,674	$ 6,722,087	$ 468,741
Commercial	4,054,197	42.5%	$ 23,568,837	5.81		*24.0%*	*25.5%*	*47.2%*	*3.3%*
Commercial - S & F	1,170,079	12.3%	$ 6,802,187	5.81					
Industrial	770,978	8.1%	$ 4,482,038	5.81		17,177,995	22,175,210	39,852,384	1,341,921
Non-Residential	52,845	0.6%	$ 307,213	5.81					
Municipal	295,796	3.1%	$ 1,719,594	5.81		**$ 0.20**	**$ 0.16**	**$ 0.17**	**$ 0.35**
Total	9,530,030		$ 55,402,278	$ 5.81	*Current Rate*	$ 0.28	$ 0.22	na	na

Calculated Volumetric Rate **$ 5.82**

Calculated Service Charges	Fixed Monthly Charge	Meter Charge	Account Charge
5/8"	$ 14.55	$ 9.72	$ 4.83
3/4"	19.41	14.58	4.83
1"	29.13	24.30	4.83
1.5"	53.43	48.60	4.83
2"	82.59	77.76	4.83
3"	160.34	155.52	4.83
4"	247.82	242.99	4.83
6"	490.82	485.99	4.83
8"	782.41	777.58	4.83
10"	1,122.60	1,117.77	4.83

Conversion
1mg/L = 0.00000083454 lbs/gallon

	BOD (lb)	TSS (lb)	TN (lb)	TP (lb)
Strength (mg/L)	250	250	30	12
lbs./gallon	0.0021	0.0021	0.0003	0.0001
Ccf (per month)	50	50	50	50
Gallons (per month)	37,400	37,400	37,400	37,400
lbs.	78.03	78.03	9.36	3.75
$/lbs.	0.20	0.16	0.17	0.35
Cost for Strength	15.56	12.79	1.58	1.31

Schedule 13
City of Richmond Department of Public Utilities
Cost of Service Study
Existing and COS Rates

Water	**Existing**	**COS**	**Delta $**	**Delta %**
Monthly Service Charge				
5/8"	$ 19.68	$ 11.56	*$ (8.12)*	*-41.24%*
3/4"	29.53	15.68	*(13.85)*	*-46.89%*
1"	49.21	23.92	*(25.29)*	*-51.40%*
1.5"	98.41	44.50	*(53.91)*	*-54.78%*
2"	157.46	69.21	*(88.25)*	*-56.05%*
3"	295.24	135.09	*(160.15)*	*-54.24%*
4"	492.06	209.20	*(282.86)*	*-57.48%*
6"	984.12	415.08	*(569.04)*	*-57.82%*
8"	1,574.59	662.12	*(912.47)*	*-57.95%*
10"	2,263.47	950.35	*(1,313.12)*	*-58.01%*
Volumetric Charges (Ccf)				
Residential	$ 1.63	$ 3.21	*$ 1.58*	*96.71%*
Commercial	2.26	3.21	*0.95*	*41.88%*
Industrial	2.96	3.21	*0.25*	*8.32%*
State & Federal	3.05	3.21	*0.16*	*5.13%*
Municipal	1.90	3.21	*1.31*	*68.76%*

Sewer	**Existing**	**COS**	**Delta $**	**Delta %**
Monthly Service Charge				
5/8"	$ 29.72	$ 14.55	*$ (15.17)*	*-51.05%*
3/4"	44.58	19.41	*(25.17)*	*-56.46%*
1"	74.30	29.13	*(45.17)*	*-60.80%*
1.5"	148.60	53.43	*(95.17)*	*-64.05%*
2"	237.75	82.59	*(155.16)*	*-65.26%*
3"	445.79	160.34	*(285.45)*	*-64.03%*
4"	742.98	247.82	*(495.16)*	*-66.64%*
6"	1,485.97	490.82	*(995.15)*	*-66.97%*
8"	2,377.54	782.41	*(1,595.13)*	*-67.09%*
10"	3,417.72	1,122.60	*(2,295.12)*	*-67.15%*
Volumetric Charges (Ccf)				
Residential	$ 2.59	$ 5.82	*$ 3.23*	*125.06%*
Commercial	4.27	5.82	*1.55*	*36.20%*
Industrial	4.96	5.82	*0.86*	*17.29%*
State & Federal	4.75	5.82	*1.07*	*22.53%*
Municipal	3.40	5.82	*2.42*	*70.98%*

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

Customer Class: **Commercial**

Combined - Commercial

ccf	*meter*		**Existing**	**COS**	*% Change*
4	5/8"		$ 75.53	$ 62.22	*-17.6%*
		$ Change		($ 13.31)	
		% Change		-17.6%	
8	5/8"		$ 101.66	$ 98.32	*-3.3%*
				($ 3.34)	
				-3.3%	
15	5/8"		$ 147.40	$ 161.51	*9.6%*
				$ 14.11	
				9.6%	
25	3/4"		$ 237.44	$ 260.75	*9.8%*
				$ 23.32	
				9.8%	
120	1"		$ 907.47	$ 1,136.21	*25.2%*
				$ 228.74	
				25.2%	
150	1"		$ 1,103.46	$ 1,407.01	*27.5%*
				$ 303.55	
				27.5%	
180	1"		$ 1,299.45	$ 1,677.80	*29.1%*
				$ 378.35	
				29.1%	
300	2"		$ 2,355.11	$ 2,859.72	*21.4%*
				$ 504.61	
				21.4%	
500	3"		$ 4,007.53	$ 4,808.64	*20.0%*
				$ 801.11	
				20.0%	

Water - Commercial

ccf	*meter*				
4	5/8"		$ 28.72	$ 24.39	*-15.1%*
		$ Change		($ 4.33)	
		% Change		-15.1%	
8	5/8"		$ 37.76	$ 37.22	*-1.4%*
				($ 0.54)	
				-1.4%	
15	5/8"		$ 53.58	$ 59.66	*11.3%*
				$ 6.08	
				11.3%	
25	3/4"		$ 86.03	$ 95.84	*11.4%*
				$ 9.81	
				11.4%	
120	1"		$ 320.41	$ 408.69	*27.6%*
				$ 88.28	
				27.6%	
150	1"		$ 388.21	$ 504.88	*30.1%*
				$ 116.67	
				30.1%	
180	1"		$ 456.01	$ 601.07	*31.8%*
				$ 145.06	

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

						31.8%
300	2"		$	835.46	$	1,031.13	*23.4%*
						$ 195.67
						23.4%
500	3"		$	1,425.24	$	1,738.29	*22.0%*
						$ 313.05
						22.0%

Sewer - Commercial

ccf	*meter*					
4	5/8"		$	46.81	$	37.83	*-19.2%*
		$ Change				($ 8.98)
		% Change				-19.2%
8	5/8"		$	63.90	$	61.11	*-4.4%*
						($ 2.80)
						-4.4%
15	5/8"		$	93.82	$	101.85	*8.6%*
						$ 8.03
						8.6%
25	3/4"		$	151.41	$	164.91	*8.9%*
						$ 13.50
						8.9%
120	1"		$	587.06	$	727.53	*23.9%*
						$ 140.47
						23.9%
150	1"		$	715.25	$	902.13	*26.1%*
						$ 186.88
						26.1%
180	1"		$	843.44	$	1,076.73	*27.7%*
						$ 233.29
						27.7%
300	2"		$	1,519.65	$	1,828.59	*20.3%*
						$ 308.94
						20.3%
500	3"		$	2,582.29	$	3,070.34	*18.9%*
						$ 488.05
						18.9%

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

Customer Class: **Industrial**

Combined - Industrial

ccf	*meter*		**Existing**	**COS**	*% Change*
200	1.5"		$ 1,831.41	$ 1,903.21	*3.9%*
		$ Change		$ 71.80	
		% Change		3.9%	
300	1.5"		$ 2,623.61	$ 2,805.85	*6.9%*
				$ 182.24	
				6.9%	
400	1.5"		$ 3,415.81	$ 3,708.49	*8.6%*
				$ 292.68	
				8.6%	
500	2"		$ 4,356.21	$ 4,665.00	*7.1%*
				$ 308.79	
				7.1%	
750	2"		$ 6,336.71	$ 6,921.60	*9.2%*
				$ 584.89	
				9.2%	
1000	2"		$ 8,317.21	$ 9,178.20	*10.4%*
				$ 860.99	
				10.4%	
2000	4"		$ 17,079.04	$ 18,509.84	*8.4%*
				$ 1,430.80	
				8.4%	
3500	6"		$ 30,197.09	$ 32,498.31	*7.6%*
				$ 2,301.22	
				7.6%	
7500	8"		$ 63,367.13	$ 69,142.57	*9.1%*
				$ 5,775.44	
				9.1%	

Water - Industrial

ccf	*meter*				
200	1.5"		$ 690.41	$ 685.79	*-0.7%*
		$ Change		($ 4.62)	
		% Change		-0.7%	
300	1.5"		$ 986.41	$ 1,006.43	*2.0%*
				$ 20.02	
				2.0%	
400	1.5"		$ 1,282.41	$ 1,327.07	*3.5%*
				$ 44.66	
				3.5%	
500	2"		$ 1,637.46	$ 1,672.41	*2.1%*
				$ 34.95	
				2.1%	
750	2"		$ 2,377.46	$ 2,474.01	*4.1%*
				$ 96.55	
				4.1%	
1000	2"		$ 3,117.46	$ 3,275.61	*5.1%*
				$ 158.15	
				5.1%	
2000	4"		$ 6,412.06	$ 6,622.01	*3.3%*
				$ 209.95	

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

						3.3%
3500	6"		$	11,344.12	$ 11,637.49	*2.6%*
					$ 293.37	
					2.6%	
7500	8"		$	23,774.59	$ 24,710.16	*3.9%*
					$ 935.57	
					3.9%	

Sewer - Industrial

ccf	*meter*					
200	1.5"		$	1,141.00	$ 1,217.43	*6.7%*
		$ Change			$ 76.43	
		% Change			6.7%	
300	1.5"		$	1,637.20	$ 1,799.43	*9.9%*
					$ 162.23	
					9.9%	
400	1.5"		$	2,133.40	$ 2,381.43	*11.6%*
					$ 248.03	
					11.6%	
500	2"		$	2,718.75	$ 2,992.59	*10.1%*
					$ 273.84	
					10.1%	
750	2"		$	3,959.25	$ 4,447.59	*12.3%*
					$ 488.34	
					12.3%	
1000	2"		$	5,199.75	$ 5,902.59	*13.5%*
					$ 702.84	
					13.5%	
2000	4"		$	10,666.98	$ 11,887.82	*11.4%*
					$ 1,220.84	
					11.4%	
3500	6"		$	18,852.97	$ 20,860.82	*10.7%*
					$ 2,007.85	
					10.7%	
7500	8"		$	39,592.54	$ 44,432.41	*12.2%*
					$ 4,839.87	
					12.2%	

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

Customer Class: **Municipal**

Combined - Municipal

ccf	*meter*		**Existing**	**COS**	*% Change*
2	5/8"		$ 60.01	$ 44.17	*-26.4%*
		$ Change		($ 15.84)	
		% Change		-26.4%	
4	5/8"		$ 70.62	$ 62.22	*-11.9%*
				($ 8.40)	
				-11.9%	
12	5/8"		$ 113.05	$ 134.43	*18.9%*
				$ 21.38	
				18.9%	
80	1"		$ 547.83	$ 775.16	*41.5%*
				$ 227.33	
				41.5%	
150	1"		$ 919.11	$ 1,407.01	*53.1%*
				$ 487.90	
				53.1%	
400	2"		$ 2,516.81	$ 3,762.36	*49.5%*
				$ 1,245.55	
				49.5%	
600	2"		$ 3,577.61	$ 5,567.64	*55.6%*
				$ 1,990.03	
				55.6%	
1000	3"		$ 6,045.03	$ 9,321.84	*54.2%*
				$ 3,276.81	
				54.2%	
1500	3"		$ 8,697.03	$ 13,835.04	*59.1%*
				$ 5,138.01	
				59.1%	

Water - Municipal

ccf	*meter*				
2	5/8"		$ 23.48	$ 17.98	*-23.4%*
		$ Change		($ 5.50)	
		% Change		-23.4%	
4	5/8"		$ 27.28	$ 24.39	*-10.6%*
				($ 2.89)	
				-10.6%	
12	5/8"		$ 42.48	$ 50.04	*17.8%*
				$ 7.56	
				17.8%	
80	1"		$ 201.21	$ 280.43	*39.4%*
				$ 79.22	
				39.4%	
150	1"		$ 334.21	$ 504.88	*51.1%*
				$ 170.67	
				51.1%	
400	2"		$ 917.46	$ 1,351.77	*47.3%*
				$ 434.31	
				47.3%	

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

600	2"		$	1,297.46	$	1,993.05
						$ 695.59
						53.6%
1000	3"		$	2,195.24	$	3,341.49
						$ 1,146.25
						52.2%
1500	3"		$	3,145.24	$	4,944.70
						$ 1,799.46
						57.2%

Sewer - Municipal

ccf	*meter*					
2	5/8"		$	36.53	$	26.19
		$ Change				($ 10.34)
		% Change				-28.3%
4	5/8"		$	43.34	$	37.83
						($ 5.51)
						-12.7%
12	5/8"		$	70.57	$	84.39
						$ 13.82
						19.6%
80	1"		$	346.62	$	494.73
						$ 148.11
						42.7%
150	1"		$	584.90	$	902.13
						$ 317.23
						54.2%
400	2"		$	1,599.35	$	2,410.59
						$ 811.24
						50.7%
600	2"		$	2,280.15	$	3,574.59
						$ 1,294.44
						56.8%
1000	3"		$	3,849.79	$	5,980.34
						$ 2,130.55
						55.3%
1500	3"		$	5,551.79	$	8,890.34
						$ 3,338.55
						60.1%

	53.6%
	52.2%
	57.2%
	-28.3%
	-12.7%
	19.6%
	42.7%
	54.2%
	50.7%
	56.8%
	55.3%
	60.1%

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

Customer Class: **Residential**

Combined - Residential

ccf	*meter*		**Existing**	**COS**	*% Change*
2	5/8"		$ 57.83	$ 44.17	*-23.6%*
		$ Change		($ 13.67)	
		% Change		-23.6%	
4	5/8"		$ 66.26	$ 62.22	*-6.1%*
				($ 4.04)	
				-6.1%	
6	5/8"		$ 74.70	$ 80.27	*7.5%*
				$ 5.58	
				7.5%	
8	5/8"		$ 83.13	$ 98.32	*18.3%*
				$ 15.20	
				18.3%	
12	5/8"		$ 99.99	$ 134.43	*34.4%*
				$ 34.44	
				34.4%	
15	5/8"		$ 112.64	$ 161.51	*43.4%*
				$ 48.87	
				43.4%	
20	5/8"		$ 133.72	$ 206.64	*54.5%*
				$ 72.92	
				54.5%	
50	5/8"		$ 260.20	$ 477.43	*83.5%*
				$ 217.23	
				83.5%	
75	5/8"		$ 365.60	$ 703.09	*92.3%*
				$ 337.49	
				92.3%	

Water - Residential

ccf	*meter*				
2	5/8"		$ 22.94	$ 17.98	*-21.6%*
		$ Change		($ 4.96)	
		% Change		-21.6%	
4	5/8"		$ 26.20	$ 24.39	*-6.9%*
				($ 1.81)	
				-6.9%	
6	5/8"		$ 29.46	$ 30.80	*4.6%*
				$ 1.34	
				4.6%	
8	5/8"		$ 32.72	$ 37.22	*13.7%*
				$ 4.50	
				13.7%	
12	5/8"		$ 39.24	$ 50.04	*27.5%*
				$ 10.80	
				27.5%	
15	5/8"		$ 44.13	$ 59.66	*35.2%*
				$ 15.53	
				35.2%	
20	5/8"		$ 52.28	$ 75.69	*44.8%*
				$ 23.41	

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

						44.8%
50	5/8"		$	101.18	$	171.88	*69.9%*
						$ 70.70
						69.9%
75	5/8"		$	141.93	$	252.05	*77.6%*
						$ 110.12
						77.6%

Sewer - Residential

ccf	*meter*					
2	5/8"		$	34.89	$	26.19	*-24.9%*
		$ Change				($ 8.70)	
		% Change				-24.9%	
4	5/8"		$	40.06	$	37.83	*-5.6%*
						($ 2.24)	
						-5.6%	
6	5/8"		$	45.24	$	49.47	*9.4%*
						$ 4.23	
						9.4%	
8	5/8"		$	50.41	$	61.11	*21.2%*
						$ 10.70	
						21.2%	
12	5/8"		$	60.75	$	84.39	*38.9%*
						$ 23.64	
						38.9%	
15	5/8"		$	68.51	$	101.85	*48.7%*
						$ 33.34	
						48.7%	
20	5/8"		$	81.44	$	130.95	*60.8%*
						$ 49.51	
						60.8%	
50	5/8"		$	159.02	$	305.55	*92.1%*
						$ 146.53	
						92.1%	
75	5/8"		$	223.67	$	451.05	*101.7%*
						$ 227.38	
						101.7%	

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

Customer Class: **State & Federal**

Combined - State & Federal

ccf	*meter*		**Existing**	**COS**	*% Change*
2	5/8"		$ 65.00	$ 44.17	*-32.1%*
		$ Change		($ 20.83)	
		% Change		-32.1%	
4	5/8"		$ 80.60	$ 62.22	*-22.8%*
				($ 18.38)	
				-22.8%	
12	5/8"		$ 143.00	$ 134.43	*-6.0%*
				($ 8.57)	
				-6.0%	
240	1.5"		$ 2,119.01	$ 2,264.27	*6.9%*
				$ 145.26	
				6.9%	
320	1.5"		$ 2,743.01	$ 2,986.38	*8.9%*
				$ 243.37	
				8.9%	
400	2"		$ 3,515.21	$ 3,762.36	*7.0%*
				$ 247.15	
				7.0%	
600	2"		$ 5,075.21	$ 5,567.64	*9.7%*
				$ 492.43	
				9.7%	
1000	3"		$ 8,541.03	$ 9,321.84	*9.1%*
				$ 780.81	
				9.1%	
1500	4"		$ 12,935.04	$ 13,996.63	*8.2%*
				$ 1,061.59	
				8.2%	

Water - State & Federal

ccf	*meter*				
2	5/8"		$ 25.78	$ 17.98	*-30.3%*
		$ Change		($ 7.80)	
		% Change		-30.3%	
4	5/8"		$ 31.88	$ 24.39	*-23.5%*
				($ 7.49)	
				-23.5%	
12	5/8"		$ 56.28	$ 50.04	*-11.1%*
				($ 6.24)	
				-11.1%	
240	1.5"		$ 830.41	$ 814.04	*-2.0%*
				($ 16.37)	
				-2.0%	
320	1.5"		$ 1,074.41	$ 1,070.55	*-0.4%*
				($ 3.86)	
				-0.4%	
400	2"		$ 1,377.46	$ 1,351.77	*-1.9%*
				($ 25.69)	
				-1.9%	
600	2"		$ 1,987.46	$ 1,993.05	*0.3%*
				$ 5.59	

Schedule 14
City of Richmond Department of Public Utilities
Cost of Service Study
Customer Impacts

					0.3%
1000	3"		$ 3,345.24	$ 3,341.49	*-0.1%*
				($ 3.75)	
				-0.1%	
1500	4"		$ 5,067.06	$ 5,018.81	*-1.0%*
				($ 48.25)	
				-1.0%	

Sewer - State & Federal

ccf	*meter*				
2	5/8"		$ 39.22	$ 26.19	*-33.2%*
		$ Change		($ 13.03)	
		% Change		-33.2%	
4	5/8"		$ 48.72	$ 37.83	*-22.4%*
				($ 10.89)	
				-22.4%	
12	5/8"		$ 86.72	$ 84.39	*-2.7%*
				($ 2.33)	
				-2.7%	
240	1.5"		$ 1,288.60	$ 1,450.23	*12.5%*
				$ 161.63	
				12.5%	
320	1.5"		$ 1,668.60	$ 1,915.83	*14.8%*
				$ 247.23	
				14.8%	
400	2"		$ 2,137.75	$ 2,410.59	*12.8%*
				$ 272.84	
				12.8%	
600	2"		$ 3,087.75	$ 3,574.59	*15.8%*
				$ 486.84	
				15.8%	
1000	3"		$ 5,195.79	$ 5,980.34	*15.1%*
				$ 784.55	
				15.1%	
1500	4"		$ 7,867.98	$ 8,977.82	*14.1%*
				$ 1,109.84	
				14.1%	

Schedule 15
City of Richmond Department of Public Utilities
Cost of Service Study
Water System Piping

Pipe Size	**Miles**	**Feet**	**Inch Feet**
<= 8"	976	5,153,280	41,226,240
10"	25	132,528	1,325,280
12"	81	425,568	5,106,816
16"	39	206,976	3,311,616
20"	18	93,456	1,869,120
24"	31	165,264	3,966,336
30"	14	74,448	2,233,440
36"	11	58,608	2,109,888
42"	1	5,808	243,936
48"	3	16,368	785,664
>= 60"	0	528	31,680
	1,199	6,332,832	62,210,016
<= 10"	1,001	5,285,808	42,551,520
> 10"	198	1,047,024	19,658,496
<= 10"	83.47%	83.47%	**68.40%**
> 10"	16.53%	16.53%	**31.60%**