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METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY

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Memo

Date: September 8, 2004

Memo to: Scott Potter

From: Kim McDoniel

Regarding: Metro Water Services Cost of Service Analysis

At your request, we have conducted an analysis of the cost of certain services provided to various Metro Water Services (MWS) customers, other than residential or commercial water and wastewater customers. One of the primary objectives was to review costs associated with out-of-county water and wastewater wholesale customers. In doing this analysis, we contracted with Raftelis Financial Consultants, who worked under our direction. Their report is included. Raftelis' major conclusions are as follows:

1. For the fiscal year ending June 30, 2004, MWS's actual revenues fell approximately $10 million short of the revenues required to cover the cost of operations and debt service. It should be noted that MWS's strong overall financial position and cash reserves can cover revenue shortfalls in the short term without an increase in rates.

2. When comparing the calculated actual cost of water and wastewater wholesale services to the related revenues collected for the 2003-2004 fiscal year, the cost exceeded the revenues by $6.4 million. This means that Davidson County residential and commercial customers are subsidizing the cost of providing wholesale water and wastewater services outside of Davidson County and to other systems inside Davidson County.

3. MWS does not meter all wastewater customers' flows into the MWS system.

4. Raftelis analyzed the cost of other services where MWS was not fully recovering costs and determined that if fiscal year 2003-2004 rates had been set to fully recover those costs, additional revenues of approximately $60,000 could have been collected.

5. Based on the cost of services among different residential and commercial customer classes and between water and wastewater customers, the existing rate structure is no longer aligned to costs by customer class and by service provided. This means that certain customer classes are subsidizing the cost of other customers' services, and that water revenues are subsidizing the cost of wastewater services.

6. If wholesale rates and the rates of other services had been set to fully cover the related cost of services for the 2003-2004 fiscal year, the overall MWS revenue shortfall would have been $3.6 million instead of $10 million.

Based on the above, Internal Audit recommends the following:

- Metro should modify all wholesale contracts so that rates paid fully cover the related cost of services without Davidson County customers subsidizing the cost of providing services to out-of-county customers and customers in other systems inside Davidson County.

- All customers' wastewater flows should be metered and billed based on uniform rates that recover the full cost of services.

- Metro should establish rates to fully cover costs for the various other services included in this analysis.

- While the study confirms that due to MWS's strong financial condition there is no need for an immediate overall rate increase, to better inform policy makers about the need for future rate adjustments the upcoming performance audit will include a full rate analysis to align the rates to the cost of services by each major customer class, and it will include an analysis of MWS's costs as compared to industry standards.

We would like to express our appreciation for the assistance and support provided by the MWS staff throughout this analysis. Please let me know if you have any questions or need additional information.

Copy: Mayor Bill Purcell
Karl Dean
David Manning
Talia Lomax-O'dneal
Richard Norment
Metropolitan Council Audit Committee

Metropolitan Government of Nashville and Davidson County

Metro Water Services

Cost of Service Analysis

September 2004

RAFTELIS FINANCIAL CONSULTING, PA

TABLE OF CONTENTS

EXECUTIVE SUMMARY

In October of 2003, the Internal Audit Division of the Metropolitan Government of Nashville and Davidson County ("Metro Government") engaged Raftelis Financial Consulting ("RFC") to perform a comprehensive water and wastewater cost of service study for the Metro Water Services ("MWS"). The general objective of a cost of service study is to calculate the actual cost to provide specific utility services or functions, expressed in terms of a unit of service (e.g. per 1000 gallons, per bill, or per service visit). The scope of work included the following:

- A Cost of Service Study for Water and Wastewater User Charges;
- A Wholesale Cost of Service Analysis;
- A Development Fee Calculation;
- A Cost of Service for Miscellaneous Fees; and,
- A Survey of Comparable Utilities.

Cost of Service Study for Water and Wastewater User Charges

The cost of service analysis for water and wastewater user charges is based on a detailed cost allocation model ("Model"), developed specifically for MWS. The Model was used to accomplish the following tasks:

- Identify revenue requirements**,** which address the "full costs" required to provide for operation/maintenance, and replacement of water and wastewater system assets;
- Calculate an average unit cost of service for water and wastewater customers; and,
- Calculate the unit cost of water and wastewater service for each existing customer class.

The first result from the Model is a comparison of the average unit cost of service for water and wastewater, as calculated in the Model, with the average revenues generated per billing unit from the current water and wastewater user rates and charges. The results of these calculations are shown below:

	Water	Wastewater	Total System
Average Unit Cost of Service (per ccf)	$1.60	$4.44	$3.00
Average Revenue per Billing Unit (per ccf)	$2.27	$3.50	$2.88

In theory, the average unit cost of service and the average revenue per billing unit should be reasonably similar if current user rates and charges are adequately recovering net revenue requirements for each utility. Since the average unit cost of service for water is significantly lower than the average revenue generated from current rates, and the opposite is true for wastewater, this indicates that water rates are subsidizing sewer costs under the current rate

structure. For the total system, an average unit cost of service that is higher than the average revenue per billing unit indicates that current rates may be insufficient to support the "full cost" of operating the utilities.

(It should be noted that the average unit cost of service is not the same as a billing rate or volume charge, and can not be compared directly to existing rates and charges. The average unit cost of service combines all of the costs associated with providing service into a single measure, or average rate, based on total volume billed, whereas the actual rates consist of volume charges and minimum charges that vary by customer class and meter size, respectively. Similarly, the average revenue per billing unit is a summary measure of the total revenues expected to be generated from both volume and base charges. As a result, direct comparisons between the average unit cost of service and a particular rate or charge are not valid.)

An average cost of service for each customer class is also calculated in the Model. To determine this, a comprehensive cost of service methodology was used to allocate the net revenue requirements to each customer class. For water customers, the cost of service methodology recommended in the American Water Works Association M-1 Rate Manual was used.

A comparison of the average unit cost of service for each class, or specifically the cost differentials among the classes, provides a basis for evaluating whether the current volume rates are consistent with the cost of service analysis. In the following chart, the calculated unit cost of service for each class is shown, along with the unit cost differential (ratio of unit costs compared to the residential class). Also shown are, and the calculated differentials based on the current volume rates for each class.

Customer Class	Water- Calculated Average Unit Cost of Service - (Volume)	Ratio of Calculated Average Unit Costs	Ratio of Current Volume Rates	Recovery of Costs
Residential	$1.32	1.00	1.00	over
Small Commercial	$1.36	1.03	1.06	over
Intermediate Commercial	$1.37	1.04	0.92	under
Large Commercial	$1.29	0.98	0.78	under

A comparison of the calculated cost of service differentials with the actual rate differential indicates that the residential and small commercial classes are subsidizing the intermediate and large commercial customers. The actual differential for the small commercial class is higher than the calculated differential, indicating over-recovery from this class. The actual differential for the intermediate and large commercial customers is lower than the calculated differential, indicating under-recovery from these classes.

Assuming that the total revenues generated by the water volume charges remained unchanged (i.e. revenue neutral), a shift to rates consistent with the cost of service analysis would result in

less revenues collected from residential and small commercial customers, and more revenues collected from intermediate and large commercial customers, as summarized in the table below.

Water	**Actual '04 Water Volume Revenues**	**Revenue Reqmts. Allocated by COS Results**	**Over/(Under) Recovery**	**Impact Per Customer (annual)**
Residential	$ 16,449,970	$ 14,684,480	$ 1,765,490	$ 13.56
Small Commercial	$ 1,366,665	$ 1,180,119	$ 186,546	$ 21.06
Intermediate Commercial	$ 18,764,421	$ 18,918,533	$ (154,112)	$ (27.40)
Large Commercial	$ 14,331,133	$ 16,129,058	$ (1,797,925)	$ (20,866)
	$ 50,912,189	$ 50,912,189	$ -	

The process for developing a cost of service analysis for wastewater costs is, typically, much more straight-forward than the methodology used for developing a water cost of service analysis. Unlike water, wastewater flow does not experience the same customer driven max day or max hour demand peaks, and as a result, there is less emphasis in identifying differences in the cost of service among wastewater customer classes. In general, it is not possible to justify significant cost differentials among customer classes for wastewater volume rates based on a cost of service analysis, and, as a result, the vast majority of wastewater rate structures are based on a uniform volume rate applied to all customers. In contrast, as shown below, the rate differentials derived from MWS's current wastewater volume rates show a significant discount for larger commercial customers, compared to residential customers, with small commercial customers paying a premium. The implication is that residential and small commercial customers are subsidizing intermediate and large commercial customers.

Customer Class	**Current Rates**	**Calculated Rate Differential**
Residential	$3.76	1.00
Small Commercial	$4.21	1.12
Intermediate Commercial	$3.43	0.91
Large Commercial	$2.59	0.69

Shifting to a uniform volume rate, assuming total revenues generated from wastewater volume rates remain unchanged, would produce the following impacts among the existing customer classes:

Wastewater	Actual '04 Wastewater Volume Revenues	Revenue Reqmts. Allocated by COS Results	Over/(Under) Recovery	Impact Per Customer (annual)
Residential	$ 23,072,777	$ 20,406,327	$ 2,666,450	$ 19.88
Small Commercial	$ 2,234,622	$ 1,731,827	$ 502,795	$ 59.51
Intermediate Commercial	$ 30,278,926	$ 28,823,700	$ 1,455,226	$ 280.75
Large Commercial	$ 17,845,684	$ 22,470,156	$ (4,624,472)	$ (56,168)
	$ 73,432,009	$ 73,432,009	$ -	

Wholesale Cost of Service Analysis

One of the objectives identified by MWS is to develop a methodology for setting wholesale rates that can be applied consistently to all wholesale customers. The recommended methodology is designed to be consistent with industry guidelines for setting wholesale or bulk customer rates. This methodology is based on the Utility Approach to rate setting. The Utility Approach is used to calculate wholesale rates since it provides a more effective methodology for compensating the utility for the risk associated with providing service to "non-owners" of the system. The Utility Approach looks at two primary cost components: an operations and maintenance ("O&M") component and a capacity component. The sum of the calculated O&M cost and capacity cost per 100 cubic feet is the cost that should be recovered from wholesale customers. This cost is summarized below:

Type of Charge	Water	Sewer
Capacity Cost per 100 cubic feet	$0.86	$1.05
Calculated O&M Cost per 100 cubic feet	$0.69	$1.04
Wholesale Cost per 100 cubic feet	$1.55	$2.09

Currently there is only one wholesale water customer. The existing water wholesale rate ($1.56/ccf) for this customer is very close to the calculated cost, indicating that it is providing for adequate and equitable cost recovery. Currently there are two types of sewer wholesale customers. One type of customer pays a trunk and treatment ("T&T") rate based on existing contractual relationships which include provisions for up-front capital contributions. For these wholesale customers, only the O&M cost component is appropriate. The other sewer wholesale customers pay a different rate because they have not made capital contributions. For these customers, both the capacity and O&M components are appropriate. The current T&T rate for sewer is $0.43/ccf which is significantly lower than the calculated O&M cost shown above. Similarly, the sewer wholesale customers that do not pay the T&T rate generally pay a rate that is significantly lower than the calculated wholesale sewer cost of $2.09/ccf. As a result, opportunities exist to generate additional revenue from sewer wholesale customers, and increase the overall equity of cost recovery between retail and wholesale customers, if the existing

contractual relationships can be amended to address a different methodology for calculating wholesale rates. The chart below provides a comparison of the revenues generated under the current wholesale rates with the potential revenues that would be generated at rates consistent with the calculated cost of service.

City	Contract Type	Present Rate	Calculated Cost (6)	FY 2004 Revenues	Estimated Revenues Using Calculated Cost (5)
Water Wholesale Contracts:					
City of Brentwood	Tariff	$1.56	$1.55	$965,098	$958,000
Sewer Wholesale Contracts:					
City of Belle Meade	Trunk and Treatment	$0.43	$1.04	$72,500	$175,349
City of Brentwood	Trunk and Treatment	$0.43	$1.04	$1,355,600	$3,278,660
City of Goodlettsville	Wholesale	(1)	$2.09	$936,854	$1,314,111
Hendersonville Utility District	Trunk and Treatment	$0.43	$1.04	$1,288,700	$3,116,856
City of Millersville	Trunk and Treatment	$0.43	$1.04	$79,700	$192,763
City of Mount Juliet	Wholesale	$1.13 / $1.23 (4)	$2.09	$1,058,000	$1,873,915
City of La Vergne	Trunk and Treatment	$0.43	$1.04	$510,500	$1,234,698
Old Hickory Utility District	Trunk and Treatment	$0.43	$1.04	$312,400	$755,572
City of Ridgetop	Wholesale	$1.28 (2)	$2.09	$34,600	$56,495
White House Utility District	Tariff	$2.59 (2)(3)	$2.09	$217,600	$175,592
Total Sewer				**$5,866,454**	**$12,174,011**

(1) Madison Suburban Utility District bills Goodlettsville at MWS's sewer rates and remits 41% of collected revenues to MWS.

(2) A 10% surcharge for repayment of TLDA loans is also assessed, similar to MWS retail customers.

(3) A base charge is included based on an 8" sewer meter for the large commercial class.

(4) The rate charged varies based on the amount of billed wastewater flow.

(5) These represent estimated revenues and do not consider any limitations imposed by the existing contracts.

(6) Calculated costs are based on billable flows.

Development Fee Calculation

Development fees, or capacity fees, are defined as one-time capital recovery charges assessed against new development as a way to recover a proportional share of the cost of capital facilities constructed to provide service capacity for new development. Capacity fees generally focus on recovery of a proportionate share of core system facilities, or those facilities that are required to serve all customers, existing and new. The effect of capacity fees is to shift cost away from existing residents to those new residents responsible for creating the additional costs. MWS currently assesses a $500 sewer capacity fee and no water capacity fee.

Appropriate capacity fees must comply with the Rational Nexus test established in court cases. The approach used for calculating water and sewer capacity fees that is recognized in the industry as cost-justified and meeting the requirement of the "rational nexus" standard applied by the courts is the System Buy-In approach. The System Buy-In methodology is most appropriate in cases where the existing system assets provide extra capacity to provide service to new customers, as is the case with MWS. Calculated fees are shown below:

Meter Size	Meter Capacity Conversion Factor (1)	Water Capacity Fee (2)	Sewer Capacity Fee (2)	Combined Capacity Fees
5/8"	1.00	$ 655	$ 329	$ 984
¾"	1.50	983	494	1,477
1"	2.50	1,638	823	2,461
1 ½"	5.00	3,276	1,646	4,922
2"	8.00	5,242	2,633	7,875
2 ½"	11.00	7,207	3,621	10,828
3"	17.50	11,466	5,761	17,227
4"	30.00	19,656	9,875	29,531
6"	62.50	40,950	20,574	61,524
8"	80.00	52,416	26,334	78,750
10"	145.00	95,004	47,731	142,735
12"	215.00	140,867	70,774	211,641

(1) American Water Works Association Manual of Water Supply Practices – Water Meters – Selection, Installation, Testing, and Maintenance ("AWWA Manual M6").

(2) Maximum level of fees that can be cost justified at the discretion of policy makers.

Cost of Service for Miscellaneous Fees

MWS receives revenues from fees assessed for various miscellaneous services such as turning on water service for new customers, late payment charges, disconnection of service, etc. As part of the cost of service analysis, RFC was asked to calculate the cost of service for providing each of these miscellaneous services. RFC's calculated costs are based upon information provided by

MWS staff such as labor rates, overhead percentages, material costs, transportation costs, and estimates of time required to complete a task. The calculated costs serve as a check against MWS current fees for these services.

			Survey Results		
Miscellaneous Fee	**MWS Current Fee**	**Calculated cost per order if meter set (1)**	**Range**	**# of utilities that charge for this service**	**# of survey respondents**
Turn-Ons	$25	$68	$5.00 - $49.50	8	8
Straight Lines	$0	$142			8
Broken Locks	$10	$98	$53 - $100	3	8
Investigations per customer request	$0	$73	$10 - $95	4	8
Flow Test	$0	$104	$60 - $90	2	8
Vandalism	$0	$96	$50 - $100	4	8
MXU	$0			0	8
After Hours Charge	$138	$239	$11 - 170	4	8
Reconnect for Non-Payment	$15	$16	$10 - $45	8	8
Notifies	$15	$8	$1 - $20	2	8
Duplicate Bill History Charge	$0	$3	$20 - $40	1	8
Late Payment Charge	5% of unpaid balance	$0	1.5% - 5%	6	8
Returned Check	$10	$25	$15 - $29	8	8
2nd Meter Inspection	$0	$42			8
Tap Fee/Connection			$35 - $12,000	8	8
5/8"	$250	$428	$35 - $2,000		
3/4"		$447			
1"	$350	$470			
1 1/2"		$602			
2"		$703			
3"	$450	$1,588			
4"	$1,000	$2,354			
6"	$1,500	$4,043	$35 - $12,000		
8"	$2,000	$8,774			
10"	$3,000	$12,188			

(1) If a radio meter is installed, the cost increases by approximately $152.00.

Survey

As part of the cost of service analysis, a survey was conducted to serve as a benchmarking tool for the various fees and charges assessed by MWS. RFC identified twelve utilities based on size, as measured by flows, and their geographic location relative to Nashville. Of the twelve utilities surveyed, eight responded to the questions asked of the survey. The survey was categorized into

the following three areas/sections of relevance to MWS and the cost of service analysis: miscellaneous fees, wholesale fees, and growth and development fees.

The results indicate that the fees assessed by various utilities vary both in terms of the amount of the fees and the fee structure among the respondents. These inconsistencies indicate that there may be policy objectives other than cost recovery driving the actual fees assessed to customers for some of these utilities. As a result, it is difficult to determine whether a charge is appropriate solely on the basis of the benchmarking analysis. The benchmarking analysis should be used in conjunction with the cost of service analyses and policy objectives in order to determine the most appropriate fees and charges.

Opportunities to Increase Revenues

As noted earlier, the cost of service analysis suggests that current rates may be insufficient to support the "full costs" of operating the utilities. Opportunities exist to increase revenues by moving toward rates for wholesale customers and for miscellaneous services that are more consistent with the cost of service analysis. The greatest opportunity to increase revenues is from adjusting the wholesale wastewater rates. These rates should be based on a consistent methodology applied to all wholesale customers. In addition, not all wholesale wastewater customers are billed based on metered wastewater flows. As a result, actual flows delivered to MWS for treatment are higher than billed flows, due to inflow and infiltration within the collection systems operated by those customers. All wholesale wastewater customers should be billed based on metered wastewater flows and consistent rates.

As a separate exercise, RFC was asked to evaluate the potential impact of moving to cost of service rates for wholesale customers and miscellaneous services in FY 2004. The table below summarizes the calculated shortfall from current (FY 2004) revenues from water and wastewater compared to the full cost revenue requirements, as estimated in the cost of service model. The second section shows a high level estimate of the additional revenues that could be generated by moving to rates for wholesale customers and miscellaneous fees that are more consistent with the cost of service analysis. The total shortfall based on the actual revenues is reduced by approximately 65%. Additional analyses will be required to determine the best way to address the apparent shortfall relative to "full cost" revenue requirements, including, for example, a more detailed assessment of opportunities to increase wholesale revenues, an evaluation of alternative approaches to address capital investment needs, as well as potential adjustments to the current rate structure. Note that there is no immediate need to adjust rates due to MWS's strong overall financial position, including the existence of significant cash reserves to address short-term capital needs.

	Water	Wastewater	Total System
Revenue Requirements (Full Cost)	$ 52,038,672	$ 129,374,789	$ 181,413,462
Actual Revenues Collected in '04 (1)	66,721,647	104,676,161	171,397,809
Surplus/(Shortfall)	**$ 14,682,975**	**$ (24,698,628)**	**$ (10,015,653)**
Revenue Requirements (Full Cost)	$ 52,038,672	$ 129,374,789	$ 181,413,462
Adjusted Revenues (2)	67,738,645	110,120,921	177,859,566
Surplus/(Shortfall)	**$ 15,699,972**	**$ (19,253,868)**	**$ (3,553,896)**
% Reduction in Total Shortfall			**-65%**

(1) Actual revenues for FY 2004 are approximately $3.5 million lower than the budgeted revenues used to develop the cost of service analysis. This difference is mainly due to lower water sales than projected in the budget estimates, which can be caused by a number of factors, including changing weather patterns. Actual revenues were used in this analysis to provide more updated information on the magnitude of the potential revenue shortfall for FY 2004, relative to the "full cost" revenue requirements developed for the cost of service analysis.

(2) Estimated FY 2004 revenues if wholesale rates and miscellanous fees, only, had been adjusted to reflect cost of service. These adjustments do not address the apparent subsidy from water to wastewater based on current retail rates and charges.

I. INTRODUCTION AND STUDY OBJECTIVES

A. INTRODUCTION

In October of 2003, the Internal Audit Division of the Metropolitan Government of Nashville and Davidson County ("Metro Government") engaged Raftelis Financial Consulting ("RFC") to perform a comprehensive water and wastewater cost of service study for the Metro Water Services ("MWS"). The last cost of service analysis performed for MWS was in 1992. Since that time, a number of changes have occurred within MWS that are likely to have produced changes in the cost of service relationships that existed when the prior study was completed. For example, MWS has completed a significant "re-engineering" of its operating structure in order to increase operating efficiencies and reduce the overall cost of operation. On the other hand, new costs have been added to address capital needs, as well as the implementation of the transfer of the Stormwater Division from Public Works to MWS and a new LOCAP ("local overhead cost allocation plan") allocation recovered from MWS. Significant additional capital needs have been identified over the next five to ten years. These and other cost drivers have resulted in increased concern about the effectiveness of the existing rates and charges in addressing the revenue needs of MWS. The first step in evaluating opportunities to improve the effectiveness and equity of revenue recovery is to complete a cost of service study.

B. OBJECTIVES OF STUDY

The general objective of a cost of service study is to calculate the actual cost to provide specific utility services or functions, expressed in terms of a unit of service (e.g. per 1000 gallons, per bill, or per service visit). The scope of work developed for MWS focuses on calculating unit costs of service for five areas: retail water and wastewater user rates and charges, wholesale customer charges, development (capacity) fees, and miscellaneous fees related to customer service activities or other specific services. RFC was also asked to conduct a survey of other "comparable" utilities to provide a broader basis for evaluating MWS's current fees and charges for utility services. The specific objectives for each study area are described below:

- ***Cost of Service Study for Water and Wastewater User Charges:*** The average unit cost of service was calculated for the various existing classes of water and wastewater customers. This information is useful in evaluating the effectiveness of the current water and sewer rate structure in recovering costs and/or addressing other pricing objectives of MWS or Metro Government. This analysis provides useful information for any future rate adjustments or rate structure changes.
- ***Wholesale Cost of Service Analysis:*** Appropriate wholesale or bulk water and wastewater costs were determined for utility service based on accepted cost of service principles and industry standard approaches.

- ***Development Fee Calculation:*** Cost justified Capacity Fees were developed for water and wastewater service, based on industry standard approaches and accepted methodologies.
- ***Cost of Service for Miscellaneous Fees:*** The cost of providing miscellaneous services related to customer service functions and other activities were calculated based on an analysis of the specific activities, personnel and equipment required to perform each service. This information is useful for evaluating opportunities for adjusting service fees to ensure adequate recovery of the full cost of providing specific services.
- ***Survey:*** A survey of various miscellaneous fees and charges (excluding user rates and charges) imposed by a representative group of comparable utilities was conducted to compare with MWS's current and calculated rates.

II. COST OF SERVICE STUDY FOR WATER AND WASTEWATER USER RATES AND CHARGES

A. CURRENT RATE STRUCTURE

The majority of revenues generated by MWS are derived from retail user rates and charges for water and wastewater services. For both water and wastewater, the rate structure includes both volumetric rates and fixed charges that vary by class of customers. One of the key objectives of a cost of service study is to calculate the difference in the actual cost of service for each customer class. This information can then be used to determine if the existing rate structure reasonably reflects these differences in the actual cost of service.

Currently, MWS retail customers are segregated into four customer classes, defined as follows:

- Residential – Up to two housing units on a common meter;
- Small commercial – Up to 1,600 cubic feet per month;
- Intermediate commercial – 1,600 to 200,000 cubic feet per month; or
- Large commercial/Industrial - Over 200,000 cubic feet per month

The water and wastewater rate structures include a separate minimum (fixed) charge that includes the first 200 cubic feet (approximately 1,500 gallons) of usage. The minimum charge varies by meter size and by customer class. For usage above 200 cubic feet per month, a volume rate is applied per hundred cubic feet ("ccf") of water used, with a separate volumetric rate for each customer class, for both water and wastewater. Sewer, or wastewater usage, is based on metered water consumption. However, the MWS has a summer water use policy that affects the calculation of sewer bills during the summer months. Title 15 of the Metropolitan Code of Laws states that customers can not be charged for sewer based on water consumption that is not returned to the sewer system. In order to recognize the use of water for irrigation in the summer, the residential sewer charge for the billing period between April 1 and November 31 is based upon the average water consumption during the months of January, February and March, plus 30%.

It should be noted that the MWS assesses an additional 10% surcharge to the calculated sewer bill to cover debt service associated with Tennessee Local Development Agency loans ("TLDA") loans. The TLDA loans and the revenues from the 10% assessment are excluded from this analysis, since they do not show up in the MWS budget and there is no specific debt service payment associated with these loans.

B. COST OF SERVICE ANALYSIS

The cost of service analysis is based on a detailed cost allocation model ("Model"), developed specifically for MWS. The Model was used to calculate average unit costs of service for water and wastewater customers. For water customers, we have used the cost of service methodology recommended in the American Water Works Association M-1 Rate Manual. For wastewater costs, a more general cost allocation approach was used to calculate an average unit cost or average cost per unit of billable wastewater flows. The M-1 Rate Manual specifies that a Test Year be established using revenue requirements, or the total cost of operating the system in that year. Revenue requirements include operating costs, indirect and overhead costs, debt service costs, and other cash needs associated with ongoing capital investment (i.e. cash funded capital outlays and contributions to reserves). The MWS's fiscal year 2004 budget and 2004 CIP were used to identify revenue requirements to be recovered from water and wastewater user charges. (In most cases, the Test Year is based on the most recent year of actual costs and expenditures available for a utility. However, for MWS, the 2004 fiscal year represented the first year that the full impact of the transfer of Stormwater costs and the adjusted LOCAP allocation were reflected in the MWS cost structure. As a result, the FY 2004 budgeted costs are expected to be more consistent with the future level of revenue requirements than prior year information.)

Revenue Requirements

Revenue requirements include all costs incurred by the MWS such as operating and maintenance costs ("O&M") and capital costs, plus other recurring cash needs for capital expenditures. The MWS's 2004 budget, which totals $82.88 million was entered into the Model and used as the Test Year for O&M costs. The budget was adjusted to also include the allocated overhead amount, LOCAP, of $4.0 million, for services provided by Metro Government. Since the MWS prepares a combined water and wastewater budget, the budget was allocated between water and wastewater using various allocation factors either provided by MWS staff, based on water and wastewater operating system statistics, or using a composite allocation.

Capital costs include debt service costs and rate funded capital improvement projects. The MWS's existing and proposed debt service obligations includes revenue bonds and state revolving fund loans. (Debt service on TLDA loans was excluded since this is paid with revenues generated from the 10% surcharge applied to the sewer bill). The annual debt service cost for MWS was allocated between water and wastewater based on fixed asset information. Approximately 23% of all fixed assets are water system assets, compared to 77% of wastewater fixed assets. These percentages were used to allocate the debt service payments for revenue bonds and state revolving fund ("SRF") loans between water and wastewater.

The MWS's expenditures for capital improvement projects for both water and wastewater for FY 2004 are estimated to be $65.0 million which is to be funded with a combination of revenues from user rates and reserves in the extension and replacement ("E&R") Fund. It was assumed that $42.3 million of this would be funded directly through rates, since this amount was budgeted in the MWS's FY 2004 budget as a transfer to the E&R Fund. MWS' surplus from rates, after

direct expenses have been deducted, contributes directly to the E&R Fund to fund capital improvement projects. The remaining $22.7 million is assumed to be funded with existing reserves from the E&R Fund. The amount to be funded through rates, $42.3 million, was used as an estimate of the annual capital needs funded through rates for the Test Year. In order to allocate between water and wastewater, each project listed in the CIP was identified as either a water or wastewater project, and if a project cost pertained to both systems, the allocation based on fixed assets was applied. The resulting allocation of CIP project costs are $7.9 million (18.6%) for water projects and $34.5 million (81.4%) for wastewater projects.

As shown in the exhibit below, total revenue requirements for FY 2004 are 2% higher than they were in FY 2003 due to the addition of LOCAP and the inclusion of additional stormwater costs. The LOCAP amount was not included in the original FY 2004 budget, but was subsequently identified as an expense to be incurred in FY 2004.

Exhibit 1

Comparison of Revenue Requirements

	FY 2003	FY 2004	Difference
Revenue Requirements			
Operating Budget	$ 71,280,048	$ 78,903,800	11%
LOCAP		$ 3,973,085	
Debt Service			
Revenue Bonds	$ 49,295,490	$ 48,810,637	-1%
SFR Loans	$ 7,945,425	$ 7,063,532	-11%
CIP (Transfer to E&R Fund)	$ 49,997,660	$ 42,330,900	-15%
Transfer to Operating Reserve	$ 151,202	$ 331,508	119%
Total Revenue Requirements	$ 178,669,825	$ 181,413,462	**2%**

The total revenue requirements were then reduced by various revenue offsets, or revenues from charges and fees other than water and wastewater user charges to calculate net revenue requirements for each utility. The MWS provided projected offsets for FY 2004 which include revenues from such items as late payments fees, service initiation fees, private fire protection charges, investment earnings, extra strength surcharges, etc. In addition, revenues generated from water and wastewater wholesale charges were also treated as offsets. The offsets were identified as other charges collected on behalf of either the water or wastewater utility, and any offset that was not attributable to one specific utility was allocated based on the composite budget allocation. Net revenue requirements represent the amount to be recovered from retail user rates and charges, for each utility.

The calculation of net revenue requirements provides information necessary to determine of the water and wastewater utilities are independently self-sufficient. By comparing the calculated amount of net revenue requirement for water and wastewater, with the actual revenues generated from current rates and charges (as of FY 2004) for water and wastewater, it is apparent that the water utility is currently subsidizing the wastewater utility. As shown in Exhibit 2, actual water

revenues are adequate to cover the net revenue requirements for the water utility. However, actual sewer revenues are inadequate for recovering the sewer utility's net revenue requirements. Interest income and other income are allocated based on the proportion of total budget attributed to each utility and a change in this allocation could reduce the apparent level of the subsidy. The apparent shortfall in total revenues is mostly due to the difference in cash transfers to the E&R Fund. For the cost of service study, we have assumed a level of cash transfers sufficient to address the full cost of operating the utility, including adequate funding for significant, multi-year capital improvement expenditures, as identified in the current CIP. In practice, actual transfers to the E&R Fund are based on cash generated from rates after all other direct expenses have been covered for the year, which is less than the amount needed to fully address the capital needs identified in the CIP. In other words, without an increase in the level of rate funded contributions to the E&R Fund, the projected funds available in the existing E&R Fund will not be sufficient to address the current (five-year) CIP.

Exhibit 2

Calculation of Net Revenue Surplus/(Deficit) per Utility

	Water	Wastewater	Total System
FY 2004 Budget Projections:			
Revenue Requirements			
O&M Expenses	$ 30,971,215	$ 51,905,670	$ 82,876,885
Debt Service	13,074,556	42,799,614	55,874,169
CIP	7,869,017	34,461,883	42,330,900
Transfers	123,885	207,623	331,508
Total Revenue Requirements	**$ 52,038,672**	**$ 129,374,789**	**$ 181,413,462**
Less Revenue Offsets:			
Wholesale Rates	(3,676,196)	(5,499,649)	(9,175,845)
Interest Income	(4,328,921)	(7,254,979)	(11,583,900)
Other Income	(2,062,338)	(3,492,580)	(5,554,918)
Total Revenue Offsets	**$ (10,067,455)**	**$ (16,247,208)**	**$ (26,314,662)**
Net Revenue Requirements	**$ 41,971,218**	**$ 113,127,581**	**$ 155,098,799**
Budgeted Revenue (1)	$ 59,363,213	$ 89,194,427	$ 148,557,640
Surplus/(Shortfall)	**$ 17,391,995**	**$ (23,933,154)**	**$ (6,541,159)**
Projected FY 2004 Billable Flow (ccf)	26,158,123	25,458,426	51,616,549
Average Unit Cost of Service (per ccf)	$1.60	$4.44	$3.00
Average Revenue per Billing Unit (per ccf)	$2.27	$3.50	$2.88

(1) From volume rates and minimum charges.

The average unit cost of service is not the same as a billing rate or volume charge, and can not be compared directly to existing rates and charges. For example, the current rate structure includes both a minimum and volume charges that are different for each customer class. In addition the base charges vary by meter size. In comparison, the average unit cost of service rolls all of the costs associated with providing service to each class into a single measure, or average rate, based on total volume billed to each customer class. As a result, direct comparisons between the average unit cost of service and a particular rate or charge are not valid. However, the proportional, or percentage differences, between the average cost of service between various customer classes, can be compared to the proportional relationships among existing rates to evaluate whether those rates are consistent with actual cost of service among and between customer classes, as discussed in more detail in the following sections.

Methodology for Calculating the Water Unit Cost of Service by Customer Class

Once the net revenue requirements are allocated between each utility, an average unit cost is calculated using the cost allocation process used for establishing cost of service-based rates. The basic methodology used to conduct a water cost of service analysis involves the allocation of revenue requirements to each customer class using a two step process. The first step involves allocating the costs to functional areas of operations and the second step involves the allocation of these costs to each class based on the patterns of demand and usage demonstrated by each class. The resulting average unit cost of service for each class provides information on the level of rate differentials that can be cost justified among the various customer classes.

Once the net water revenue requirements were identified, the next step in the cost of service methodology is to allocate the Test Year revenue requirements for water into the following functional categories:

- Treatment,
- Transmission,
- Distribution,
- Storage,
- Customer Service/Billing,
- Meters, and
- Administration/General.

The water Test Year revenue requirements were allocated to the functional categories listed above based on allocation factors developed by Staff, composite allocations, or fixed asset information. The majority of the operating budget was allocated based on input from MWS staff related to specific system operating characteristics and/or data generated from the billing system. Debt service and CIP revenue requirements were allocated based on fixed asset information. In addition, RFC and MWS staff reviewed each revenue requirement line item for the Test Year to ensure that the appropriate allocation percentage was applied. Exhibit 3 below shows the results of this allocation.

Exhibit 3

Functionalization of Revenue Requirements

Functional Categories	Allocation	
Treatment Plant	$	12,684,789
Transmission	$	5,269,049
Distribution	$	19,511,412
Storage	$	1,502,577
Customer Service & Billing	$	2,203,457
Meter	$	799,933
Total	**$**	**41,971,217**

Once the costs were allocated to functional categories, system peaking factors were used to allocate these costs to base capacity, max day, and max hour categories. Peaking factors are a measure of the variability of water usage over time. Demand levels change with the season (max day demand) and during the day (max hour demand). Water systems must be designed and constructed to meet maximum demand levels in order to maintain the integrity of the system and provide uninterrupted service. Different functional components of the system are designed to meet different peak demands. For example, the treatment plants are designed to base demand and meet maximum day demand levels, whereas the transmission and distribution components must be sized to meet maximum hourly fluctuations, in addition to base demand and max day demand. System storage is primarily designed to meet max day and max hour requirements. The max day factor is simply the ratio of maximum day usage, measured as maximum day water production at the treatment plants, divided by average daily production for the year. Daily peaking information, based on plant-wide production numbers, was obtained from the MWS's engineering staff. The estimated max day system peaking factor is 1.4 and the estimated max hour system peaking factor is 1.71. These system peaking factors were then used to determine the allocation between base, max day, and max hour. Exhibit 4 below shows the results of this allocation.

Exhibit 4

Categorization of Revenue Requirements

Functional Category	BASE	MAX DAY	MAX HOUR	Customer Service/Meters
Treatment Plant	$ 9,060,563	$ 3,624,225	$ -	$ -
Transmission	$ 3,763,606	$ 1,505,443	$ -	$ -
Distribution	$ 11,423,543	$ 4,569,417	$ 3,518,451	$ -
Storage	$ -	$ 879,729	$ 622,848	$ -
Customer Service/Billing	$ -	$ -	$ -	$ 2,203,457
Meter	$ -	$ -	$ -	$ 799,933
TOTAL	**$ 24,247,713**	**$ 10,578,814**	**$ 4,141,299**	**$ 3,003,390**

Total Base, Max Day, Max Hour	**$ 38,967,826**
Total including Customer Service/Meters	**$ 41,971,217**

Certain functional categories such as customer service/billing costs, and meter costs are not allocated to the base, max day or max hour categories. Instead these costs are separated and are assumed to be recovered directly from the monthly minimum charge. As a general practice, the monthly base or minimum charge is typically set to recover specific categories of cost required to service customer accounts, and other similar functions, that are not directly related to the delivery and use of water or wastewater. These types of costs do not vary with consumption, are basically fixed, and are, therefore, appropriately recovered through a fixed charge. Since MWS already has a minimum charge in place for both water and sewer, the customer service, billing and meter costs were excluded from the cost of service allocation to the volumetric rate component of the rate structure.

The next step includes further allocating the base, max day, and max hour costs to each customer class to determine the revenue requirements to be recovered by the volume charge for each customer class. It is not unusual for cities to lack peaking factor information for each customer class, particularly estimates of max hour factors, since acquiring this information requires the installation of special meters for prolonged periods to measure the usage patterns of different customer classes. In the absence of measured capacity factors, it was necessary to develop capacity factors based on existing billing system data and plant production data. RFC developed estimates of these factors using procedures outlined in the AWWA M1 Rate Manual. In particular, the process involved using customer class monthly peaking data (from billing information) and certain adjustments typical of the existing customer classes to develop appropriate factors.

Base capacity costs are allocated to each customer class based upon the percentage of total billable flow attributable to each class. In order to allocate max day and max hour costs, the proportion of total usage is adjusted, or scaled, using the specific max day and max hour peaking factors developed for each class. As a result, classes demonstrating larger peak day and peak hour factors are allocated a proportionally larger share of the max day and max hour costs.

Exhibit 5 provides a summary of the peaking factors developed for each customer class and the resulting allocation factors applied to each category of costs. Exhibit 6 shows the results of applying these factors to calculate the total cost allocated to each customer class.

Exhibit 5

Allocation Factors for Customer Classes

Customer Class	Annual Usage (100 cf)	% of Usage (Allocation of Base Costs)	Max Day Peaking Factor	Max Day Allocation Factors	Max Hour Peaking Factor	Max Hour Allocation Factors
Residential	10,286,964	35.1%	1.90	30.0%	3.15	44.9%
Small Commercial	820,119	2.8%	2.10	2.9%	3.15	3.0%
Intermediate Commercial	10,841,949	37.0%	2.20	42.1%	3.10	34.1%
Large Commercial	7,343,328	25.1%	2.05	25.0%	2.75	18.0%
	29,292,361	100.0%				

Exhibit 6

Allocation of Costs by Customer Classes

Cost Category	Cost	Residential	Small Commercial	Intermediate Commercial	Large Commercial
BASE	$ 24,247,713	$ 8,515,372	$ 678,880	$ 8,974,779	$ 6,078,681
MAX DAY	$ 10,578,814	$ 3,171,554	$ 309,038	$ 4,456,880	$ 2,641,342
MAX HOUR	$ 4,141,299	$ 1,860,784	$ 124,613	$ 1,412,045	$ 743,857
Total	**$ 38,967,826**	**$ 13,547,710**	**$ 1,112,532**	**$ 14,843,705**	**$ 9,463,880**
% of Total Allocated to Customer Class	**100.0%**	**34.8%**	**2.9%**	**38.1%**	**24.3%**

Average Water Unit Cost of Service

The costs allocated to each class are then divided by total consumption to determine an average unit cost of service for volume costs for each customer class. FY 2003 actual billable consumption was obtained from MWS staff. Historical water usage for each customer class and in total was reviewed for FY 2001 through FY 2003. Total consumption over this three-year period fell approximately 3% in FY 2002 and 0.6% in FY 2003. Residential consumption decreased by an average of 2.8% per year while consumption for the commercial classes decreased significantly in 2002 but had modest increases in 2003. As a result, it was determined that consumption should not be escalated in order to project FY 2004 consumption. Therefore, FY 2003 consumption was used to determine the water volume unit cost.

Exhibit 7

Calculated Average Unit Cost Per Customer Class for Water

Customer Class	Water- Calculated Average Unit Cost of Service - (Volume)
Residential	$1.32
Small Commercial	$1.36
Intermediate Commercial	$1.37
Large Commercial	$1.29

As noted previously, the average unit cost of service is not the same as an actual volumetric rate used to calculate monthly bills. However, the ratio of these average unit costs of service among the customer classes identifies the level of the rate differential that can be cost justified based on this analysis. The calculated unit cost differential is compared to the existing volume rate differentials, where the differential is measured as the ratio of each rate (calculated and actual) to the respective residential rate. As shown in Exhibit 8, it appears that the residential and small commercial classes are subsidizing the intermediate and large commercial customers. The actual differential for the small commercial class is higher than the calculated differential, indicating over-recovery from this class. The actual differential for the intermediate and large commercial customers is lower than the calculated differential, indicating under-recovery from these classes. In addition, since the actual differentials for the intermediate and large commercial are significantly lower than the calculated differential, this implies that both the residential and small commercial are subsidizing the other two classes (i.e. are over-recovering their share of revenues).

Exhibit 8

Calculated Differentials and Average Unit Cost

Customer Class	Ratio of Calculated Average Unit Costs	Ratio of Current Volume Rates	Recovery of costs
Residential	1.00	1.00	over
Small Commercial	1.03	1.06	over
Intermediate Commercial	1.04	0.92	under
Large Commercial	0.98	0.78	under

Although it is not clear how these rate differentials were originally established, the existence of this apparent inequity among customer classes in not unusual if these relationships and rate differentials are not reviewed and adjusted periodically, which is the case for MWS. The information generated by the cost of service analysis can be used to ensure that future rate adjustments are designed to provide more equitable cost recovery.

To determine the amount of the over or under-recover of costs for each customer class, actual revenues generated from each customer class for FY 2004 were used in conjunction with the resulting ratios from the cost of service analysis. Assuming that the total revenues generated by the water volume charges remained unchanged (i.e. revenue neutral), a shift to rates consistent with the cost of service analysis would result in less revenues collected from residential and small commercial customers, and more revenues collected from intermediate and large commercial customers, as summarized in the exhibit below.

Exhibit 9

Estimated Over and Under-Recovery of Water Revenues

Water	**Actual '04 Water Volume Revenues**	**Revenue Reqmts. Allocated by COS Results**	**Over/(Under) Recovery**	**Impact Per Customer (annual)**
Residential	$ 16,449,970	$ 14,684,480	$ 1,765,490	$ 13.56
Small Commercial	$ 1,366,665	$ 1,180,119	$ 186,546	$ 21.06
Intermediate Commercial	$ 18,764,421	$ 18,918,533	$ (154,112)	$ (27.40)
Large Commercial	$ 14,331,133	$ 16,129,058	$ (1,797,925)	$ (20,866)
	$ 50,912,189	$ 50,912,189	$ -	

Methodology for Wastewater Unit Cost of Service

The process for developing a cost of service analysis for wastewater costs is, typically, much more straight-forward than the methodology used for developing a water cost of service analysis. In general, wastewater systems are not sized and designed around the necessity of meeting peak day and peak hour demands caused by customer usage patterns. Wastewater systems are designed around average flow requirements, and peak flows driven by wet weather or storm events, rather than by customer demands. As a result, there is less emphasis in identifying differences in the cost of service among customer classes. Instead, emphasis is placed on segregating costs between general functional categories for treatment and disposal, collection system, and customer service related costs.

For treatment and disposal costs, as long as the wastewater is of normal strength or concentration, these costs are the same for all customers. For those customers that do have high strength wastewater, the high strength surcharges are intended to capture the incremental costs associated with treating this wastewater, such that the average or normal customer is not impacted by these incremental costs.

For collection system costs, a key issue is identifying costs associated with wet weather events. For the Department, these costs are attributable to a number of factors, including inflow and infiltration ("I&I") issues, combined sewer systems, and the fact that stormwater is operated as a component of the wastewater utility. Costs associated with addressing I&I problems and treating additional water entering the collection system as a result of I&I are a function of a number of factors that affect the whole system. As a result, these costs are generally recovered on a pro-rata basis from all customers through the volume charge. Similarly, costs associated with combined sewer systems, although attributable to certain areas or locations where these systems exist, are not impacted by customer classification, or any class specific customer attributes, and again, are typically recovered through the volume rate. As an alternative, it is possible to develop rates or surcharges that are applied to specific areas or zones of a system where combined sewer systems exist, to recover a portion of the costs associated with correcting this problem. However, the costs of implementing and administering this type of rate structure can be significant. In addition, as combined sewer systems are eliminated, all customers benefit, since this results in additional capacity available to serve all customers and accommodate growth.

For stormwater costs, the current situation for the Department is that these costs are allocated to wastewater operations, and the assumption is that these costs are to be recovered from wastewater user rates and charges. The cost allocation model is built around this assumption. Again, there is no reasonable cost basis for allocating these costs differently to different customer classes, as long as these costs are recovered primarily from wastewater user rates and charges.

For the reasons discussed above, the most common rate structure used for wastewater is a uniform volume rate or charge that is the same for all customers and that is designed to recover all costs associated with the normal operation and maintenance of the collection system and treatment plants. Customer service related costs are typically recovered from a base or minimum charge, rather than a volume charge. Not all utilities have a uniform volume charge for wastewater. Differences in volume rates are typically based on specific operational cost differences due to location (for example, inside-city and outside-city customers) or based upon specific treatment plants serving one drainage basin versus another, rather than customer classes based on usage levels. Rate differentials may also be implemented based on broader policy objectives, such as encouraging economic development. In any event, differences in cost of service among general customer classes served throughout a system (no geographic separation of

customer classes) typically do not provide a reasonable basis for developing separate rates for broad classes of customers. As a result, the main objectives for our analysis are to provide information as to the relative costs associated with the main functional categories of wastewater operations, and to assess whether current rates and charges for wastewater service are recovering the total revenue requirements for wastewater operations.

The wastewater revenue requirements and offsets were allocated to functional categories using allocation percentages provided by MWS staff or composite allocation factors. The functional categories are as follows:

- Treatment,
- Disposal,
- Collection,
- Customer Service/Billing/Meter Reading,
- Admin & General, and
- Stormwater.

Similar to the methodology used for allocating the water revenue requirements, the wastewater revenue requirements were allocated to functional categories based on information provided by MWS staff, system characteristics, or composite allocation factors. Based on the functional allocation, as shown in exhibit 11, it was determined that approximately $8.7 million in operating and maintenance costs are attributable to stormwater. These costs were separated out so that an average unit cost could be calculated including and excluding stormwater costs. The objective for this exercise was to provide information about the impact of stormwater costs on the total costs for operation of MWS and on the wastewater unit cost of service. Exhibit 10 shows the results of the allocation to functional categories.

Exhibit 10

Allocated Wastewater Net Revenue Requirements

Functional Category	Cost
Treatment, Disposal, & Collection	$ 100,460,396
Customer Service/Billing	$ 3,433,474
Meters & Maintenance	$ 570,143
Stormwater	$ 8,663,575
TOTAL	**$ 113,127,589**

Wastewater flow does not experience the same customer driven max day or max hour peaks as water, as a result, wastewater unit costs are usually the same regardless of customer class. Therefore, a unit cost was not calculated per customer class. Instead an average unit cost was calculated for the entire system. Consistent with the water cost of service analysis, costs for billing, customer service and meters were excluded since these costs are assumed to be recovered from the minimum charge. The wastewater volume revenue rate requirements were divided by wastewater flows to determine an average unit cost as shown below. Similar to the trends in water flow, wastewater flows has not increased significantly over the past two years (if wholesale flows are excluded). Wastewater flows decreased in FY 2002 by approximately 1.2% and slightly increased (0.6%) in FY 2003. Therefore projected wastewater flows for FY 2004 were assumed to remain level, at FY 2003 levels.

As shown below in Exhibit 11, the calculated unit cost (when customer service/billing and meter maintenance costs are excluded) is $4.29.

Exhibit 11

Calculated Average Unit Cost for Wastewater

	Volume Revenue Requirements
Net Revenue Requirements	**$ 109,123,971**
Total Consumption	**25,458,426**
Calculated Wastewater Average Unit Cost (per ccf)	**$ 4.29**

The costs associated with the transmission and treatment of wastewater are not significantly impacted by demand patterns or other factors that vary by customer class. As shown below in Exhibit 12, the rate differentials derived from the current wastewater volume rates show a significant discount for large commercial customers, compared to residential customers, with small commercial customers paying a premium. The implication is that residential and small commercial customers are subsidizing intermediate and large commercial customers. Any future rate adjustments should include consideration of an objective to reduce the current rate differentials and move toward a uniform wastewater volume rate for all customers.

Exhibit 12

Calculated Rate Differential - Wastewater

Customer Class	Current Rates	Calculated Rate Differential
Residential	$3.76	1.00
Small Commercial	$4.21	1.12
Intermediate Commercial	$3.43	0.91
Large Commercial	$2.59	0.69

Exhibit 13 shows the impacts among the existing customer classes assuming a shift to a uniform volume rate, and assuming total revenues generated from wastewater volume rates remain unchanged.

Exhibit 13

Estimated Over and Under-Recovery of Wastewater Revenues

Wastewater	Actual '04 Wastewater Volume Revenues	Revenue Reqmts. Allocated by COS Results	Over/(Under) Recovery	Impact Per Customer (annual)
Residential	$ 23,072,777	$ 20,406,327	$ 2,666,450	$ (19.88)
Small Commercial	$ 2,234,622	$ 1,731,827	$ 502,795	$ (59.51)
Intermediate Commercial	$ 30,278,926	$ 28,823,700	$ 1,455,226	$ (280.75)
Large Commercial	$ 17,845,684	$ 22,470,156	$ (4,624,472)	$ 56,168
	$ 73,432,009	$ 73,432,009	$ -	

III. WHOLESALE COST OF SERVICE ANALYSIS

A. BACKGROUND

Metro Water Services ("MWS") currently provides service to one water wholesale customer and ten sewer wholesale customers. The water customer's present rate structure is based on the intermediate commercial customer class, which is composed of a base charge and a volume rate. The ten sewer customers are charged based upon a variety of wholesale rates and rate structures. Six of the ten sewer wholesale customers are trunk and treatment wholesale customers, who are participating entities in the Nashville 201 Facilities Plan. These customers' current wholesale rate is based on a contract methodology that was put into place March 2, 1978. The rate for the trunk and treatment customers is updated annually, based upon allocation factors established in the original contract, to reflect increases in O&M costs and certain capital costs, as well as a debt service component. Of the four remaining sewer wholesale customers, both the City of Mount Juliet and the City of Ridgetop have rates that are pre-set in their individual contracts, and are adjusted annually based on the change in the Consumer Price Index ("CPI"). The City of Goodlettsville has a sewer wholesale rate based on a percentage of MWS' rates. The White House Utility District's wholesale rate is based on the large commercial customer class rate, which is composed of a base charge and a volume rate. Exhibit 14 outlines MWS's list of wholesale customers and the details of the various contracts.

A large disparity exists between the sewer wholesale contracts, and the need to examine this disparity has become apparent as MWS has continued to grow and add wholesale customers. Conversely, as MWS has continued to acquire other water utilities as opposed to maintaining wholesale relationships with them, the number of wholesale water customers has decreased. As a result of the changing nature of MWS's relationships with its wholesale customers, the need to calculate a cost of service based rate to serve these wholesale customers has become imperative.

Exhibit 14

Wholesale Contracts

Water					
City	**Contract Type**	**Contract Expiration**	**Time Required to End Contract**	**Annual Revenues**	**Present Rate Structure**
Brentwood	Tariff	March 20, 2021	Written Notice to be effective in 4 years	$965,098	Intermediate Commercial Customer
Wastewater					
City	**Contract Type**	**Contract Expiration**	**Time Required to End Contract**	**Annual Revenues**	**Present Rate Structure**
Bell Meade	Trunk and Treatment	Open	60 Day Written Notice to be effective in 1 year	$72,500	T&T Rate
Brentwood	Tariff	12/31/2000, month to month	Written Notice to be effective in 4 years	$1,355,600	T&T Rate
Goodlettsville	Wholesale	June 7, 2007	Written notice if violating Metro's Industrial Waste Code	$936,854	41% Metro's Sewer Rates
Hendersonville	Trunk and Treatment	Open	60 Day Written Notice to be effective in 3 years	$1,288,700	T&T Rate
Millersville	Trunk and Treatment	Open	60 Day Written Notice to be effective in 1 year	$79,700	T&T Rate
Mount Juliet	Wholesale	June 22, 2029	Not addressed	$1,058,000	Rate based on CPI
LaVergne	Trunk and Treatment	Open	60 Day Written Notice to be effective in 1 year	$510,500	T&T Rate
Old Hickory	Trunk and Treatment	Open	90 Day Written Notice to be effective in 3 years	$312,400	T&T Rate
Ridgetop	Wholesale	September 30,2031	Not addressed	$34,600	Rate based on CPI
White House	Tariff	October 1,2016	Mutual Written Consent of Parties	$217,600	Tariff

B. DEVELOPMENT OF WATER AND WASTEWATER WHOLESALE RATES

One of the objectives for this study is to develop a methodology for setting wholesale rates that can be applied consistently to all wholesale customers. The recommended methodology is designed to be consistent with industry guidelines for setting wholesale or bulk customer rates. This methodology is based on the Utility Approach to rate setting. The Utility Approach is typically used to calculate utility rates by private sector service providers (i.e. investor-owned utilities) regulated by public service commissions or similar agencies. However, the Utility Approach is also used by government-owned utilities to determine outside-city rate differentials and to calculate wholesale rates since it provides a more effective methodology for compensating the utility for the risk associated with providing service to "non-owners" of the system. The Utility Approach looks at two primary cost components:

1. An operation and maintenance component ("O&M") which includes an allocated share of direct costs for operation O&M of the assets used to provide water/sewer service to wholesale customers;
2. A capacity component which includes a rate of return applied to an allocated portion of the investment in assets used to serve wholesale customers, and an allocated portion of the depreciation expenses associated with these assets.

The above mentioned components are allocated to the wholesale customers based on their pro rata share of usage, as determined from an analysis of historical flows. Each of these components is discussed in more detail below.

O&M Component

To determine the O&M component of the water and sewer wholesale rates, budgeted FY 2004 O&M costs, including general, administrative and overhead costs, but exclusive of debt service costs, capital outlay, and CIP projects, were allocated between water and sewer. O&M costs for water and sewer, separately, were then allocated between three categories of costs:

1. Joint costs – Includes costs for the operation of facilities that provide benefit to both wholesale and retail customers. Typically this would include costs associated with the operation of all core system assets including water source of supply, treatment, and major transmission lines and wastewater treatment, major collection lines, and pump stations.
2. Retail costs – Includes costs for the operation of system components that generally do not benefit wholesale customers. This would include costs associated with local service water distribution lines and water storage tanks (reservoirs) used to pressurize local distribution systems (unless wholesale customers also take advantage of these tanks), and also costs associated with local service sewer collection lines.
3. Account costs – Includes costs associated with customer service, billing and collection, meter reading and other costs required to service individual accounts. The per bill

amounts of these costs were determined to be negligible and not considered in calculating wholesale rates.

The sum of the allocated "joint" costs was divided by total projected billable flows, including both wholesale and retail billable flows, to calculate a unit rate for O&M costs attributable to both wholesale and retail service. The projected O&M costs are summarized below in Exhibit 15:

Exhibit 15

Wholesale Cost Calculation –O&M Component

Type of Costs	Water	Sewer
Total O&M Joint Costs	$20,628,328	$37,580,668
Total Billable Flows (100 cubic feet)	29,804,317	36,288,133
O&M Cost per 100 cubic feet	**$0.69**	**$1.04**

Capacity Component

The capacity component of the wholesale rate incorporates both the return on assets calculation and the recovery of an allocated portion of depreciation expense. The return on assets component is intended to compensate MWS for risk incurred to reserve a portion of its total system capacity for wholesale customers, or "non-owners" of the system. The portion of the depreciation expense is designed to reimburse MWS for the use of the assets by the wholesale customers.

Return on Assets

The return on assets is calculated by multiplying a rate of return factor times the value of the assets used to serve wholesale customers. The asset value in our analysis is based on the original cost less depreciation ("OCLD"), or net book value ("NBV"). MWS provided a detailed list of both the water and sewer system assets and the annual depreciation expense associated with the assets. This information was used to determine the NBV of those assets which are used to provide service to wholesale customers.

Whereas the OCLD approach provides the most appropriate measure for the value of the existing assets, it is also important to address the value of on-going capital investments, particularly those expenditures already made, but not yet booked to fixed assets, as measured primarily by Construction Work In Progress ("CWIP"). CWIP was provided by MWS to be included in the allocation of assets to the wholesale customers since this represents a significant investment in utility assets. Contributed Capital was deducted from the assets and CWIP, since it would not be appropriate to earn a return on assets not paid for by MWS. The objective is to develop an estimate of the total value of the assets that are used to provide service to wholesale customers,

that were contributed by, or paid for by MWS, and ultimately by MWS's retail customers, who are the "owners" of the system.

Once the value of the assets is identified using the OCLD approach, the next step is to allocate those assets between those that benefit both wholesale and retail customers and those that benefit only retail customers. For water, the water treatment plant assets, the reservoir and pump station assets, and the transmission main assets provide benefit in delivering service to the wholesale customer. Since the one wholesale water customer is fully integrated into the retail distribution system and relies on MWS to pressurize its system, it is appropriate to include cost for reservoirs (tanks) in with those assets providing benefit in delivering service to the wholesale customer. All other water assets (such as the distribution lines) were not included since these assets do not provide direct benefit in delivering service to the wholesale customer. The total OCLD value of water core assets associated with water production, storage and transmission is approximately $119.2 million including CWIP. Contributed Capital is $6 million. The allocated costs ($113.2 million) are then multiplied by the proportion of the wholesale customers' flows versus total system flows. For FY 2003, that proportion was 2.0%, resulting in approximately $2.3 million in OCLD value attributable to the wholesale customer.

For wastewater, the wastewater treatment plant assets, sludge management and odor control, pump station assets, and sewer trunk lines and large force mains benefit wholesale and retail customers, while all other wastewater assets do not provide benefit in delivering service to wholesale customers. The total OCLD value of sewer core assets associated with sewer treatment and transmission is $414.4 million including CWIP. Contributed Capital is $113.7 million. The allocated costs ($300.7 million) are then multiplied by the wholesale customers' proportion of sewer flows as compared to the system. For FY 2003, this percentage was 25.9%, resulting in approximately $77.9 million in OCLD value for wholesale customers.

The next critical factor is to determine a rate of return to apply to these asset values. The rate of return is set equal to the weighted average cost of capital ("WACC"). The WACC considers both the cost of debt and the cost of equity.

Exhibit 16 shows the calculation of WACC and the resulting rate of return used to calculate the return component used in the wholesale analysis.

EXHIBIT 16 WACC - RATE OF RETURN	
COST OF DEBT CAPITAL	
MWS Weighted Average Cost of Debt (1)	5.7%
COST OF EQUITY CAPITAL	
Risk Free Rate - Long-Term U.S. Treasury Bond Yield (2)	4.80%
Equity Risk Premium (2) times Beta (3) (7.0% * 0.55)	3.85%
Small Company Risk Premium (2)	1.48%
Specific Company Risk Premium	0.00%
Total Buildup of Cost of Equity Capital	**10.13%**
DEBT STRUCTURE (4)	
Debt as Percentage of Capital	36.52%
Equity as Percentage of Capital	63.48%
WEIGHTED AVERAGE COST OF CAPITAL (WACC)	
Weighted Cost of Debt	2.09%
Weighted Cost of Equity	6.43%
Weighted Average Cost of Capital	**8.52%**

(1) MWS weighted average cost of debt based on outstanding bond issues listed in Official Statement for the MWS Series 2002 Bonds.

(2) Key Variables in Estimating the Cost of Capital, SSBI Valuation Edition 2003 Yearbook (based on 2002 data).

(3) Value Line's Sample Water Industry Report, October 31, 2003.

(4) Department of Water and Sewerage Services, The Metropolitan Government of Nashville and Davidson County Financial Statements, June 30, 2003.

Since MWS does not issue stock, there is no clear cost of equity for MWS. Therefore, the cost of equity for the water utility marketplace must serve as a proxy for the cost of equity for MWS.

The cost of equity is comprised of several components, including a risk-free rate of return plus various risk premiums. The risk free rate can be determined by looking at the yield on long-term U.S. treasury bonds. For this analysis, the risk free rate is assumed to be 4.80%. The beta is a measure of the volatility of the particular industry's returns as compared to the marketplace. Value Line's Sample Industry Report provides betas for publicly traded private water companies on a quarterly basis. Value Line's average beta, used for this analysis, is .55. The return on risk associated with investing in equity (referred to as the equity risk premium) is 7.0%, which can be determined by comparing the return on equity investments versus the risk free rate. An analysis is performed by Ibbotson Associates each year that calculates the equity risk premium. They also calculate the return on the risk of investing in smaller companies (referred to as the small

company risk premium). For MWS, the risk associated with size has been estimated at 1.48%. No risk has been assigned to the specific company premium.

The calculated weighted average cost of capital or rate of return is 8.52%. This rate of return is then multiplied times the OCLD value for both water and sewer, respectively, to derive a return component of approximately $196,000 for water and $6.6 million for sewer.

Depreciation Expense

The depreciation cost component is calculated by determining the annual depreciation on each category of assets. The same percentages as used in the return on assets calculation were applied to the depreciation expense for each category of assets to determine the portion of the depreciation expense associated with assets that provide benefit to wholesale customers. The wholesale customers' pro-rata share of usage based on 2003 flows (2.0% for water and 25.9% for sewer) was applied in order to derive an annual depreciation cost component (approximately $113,800 for water and $4.7 million for wastewater) applicable to wholesale customers.

The total capacity cost for 100 cubic feet of water system capacity is shown below in Exhibit 17.

Exhibit 17

Wholesale Cost Calculation –Water Capacity Component

	$195,968	Return on Assets
+	113,781	Depreciation Allocated to Wholesale Customers
=	$309,749	Annual Capacity Cost

The annual capacity cost component is then divided by the total wholesale water flows to determine the actual capacity cost per 100 cubic feet ($309,749/ 360,873 = $0.86 per 100 cubic feet). The water capacity charge is determined to be $0.86 per 100 cubic feet.

For sewer, the same exercise yields a sewer capacity cost of $0.99 per 100 cubic feet. The annual capacity cost component divided by total wholesale sewer flows: $9,868,011 / 9,995,326 = $0.99 per 100 cubic feet, as shown below.

Exhibit 18

Wholesale Cost Calculation –Sewer Capacity Component

	$6,636,099	Return on Assets
+	$4,698,714	Depreciation Allocated to Wholesale Customers
=	$11,334,813	Annual Capacity Cost

The sum of the calculated capacity cost and calculated O&M cost per 100 cubic feet is the cost to serve wholesale customers. Exhibit 19 details the calculated wholesale costs.

Exhibit 19

Summary of Wholesale Cost Calculations

Type of Costs	Water	Sewer
Capacity Cost per 100 cubic feet	$0.86	$1.05
Calculated O&M Cost per 100 cubic feet	$0.69	$1.04
Wholesale Cost per 100 cubic feet	**$1.55**	**$2.09**

For those sewer wholesale customers (trunk and treatment customers under the 201 Facilities Plan) that have previously contributed capital upfront, their wholesale cost of service would just be the O&M component of the wastewater wholesale cost, which is calculated at $1.04. These customers have already contributed to the capacity charge portion of the wholesale cost.

C. COMPARISON OF CURRENT RATES VERSUS CALCULATED COSTS

The rate impacts of the calculated costs on the various wholesale customers are demonstrated in Exhibit 20 below. Rate impacts vary depending on the type of wholesale customer. The revenues generated from these wholesale customers in fiscal year 2004 is shown and compared to the estimated revenues that would be generated if the calculated wholesale costs were implemented. As shown, water revenues would be 0.7% lower, while sewer revenues would be approximately 108% higher.

Exhibit 20

Comparison of Present Rates versus Calculated Costs

City	Contract Type	Present Rate	Calculated Cost (6)	FY 2004 Revenues	Estimated Revenues Using Calculated Cost (5)
Water Wholesale Contracts:					
City of Brentwood	Tariff	$1.56	$1.55	$965,098	$958,000
Sewer Wholesale Contracts:					
City of Belle Meade	Trunk and Treatment	$0.43	$1.04	$72,500	$175,349
City of Brentwood	Trunk and Treatment	$0.43	$1.04	$1,355,600	$3,278,660
City of Goodlettsville	Wholesale	(1)	$2.09	$936,854	$1,314,111
Hendersonville Utility District	Trunk and Treatment	$0.43	$1.04	$1,288,700	$3,116,856
City of Millersville	Trunk and Treatment	$0.43	$1.04	$79,700	$192,763
City of Mount Juliet	Wholesale	$1.13 / $1.23 (4)	$2.09	$1,058,000	$1,873,915
City of La Vergne	Trunk and Treatment	$0.43	$1.04	$510,500	$1,234,698
Old Hickory Utility District	Trunk and Treatment	$0.43	$1.04	$312,400	$755,572
City of Ridgetop	Wholesale	$1.28 (2)	$2.09	$34,600	$56,495
White House Utility District	Tariff	$2.59 (2)(3)	$2.09	$217,600	$175,592
Total Sewer				**$5,866,454**	**$12,174,011**

(1) Madison Suburban Utility District bills Goodlettsville at MWS's sewer rates and remits 41% of collected revenues to MWS.

(2) A 10% surcharge for repayment of TLDA loans is also assessed, similar to MWS retail customers.

(3) A base charge is included based on an 8" sewer meter for the large commercial class.

(4) The rate charged varies based on the amount of billed wastewater flow.

(5) These represent estimated revenues and do not consider any limitations imposed by the existing contracts.

(6) Calculated costs are based on billable flows.

Additional information regarding MWS's wholesale rates as they compare to other comparable utilities can be found in Section VI of this report.

IV. DEVELOPMENT FEE CALCULATION

Development fees are defined as one-time capital recovery charges assessed against new development as a way to recover a proportional share of the cost of capital facilities constructed to provide service capacity for new development. Development fees are also referred to as "system development charges", "capital recovery charges", "facilities investment fees", "development impact fees", "capacity fees", etc. Development fees generally focus on recovery of a proportionate share of core system facilities, those facilities that are required to serve all customers, existing and new. These types of fees are typically used in areas experiencing high growth rates or in communities that want to manage their growth. The effect of development fees is to shift cost away from existing residents to those new residents responsible for creating the additional costs. MWS currently assesses a $500 sewer capacity fee and no water capacity fee.

Appropriate development fees must comply with the Rational Nexus test established in court cases. The Rational Nexus test requires that: 1) the need for development fees is a result of new growth; 2) the amount of the fee does not exceed the reasonable cost to provide capacity to accommodate growth; and 3) the funds collected must be adequately earmarked for the sufficient benefit of new customers required to pay the fee.

There are two approaches for calculating water and sewer development fees that are recognized in the industry as cost-justified[1] and meet the requirement of the "rational nexus" standard applied by the courts. The two approaches are the System Buy-In Approach and the Marginal Incremental Approach.

A. SYSTEM BUY-IN APPROACH

The System Buy-In Methodology is most appropriate in cases where the existing system assets provide extra capacity to provide service to new customers. This approach calculates a fee based upon the proportional cost of each user's share of existing plant capacity. The cost of the facilities is based on fixed assets records and usually includes escalation of the depreciated value of those assets to current dollars. All core assets that provide benefit to the general transmission/collection and treatment systems are included, such as water and sewer treatment plants, water reservoirs (storage tanks), major water transmission mains and sewer interceptors, and pump/lift stations. Excluded from the calculation are costs associated with local service lines that are dedicated to serving existing customers. In addition, all assets contributed by or paid for by developers, or assets that were grant funded, are excluded from the calculation since these costs were not "paid" by the existing customers. Also, outstanding principal on funds borrowed to construct the core assets is deducted in order to ensure that new customers are not

[1] See the AWWA manual M26 – Water Rates and Related Charges, Chapter 3: System Development Charges, pp.19-33.

being double charged for these costs, since this cost will be recovered from all present and future customers through retail rates which must be set to recover debt service costs.

B. MARGINAL/INCREMENTAL COST APPROACH

The second method used to calculate water and sewer capacity fees is the Marginal/Incremental Cost Methodology. This method focuses on the cost of adding additional facilities to serve new customers. It is most appropriate in a situation where existing facilities do not have available capacity to provide service to new customers, and the cost for new capacity can be tied to an approved CIP, or where additional capacity is currently being added and costs can be tied to an on-going construction program. It was determined that the Marginal/Incremental Cost Methodology was not the appropriate methodology to use for MWS's capacity fee analysis.

C. CALCULATION OF DEVELOPMENT/CAPACITY FEES

1. Water

The calculation of the water capacity fee for MWS is appropriately based on the System Buy-In Method. Although MWS is currently involved in expanding certain components of the water distribution system to address growth, most of the core system assets of MWS, particularly water treatment plants, have adequate capacity to serve new customers. The typical approach is to determine a development or capacity fee for new water customers based on the estimated investment in water treatment assets escalated to current dollars. In MWS's case, sufficiently detailed fixed asset information is not currently available to allow for escalating the values of individual assets to current dollars. Instead, the analysis is based on the replacement cost of the major system assets developed for insurance purposes. This replacement cost was then adjusted for the proportion of the assets original cost that has already been depreciated, as provided in the fixed asset records, to develop an estimate of the RCNLD value of core system assets. No replacement cost was available for water transmission lines, instead a more conservative estimate based on the original cost less depreciation was used for these assets. Construction Work in Progress (CWIP) to be completed before June 30, 2004 was also added to the escalated value of the existing fixed assets to determine the total value. The outstanding bond principal was credited against system value. This credit accounts for the fact that the payment for projects financed by bonds is collected through the monthly rates the customer will pay. These adjustments to the RCNLD value determine the total system value which the new customers are buying into. The total value is divided by the maximum capacity of the overall system (180 mgd) to determine a cost per gallon per day for the treatment and delivery of finished water. This cost per gallon per day represents an estimate of the value of the existing assets available to

serve new customers that these customers are being asked to "buy into". The cost per gallon per day for the MWS water system based on the System Buy-In Approach is $1.13.

The amount of the water capacity fee is calculated on the basis of a usage standard for a typical residential customer which is defined in terms of an equivalent dwelling unit (EDU). The number of gallons per day (GPD) of consumption for an EDU is calculated by using an estimate of the average usage per person (100 gallons per day) and multiplying it by the number of persons per household (3.5). [2] The result is then multiplied by a water loss factor (1.18) and system-wide peaking factor for customer usage (1.4) to calculate the GPD per EDU. Water facilities must be sized to meet peak periods of customer demand, including accounting for lost or non-billed water. The resulting GPD per EDU (578) is then multiplied by the cost per gallon to calculate the capacity fee for a residential customer, as shown in Exhibit 21.

Exhibit 21

Calculation of Water Capacity Fees for an Equivalent Dwelling Unit

GPD per person	100
Persons per household	3.5
Water Loss	1.18
System Peaking Factor	1.4
GPD per EDU	**578**

Cost per Gallon * GPD per EDU = $1.13 * 578 = $ 655

Costs for other customer types are based on meter capacity ratios calculated based upon the ratio of capacity provided by different meter sizes.

2. Sewer

The calculation of the sewer capacity fee for MWS is also based on the System Buy-In Method, for the same reasons, and using the same approach as described for the water capacity fee. Similar to the water capacity fee, the outstanding bond principal attributable to sewer, was credited against sewer system value. In addition, MWS also received state revolving fund loans (SRF) loans which were used to finance a variety of "core" sewer capital projects. The outstanding principal for these SRF loans was also credited against the sewer system value. These adjustments to the RCNLD value determine the total system value which the new customers are buying into. The total value is finally divided by the maximum capacity of the overall system (186.5 mgd) to determine a cost per gallon charge for buying into the system. The cost per gallon charge for the MWS sewer system based on the System Buy-In Approach is $0.98.

[2] Gallons per person (100), persons per household (3.5), and water loss factor (1.18) from MWS staff.

The amount of the sewer capacity fee is calculated on the basis of a usage standard for a typical residential customer, also defined in terms of an equivalent dwelling unit (EDU). The number of average gallons per day (GPD) of consumption for an EDU is calculated by using an estimate of the gallons of wastewater generated per person (70) and multiplying it by the number of persons per household (3.5)[3]. The result is then multiplied by the inflow and infiltration factor (1.365) to calculate the GPD per EDU. The resulting GPD per EDU (334) is then multiplied by the cost per gallon to calculate the capacity fee for a residential customer, as shown in Exhibit 22.

Exhibit 22

Calculation of Sewer Capacity Fees for an Equivalent Dwelling Unit

GPD per person	70
Persons per household	3.5
Inflow and Infiltration Factor	1.365
GPD per EDU	**334**

Cost per Gallon * GPD per EDU = $0.98 * 334 = $ 329

Costs for other customer types are based on meter capacity ratios calculated based upon the ratio of capacity provided by different meter sizes.

As discussed above, the water and sewer capacity fees are calculated on a per EDU basis. These fees are appropriate for a typical or average residential customer with a 5/8" meter based on actual system usage characteristics. For non-residential customers, water and sewer capacity fees are assessed based on meter size. The use of meter sizes provides an effective and easy way to capture the impact of different levels of demand for different types of customers. Customers with larger meters are assumed to place a larger potential demand on the utility system for water and sewer services. The capacity fees for larger meters are adjusted or increased based on the capacity of flow provided by each meter size relative to a 5/8" meter. Adjusting the capacity fees by meter size also encourages larger customers to properly size their meters consistent with realistic demand expectations. Properly sized meters result in more efficient and accurate metering.

The capacity fees for each meter size are calculated based on the ratio of meter capacity for each meter size compared to a 5/8" meter. Exhibit 23 provides a summary of the recommended water and wastewater capacity fees by meter size, which represent the maximum amount that could be cost justified. Note that the current flat capacity fee of $500 for wastewater only is less than the combined capacity cost (water and wastewater).

[3] Gallons per person (70), persons per household (3.5), and inflow and infiltration factor (1.365) from MWS staff.

Exhibit 23

Calculated Water and Sewer Capacity Fees by Meter Size

Meter Size	Meter Capacity Conversion Factor (1)	Water Capacity Fee (2)	Sewer Capacity Fee (2)	Combined Capacity Fees
5/8"	1.00	$ 655	$ 329	$ 984
¾"	1.50	983	494	1,477
1"	2.50	1,638	823	2,461
1 ½"	5.00	3,276	1,646	4,922
2"	8.00	5,242	2,633	7,875
2 ½"	11.00	7,207	3,621	10,828
3"	17.50	11,466	5,761	17,227
4"	30.00	19,656	9,875	29,531
6"	62.50	40,950	20,574	61,524
8"	80.00	52,416	26,334	78,750
10"	145.00	95,004	47,731	142,735
12"	215.00	140,867	70,774	211,641

(1) American Water Works Association Manual of Water Supply Practices – Water Meters – Selection, Installation, Testing, and Maintenance ("AWWA Manual M6")

(2) Maximum level that can be cost justified at the discretion of policy makers.

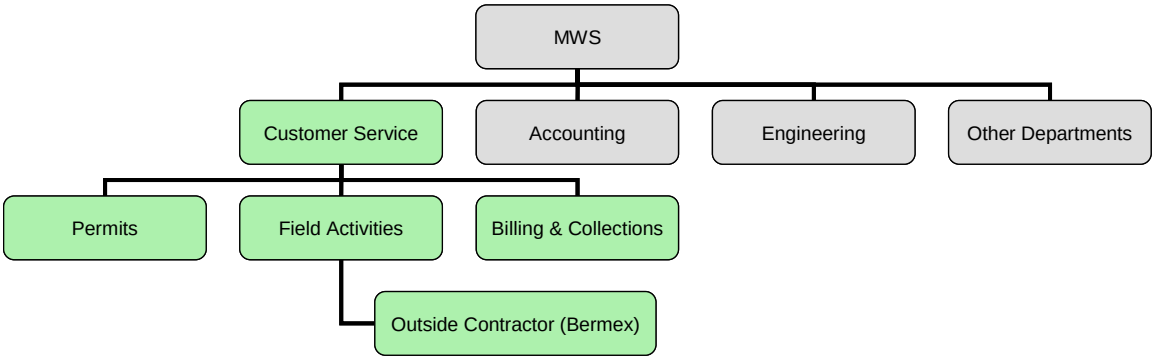
Additional information regarding MWS's capacity costs as they compare to other comparable utilities can be found in Section VII of this report.

V: MISCELLANEOUS COSTS

MWS receives revenues from fees assessed for various miscellaneous services such as turning on water service for new customers, late payment charges, disconnection of service, etc. As part of the cost of service analysis, RFC was charged with calculating the cost to provide each of these miscellaneous services. RFC's calculated costs serve as a check to MWS' current fees. In addition, a survey was conducted to compare MWS' current fees, and costs calculated by RFC, with the fees of comparable utilities (discussed in more detail in Section VII of this report). The results of the cost of service analysis for miscellaneous costs is discussed below. It should be noted that costs calculated using the cost of service methodology represent the maximum amount that could be justified for a service, but a lower fee may actually be charged due to policy issues in order to address other policy and pricing objectives. The results are segregated by the department within MWS responsible for providing the miscellaneous service, as shown below in Exhibit 24.

Exhibit 24

MWS Organizational Chart



A. SERVICES PROVIDED BY FIELD ACTIVITIES

Field activities performs several services which are as follows:

- Turn – ons: Turning on water service for new and existing customers;
- Straight lines: Removal of materials inappropriately used by water customers to tap into a line in order to bypass the meter and obtain water without paying for monthly metered water;

- Broken locks: Restoring locks which were installed on meters damaged or removed due to delinquency in water payments;
- Investigations per customer request: Determining the accuracy of meter readings that are being questioned by water customers;
- Flow test: Performing a flow test to determine if pressure is low due to the homeowner's plumbing or due to MWS' system;
- Vandalism: Replacing or restoring a meter that has been intentionally damaged;
- MXU Transceiver: Installing a radio read meter that provides automated meter reading capabilities; and,
- After hours charge: Performing any of the above services after normal operating hours.

Miscellaneous costs for services provided by field activities were calculated using a "bottom-up" approach. Personnel from field activities were interviewed to determine the amount of time spent on various activities and to discuss the tasks involved to complete each activity. A labor rate and overhead rate was provided by field activities for each activity and applied to the amount of time spent on each activity. The labor rates and overhead percentages vary based on the activities being performed and the personnel typically involved in those activities. In addition, the calculation included expenses, or an hourly expense rate, associated with travel (truck costs) and any materials and supplies typically used in conducting the activity such as coupling costs and meter costs.

Exhibit 25 below shows the current fees for miscellaneous services performed by field activities. RFC calculated costs to conduct each of these activities in order to gauge the accuracy of MWS' current fees for these services. In addition, the results of the miscellaneous fees survey are shown below for comparison purposes. As shown, the current fees are not recovering the expenses associated with each of these activities. Furthermore, the wide range of fees charged for these services as shown by the survey results indicate that fees for these services are highly variable and do not appear to be consistent with a cost of service based approach. Some of these fees may be kept artificially low due to policy issues.

Exhibit 25

Results of Miscellaneous Costs Provided by Field Activities

				Survey Results		
	Miscellaneous Fee	**MWS Current Fee**	**Calculated cost per order if meter set**	**Range**	**# of utilities that charge for this service**	**# of survey respondents**
	Turn-Ons	$25	$68	$5.00 - $49.50	8	8
	Straight Lines	$0	$142			8
	Broken Locks	$10	$98	$53 - $100	3	8
	Investigations per customer request	$0	$73	$10 - $95	4	8
	Flow Test	$0	$104	$60 - $90	2	8
	Vandalism	$0	$96	$50 - $100	4	8
	MXU	$0			0	8
(1)	After Hours Charge	$138	$239	$11 - 170	4	8

(1) On average, an employee spends 4 hours on an after hours call. Therefore, the per hour rate is $54.00. This charge is not assessed if the required work is the responsibility of MWS.

B. SERVICES PROVIDED BY BERMEX

Several activities associated with miscellaneous fees are outsourced to a company called Bermex, including reconnections for non-payments and notifies (or notification of service disconnection). MWS' customer service group will send work orders regarding these two activities to field services who then instruct Bermex to either notify a customer that their water service will be disconnected or reconnect water service after payment has been submitted by a water customer. Bermex charges MWS $13.54 for each reconnection and $5.77 for each notice. The calculated costs for these fees include the Bermex charges plus a cost for customer service activities based on an average labor rate and time associated with each activity. As shown in Exhibit 26, the current reconnection fees are comparable to those calculated in the cost of service study. It appears that the current fee to notify a customer of disconnection is closer to the calculated cost of service. It should be noted that very few utilities charge for notification of service disconnection as a separate fee.

Exhibit 26

Results of Miscellaneous Costs Provided by Bermex

			Survey Results		
Miscellaneous Fee	**MWS Current Fee**	**Calculated cost per order**	**Range**	**# of utilities that charge for this service**	**# of survey respondents**
Reconnect for Non-Payment	$15	$16	$10 - $45	8	8
Notifies	$15	$8	$1 - $20	2	8

C. SERVICES PROVIDED BY BILLING & COLLECTING AND ACCOUNTING

Several miscellaneous fees are charged for activities conducted solely by billing and collections or the accounting department. Billing and collections is responsible for producing duplicate copies of billing history upon a customer's request and for assessing a late payment charge for bills that are past due. Currently, billing and collections does not charge customers for duplicate copies of bill history. The calculated cost per order is approximately $3.50. Only one other utility in the survey assesses a fee for this service and the fee it assesses is significant ($20 to $40 depending on the amount of the bill).

MWS currently assesses a 5% penalty on any unpaid balance. Since the tracking and billing of late payment charges is mostly automated, the costs associated with handling a late payment charge are the same regardless of the amount of the bill. The only cost differential among bills is the amount of foregone interest. Since larger bills result in larger foregone interest earnings, a 5% late payment equally recovers the foregone interest. It should be noted that the majority of the utilities participating in the survey assess a 1.5% late payment charge.

Exhibit 27

Results of Miscellaneous Costs Provided by Billing & Collections and Accounting

			Survey Results		
Miscellaneous Fee	**MWS Current Fee**	**Calculated cost per order**	**Range**	**# of utilities that charge for this service**	**# of survey respondents**
Duplicate Bill History Charge	$0	$3	$20 - $40	1	8
Late Payment Charge	5% of unpaid balance	$0	1.5% - 5%	6	8
Returned Check Charge	$10	$25	$15 - $29	8	8

D. SERVICES PROVIDED BY THE PERMIT DEPARTMENT

The permits group is responsible for two miscellaneous fees – a second or more meter inspection and tap fees. Similar to the methodology for deriving the costs for the miscellaneous services performed by field activities, the cost of service for second or more meter inspections and tap fees is calculated using a "bottom up" approach. Personnel from the permits group were interviewed to determine the specific tasks or activities for second or more meter inspections and tap fees, as well as the time spent performing the tasks associated with each of these services. A labor rate and overhead rate for the permits group was applied to the time spent for each of the tasks, and materials costs were added into the charge as needed (truck costs). For tap fees, while the permits group performs the clerical work as well as the check to make sure that the work had been done correctly, the system services group performs the actual tap onto the line. A labor rate for the system services group and material costs (including the cost for the water meter) was applied in the same manner as the permits group's time in order to calculate the actual cost to perform the tap.

As shown in Exhibit 28, the calculated water tap costs are significantly higher than the current tap fees. The majority of the difference can be explained by meter costs.

Exhibit 28

Results of Miscellaneous Water Costs Provided by the Permit Department

			Survey Results		
Miscellaneous Fee	**MWS Current Fee (1)**	**Calculated cost per order if meter set**	**Range**	**# of utilities that charge for this service**	**# of survey respondents**
2nd Meter Inspection	$0	$42			8
Water Tap Fee/Connection			$35 - $12,000	8	8
5/8"	$250	$428			
3/4"		$447			
1"	$350	$470			
1 1/2"		$602			
2"		$703			
3"	$450	$1,588			
4"	$1,000	$2,354			
6"	$1,500	$4,043			
8"	$2,000	$8,774			
10"	$3,000	$12,188			

(1) The current fee schedule did not provide tap fees for 3/4", 1 1/2" or 2" taps.

Sewer tap costs for 4” and 6” taps were calculated using a similar methodology as that used to calculate water tap costs, excluding the cost for the meter. As shown below, the resulting tap costs for 4” and 6” taps is $225, which is lower than the current sewer tap fee of $500. All sewer taps greater than 6” should be charged based on actual costs (time and materials).

Exhibit 29

Results of Miscellaneous Sewer Costs Provided by the Permit Department

			Survey Results		
Miscellaneous Fee	**MWS Current Fee**	**Calculated cost**	**Range**	**# of utilities that charge for this service**	**# of survey respondents**
Sewer Tap Fee/Connection					
4"	$500	$225	$310 - $1,640	7	8
6"	$500	$225			

VI. SURVEY

As part of the cost of service analysis, a survey was conducted to serve as a benchmarking tool for the various fees and charges assessed by MWS. RFC identified twelve water and wastewater utilities (ten cities) to determine the types of fees assessed by the utilities as well as the actual fees assessed. The utilities were chosen based on size, as measured by flows, and their geographic location relative to Nashville. Of the twelve utilities surveyed, eight responded to the questions asked on the survey. The list below details the utilities that responded:

- Memphis, Tennessee
- Little Rock, Arkansas (Water)
- Jacksonville, Florida
- Charlotte, North Carolina
- Birmingham, Alabama
- Dayton, Ohio
- Richmond, Virginia
- Greenville, South Carolina (Sewer)

Both the Little Rock and the Greenville systems have separate entities to operate the water and the wastewater utilities. The remainder of the cities have one entity that operate both water and wastewater.

The survey was categorized into four areas/sections of relevance to MWS and the cost of service analysis. These sections include:

- Miscellaneous fees,
- Wholesale fees,
- Growth and development fees, and
- High strength surcharges

The results of each of the four surveys are summarized below. The results can be used for MWS comparison purposes, as well as an informational tool as to the types of charges that other utilities similar to MWS may charge.

As shown, the fees assessed by various utilities range both monetarily and structurally as some fees are based on meter size. In addition, the number of utilities that assess certain fees versus those that do not varies for each fee. These inconsistencies indicate that there may be policy objectives other than cost recovery driving the actual fees assessed to the utility customers.

While comparing various water and wastewater rates and charges with other communities can provide insights regarding a utility's pricing policies, care should be taken in drawing conclusions from such a comparison. Higher rates may not necessarily mean the actual costs of providing these services are higher or that the utilities are operated and managed poorly. Many factors affect the level of costs and the pricing structure employed to recover these costs. Some of the most prevalent factors include geographic location, demand, customer constituency, level of treatment, level of grant funding, age of system, level of general fund subsidization, and rate setting methodology. As a result, it is difficult to determine whether a charge is appropriate solely on the basis of the benchmarking analysis. The benchmarking analysis should be used in conjunction with cost of service analyses in order to determine the most appropriate charges.

Miscellaneous Fees

1) FEES ($)

	Nashville (Current Fees)	Nashville (proposed Fees)	Memphis	Knoxville	Little Rock - water	Jacksonville	Charlotte	Birmingham	Dayton	Richmond	Western Carolina Regional Sewer Authority	Greenville Water System
Customer Service												
Turn-On Fee	$ 25.00	$ 25.00	$50	$20 fee and $100 security deposit	$15	$10	$32	$ 13.00	5/8" - 1" = $5; 1 1/2" = $30; 2" = $40; 3" = $80; 4" = $90; 6" = $140; 8" = $200; 10" = $225	$35		$20
Disconnect / Reconnect for Non-Payment	$ 15.00	$25	$25		Non-pay turn on =$20 Non-pay set-back =$25	$14	$45	$16 / $34	$10	$35	$300	
Returned Check	$ 10.00	$ 20.00	$20		$15 plus bank fee	$20	$29	$25	$25	$20		$20
Request Copies of Bill History	$ -	$5 for 1st page, $1 thereafer	$20 -$40			$0	$0		none	none		$0
Late Payment Charge	5%	greater of 5% of unpaid balance or minimum charge	$0	if not paid within 15 days, 5% for 1st $250 and then 1 1/2% on any excess balance (after 30 days, continue to add another 1 1/2% for each month late)		1.5% of balance	1.5% of bill balance		none	$20 and interest charge of .83%	1% per month on unpaid balance	Greater of $2 or 1.5% of bill
Notification for Termination of Service	$ 15.00	$ 25.00	none		Collection Visit = $20	$0	$1		none	none		
Meter / Reading / Maintenance Fees												
Inspection of a Second or Additional Meter	$ -	$ 25.00	none			$0	$0	$13	$5	$20		
Investigation of Meter per Customer Request	$ -	$ 25.00	$95			$40 but $85 for 1 1/2 - 2" meter	$0		varies based on meter size: 5/8 - 1" = $10; 1 1/2 - 2" =$25 ; > 3" = $50	none		$50
Broken Locks on Meters	$ 9.60	$ 45.00	$53		$75	$0	$0		if due to water theft, then $100	none		
Vandalism of Meter	$ -	$45 or $200 for electric meters	have fee but not given		Stolen meter = $50	125% X rate X estimated usage	$0		meter cost plus $100 fine	none		
Transceiver Unit Damage	$ -	$ 200.00	none			$0	$0		none	none		
After-Hours Charge	$ 137.50	$ 137.50	$11		$50	$25	$0		none	for sewer unstop work - $40 per hour (normal hours) w/ $70 minimum or $60 per hour (after hrs) w/$170 min.		

Miscellaneous Fees

	Nashville (Current Fees)	Nashville (proposed Fees)	Memphis	Knoxville	Little Rock - water	Jacksonville	Charlotte	Birmingham	Dayton	Richmond	Western Carolina Regional Sewer Authority	Greenville Water System
2) Other Misc. Fees												
Back Flow Prevention yearly inspection		$ 125.00				$35	fee varies			none		
Fire hydrant Flow test						$82				none		
Non-pay restore closed account					$35					$35		
Same day turn on	$ -	$ 40.00			$20					$35		
Meter Removal/reinstallation							$69					
Miscellaneous Fees												
Yoke removal / reinstallation							$74					
Meter lock/ unlock fee							$69					$20
Bad order plumbing								$16 or $34 for after hours				
Main turn on/ turn off							$835					
3) Does your utility impose a charge for verifying that service is off if customer is stealing water?	$ -	$ 125.00	$74				no	no	Yes, $100.			
4) Does your utility charge for a flow test?	0	If MWS fault, then no charge, but otherwise $125	$95 per customer request		Only if the meter is not at fault.		no	Not at this time	$60, $30 per fire hydrant (flow one, gauge one).	Sewer		
5) Does your utility charge for fire protection?		Volume charge of $2.14 per ccf and a minimum volume charge that varies by meter size	residential - no		No	Yes. Closed system : 4" or less = $49; 6" = $97; 8" = $200; 10" = $356 Detector Meter rates: 4" or less = $15; 6" = $20; 8" = $30; 10" = $40		$115 per year charge to fire districts and municipalities	Yes, based on pipe size: 2"= $5; 3" = $7.50; 4" =$10; 6" = $20; 8" = $37.50; 10" = $58.50; 12" = $80	0-4" = $38.22; 6" = $44.13; 8" = $70.58; 10" = $117.59		

Note: Blank spaces indicate no response

Wholesale

	Nashville	Memphis	Knoxville	Little Rock - water	Jacksonville	Charlotte	Birmingham	Dayton	Richmond	Western Carolina Regional Sewer Authority (Greenville)
1) How many wholesale customers do you have?	1 water and 10 sewer	water = zero sewer = 4		5 water customers	only 1 wastewater customer	No wholesale customers but have 3 inter-county agreements	7	none	3 water and 0 sewer	
2) Are all of your wholesale customers charged at the same rate?	no	no		Yes	yes	Yes, all charged block 2 rates	yes	NA	no	
3) How are the wholesale rates structured?	volume charge	volume charge		minimum purchase	base charge based on meter size and volume charge	volume rate	same as residential rates	NA	volume charge	
4) What are the rates being charged?	water = $1.85 / ccf and $28.19 base fee/month; T&T = $.52; 1 customer pays commercial rate, 6 pay T&T rate, and 3 pay pre-set volume rate that changes based on CPI	$.31/100 cf; 73% of base rate of $.875 per 1,000 gallons; 72% of base rate; or same as base rate	$.76 per 100 cubic feet for water and $1.34 per 1,000 gals for metered sewer or $1.53 per 1,000 gals for unmetered sewer	First 200 cubic feet = $173.46 for 6"meter for monthly min. charge and then $.704 per 100 CF thereafter	$1.74 per ccf	$1.82 /ccf (water)	same as residential rates	NA	Average rate of $.42 per ccf between 3 customers	
5) Is the rate based on a cost of service study. If so, when was the study conducted?		Yes. Study was done about 2 - 3 years ago.		Yes, 2000	Yes, 1993		yes		Yes, annually.	
6) Do you have outside-City customers?	no	Yes.		Yes	No	Yes, but regional utility	yes	Yes	Yes	
Are your wholesale customers charged the same rate as the outside-city customers?	NA	Different rates are charged except for base rate.		NO	NA		Have contracts w/ these customers.	NA	No	

Note: Information for the Greenville Water System was only obtained for miscellaneous fees.

Development Fees

	Nashville	Memphis	Knoxville	Little Rock - water	Jacksonville	Charlotte	Birmingham	Dayton	Richmond	Western Carolina Regional Sewer Authority (Greenville)
1) Does your utility have any special contract rates with individual large-volume customers?	Yes, separate lower rate for larger customers	Yes, for water & no for sewer		No	No	No	only for raw water	Have a declining block rate structure in place	no	
Connection Charge / Tap Fee										
a) Does your utility charge a connection charge or tap fee for residential water/sewer service?	Yes for water and sewer	Water - yes and Sewer - yes		yes.	Yes, both a connection charge and tap fee	Yes	Yes	Yes	Yes	NO
b) What is the amount?	$250 current but proposed charge is $400	water = $230 to $280; sewer = $1,150 plus $250 for development fee		metered connection: 5/8" = $2000; 3/4" = $2,400; 1" = $2,800; 1 1/2" = $4,200; 2" = $4,800; 3" = $7,200; 4" = $8,000 and 6" =$12,000	Conn. = $73 and Tap Fee = $427	$995 water and $1640 sewer (both assume a 3/4" meter)	$310	Varies based on typr of street sidewalks, and sod restoration we have to do	$35 for residential water and $30 for Res. Sewer	
Does it vary by meter size or some other factor				meter size	Yes, varies by meter size	Varies by meter size.	varies by meter size		only non-residential varies by meter size	
c) Is this fee based on a COS study and if so when was it completed?	COS but internally by engineering	water - COS study ; sewer - 1992 COS Study		Yes 2000	Not sure since took over system from W&S depmt.	Not really . Based on average cost per year and #.	yes	Review billed amoutn vs. actual cost every few years and adjust standards accordingly	Yes	
Fees for Line Extensions										
a) How does your utility recover costs to extend facilties?	N/A	water - developer & residential; sewer - recovers costs in certain areas		Developer covers costs	Through developer contributions	Commercial and business developers have 50/50 share policy. Residential is bond funded up to 1,000 feet	RA and DC	New areas are part of the developers cost to install. Existing areas are charged an assessment if needed.	NA	Developer contributions
b) If your utility assesses new residential customers, how is this fee determined?	N/A	water - NA		capital investment charges per acre will vary between $50 - $400 based on prior acreage charge	NA		$21 per foot	Based on total project cost divided by the linear foot of piping stallded. Customer pays a cost per foot of frontage from property line.		
c) Is this fee based on a COS study and if so when was it completed?	N/A	water - COS study		Yes, annually.	NA	50/50 policy is based on tracking cost per foot for line extension	yes	No		
Development/Impact Fees										
a) Does your utility charge capital recovey or impact fees to new residential customers to finance trunk facilties?	sewer = $500 capacity charge? And $2,000 drainage basin fee. Also, $50 capacity analysis charge for sewer only	water - no; sewer - yes in some areas outside city limits		Yes	Yes, and call them Capacity Charges	Yes	no	No	NO	Yes
b) What is the amount?	N/A	$1,000 per lot (sewer)		charge system develoment charges to expand capacity: based on service units and range from $150 to $3.750 based on meter size	WATER: Min. charge = $40 or $.10 per gal SEWER: Min = $1,025.50 or $2.93 per gal	$235 water and $775 sewer	NA	NA		residential 5/8" = $2000, 1" = $4,000; 1 1/2 " = $12,000. commercial: 5/8" = $2000, 3/4" = $4,000, 1" = $6000, 1 1/2" = $12,000, 2" = $18,000, 3" = $40,000, 4" = $80,000, 6" $240,000, 8" = $320,000
c) Is this fee based on a COS study and if so when was it completed?	N/A	calculated on estimate of total costs and # of lots			No	No	NA	NA		Yes

Metropolitan Government of Nashville and Davidson County

Metro Water Services

Retail and Wholesale Rate Study Report

May 2006

RFC
RAFTELIS FINANCIAL CONSULTANTS, INC.

METRO WATER SERVICES

TABLE OF CONTENTS

EXECUTIVE SUMMARY

In the fall of 2004, Raftelis Financial Consultants, Inc. ("RFC") completed a comprehensive cost of service study which evaluated opportunities to improve the effectiveness and equity of revenue recovery from water and wastewater rates and charges for both retail and wholesale customers. The cost of service study was completed at the request of the Internal Audit Division of the Metropolitan Government of Nashville and Davidson County ("Metro Government") for Metro Water Services ("MWS"). The cost of service study was the first phase of a broader assignment to complete a comprehensive financial planning and rate study for MWS. The cost of service study resulted in two general conclusions prompting the need for additional analyses. First, although the cost of service study identified where the existing retail rate structure for both water and wastewater service could be adjusted and improved, the more important concern became overall revenue sufficiency. Recent trends showing decreasing debt service coverage ratios and reduced funds generated to address capital investment needs indicated that immediate rate adjustments, as well as other steps to enhance revenues, would be necessary to maintain revenue sufficiency. The general objective of the retail rate study was to develop a financial planning and rate model ("Rate Model") to project rates and charges over a four-year forecast period, fiscal years ("FY") 2007 to FY 2010, to ensure that adequate revenues are generated and to evaluate the impact on revenues of potential changes to the existing rate structure.

Second, the cost of service study indicated that the existing level of wholesale wastewater rates, and the methodology used to calculate those rates, did not provide for adequate cost recovery from most of the wholesale wastewater customers served by MWS. As a result, a more detailed analysis was recommended to calculate revised wholesale rates to provide more equitable cost recovery. The general objective of the wholesale rate study was to "fine tune" many of the assumptions and variables used in the initial cost of service analysis in order to calculate updated wholesale rates.

Before the retail and wholesale rate study began, Metro Government also requested that RFC conduct a benchmarking study to assess the financial performance and cost efficiency of MWS. The objective of the benchmarking study was to evaluate the efficiency of MWS current operations as compared to other utilities, and to identify any areas where MWS appeared to be less cost effective. RFC performed this analysis so that Metro Government could decide whether or not there were any areas where MWS's costs were higher than those of comparable utilities before determining rate adjustments as part of the wholesale and retail rate study. The benchmarking study focused on higher-level cost, rate and financial information, rather than specific operational metrics, in an effort to focus on the total cost and financial performance of MWS. In general, the benchmarking study indicated that MWS compared favorably to the average metrics in almost every category, based on operational and financial data from 2003.[1]

[1] RFC's 2004 Water and Wastewater Rate Survey ("Rate Survey") developed in conjunction with AWWA.

The results and observations of the benchmarking study are included in Appendix A of this report.

A. Retail Study

One of the objectives for the retail rate study was to identify opportunities to adjust the existing rate structure to increase the effectiveness of revenue recovery while still addressing other pricing objectives, such as equity, affordability, customer impacts, revenue stability, etc. MWS' current water and wastewater retail rate structures include a separate minimum (fixed) charge that includes the first 200 cubic feet ("2 ccf" or approximately 1,500 gallons) of usage. The minimum charge varies by meter size and by customer class. For usage above 2 ccf per month, a volume rate is applied per ccf of water used, with a separate volumetric rate for each customer class, for both water and wastewater. MWS has a summer water use policy that caps billable wastewater in the summer (April 1 through November 31) based upon the average water consumption during the months of January, February and March, plus 30%, in order to take into account irrigation usage which is not returned to the wastewater system. In addition, MWS has implemented a policy regarding multiple accounts (or meters) on contiguous properties, by which non-residential customers are allowed to aggregate their flow for purposes of being re-classified (or adjusted) as an intermediate or large user, thereby receiving the benefit of being charged a lower volumetric rate.

This water and wastewater rate structure is the result of several modifications over the last 10 to 15 years in an apparent effort to promote certain pricing objectives, such as affordability, self-sufficiency of each utility, and equity among customer classes. The resulting rate structure has a number of features that are not typical of, or consistent with, current trends in utility rate setting, and are generally more complicated than necessary to address the apparent pricing objectives. Certain other policies, particularly the policy allowing multiple contiguous accounts to be combined (referred to as "contiguous accounts"), tend to reduce the effectiveness of revenue recovery and make it more difficult to accurately project revenues based on the available customer and billing information. In addition, MWS has not implemented water and wastewater rate adjustments in the past six years. Wastewater rates have remained unchanged since 1996 and water rates have remained unchanged since 1999, when a rate decrease was implemented. In comparison, the median water and wastewater charges for residential customers for various utilities throughout the US have increased 4.3% and 4.1% annually, for water and wastewater respectively, for the time period 1996 to 2004[2].

[2] *2004 Water and Wastewater Rate Survey*; American Water Works Association/ Raftelis Financial Consultants, Inc.; 2004; page 5.

RFC identified various modifications to the current rate structure (as described in Section II of this report) to address some of the more unusual aspects of the current rate structure and modeled these rate structure alternatives in order to determine the potential impact on customers and to evaluate the consistency of these impacts with the existing pricing objectives and policies. Any change to a rate structure represents a shift in the allocation of costs among customers in different classes or with different usage characteristics. Given the complicated nature of MWS' existing rate structure, there was concern that the implementation of a more straight forward rate structure might produce short-term customer impacts that were inconsistent with various pricing objectives, and that might reduce the stability and effectiveness of revenue recovery as these changes were implemented. These concerns become critical in light of the need to significantly increase total revenues to address immediate revenue deficiencies facing MWS. In fact, the preliminary modeling efforts demonstrated this to be the case. The proposed rate structure changes resulted in a broad range of variable customer impacts, depending on customer class and usage levels. Because of this range of customer impacts, and inconsistencies with current pricing objectives and policy issues, the alternative rate structures identified by RFC were not considered appropriate for implementation at this time. Therefore the focus of the retail study was to determine the level of the across-the board rate adjustments, without changing the current rate structure, necessary to meet revenue requirements and achieve revenue sufficiency.

In order to forecast the level of rate adjustments that may be necessary over the four-year forecast period, revenue requirements were identified and projected into the future. Revenue requirements include all costs incurred by MWS to operate the water and wastewater utilities, address capital investment needs, and address other financial policies including:

- MWS' total budget for both water and wastewater for FY 2006 is approximately $90.5 million and is used as the base year to project future operating and maintenance ("O&M") expenses. O&M expenses are anticipated to increase by 2.7% per year until FY 2010.
- On average, the amount of capital improvement projects ("CIP") to be funded in each fiscal year of the forecast period is approximately $87 million.
- Annual debt service costs are forecast to increase from approximately $58 million in FY 2006 to approximately $83 million by FY 2010 in order to fund a portion of the CIP with additional bonds.
- MWS has a policy which establishes a minimum level for the fund balance in its Extension and Replacement Fund (a reserve used to fund capital projects) of approximately $50 million per year for FY 2006 to 2010.

In addition to these revenue requirements, the rate adjustments should effectively address liquidity and debt coverage requirements. MWS' investment advisor, Public Financial

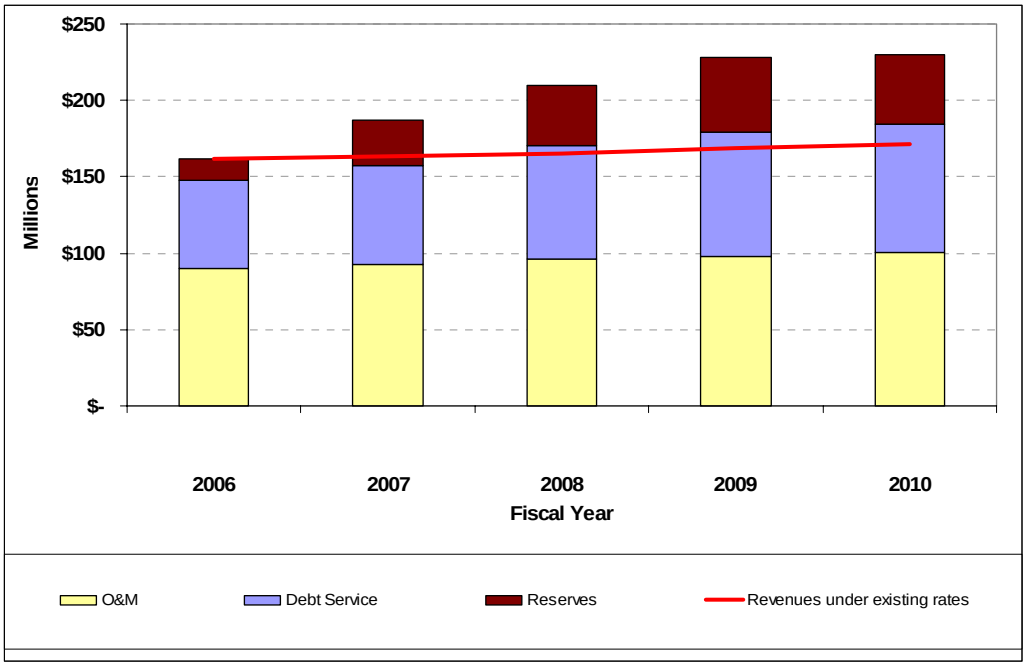
Management, indicated that in order to maintain the current credit rating, the following coverage and liquidity targets should be achieved, which have also been factored into the projected revenue requirements:

- Achieve a standard bond coverage ratio close to 1.90 in each fiscal year; and,
- Maintain at least 200 days of cash balance on hand in each fiscal year.

The following chart shows the projected revenue requirements based on these objectives and the expected revenues to be generated from the current rates and projected demand. The level of revenue shortfalls is significant, beginning in FY 2007. In addition, without some adjustment to rates and/or projected costs, it is possible that MWS will not meet the debt service coverage requirements specified in the Bond Resolution for the existing revenue bonds, also beginning as early as the next fiscal year.

Exhibit ES-1

Projection of Revenue Sufficiency Under Existing Rates



In order to determine the net revenue requirements and necessary rate adjustments for each separate utility, each component of the revenue requirements identified above was allocated between the two utilities based on various allocation factors. Assuming that the current water and wastewater rate structures remain in effect, the water and wastewater rate adjustments required to meet the revenue requirements identified above are summarized below. It should be

noted that the rate adjustments are shown both including and excluding the implementation of proposed wastewater wholesale rates.

Overall Rate Adjustments Including Implementation of Proposed Wastewater Wholesale Rates

	FY 2007	FY 2008	FY 2009	FY 2010
Water Rate Adjustments	15.0%	10.0%	5.0%	0.0%
Wastewater Rate Adjustments	20.0%	15.0%	10.0%	0.0%
Combined Customer Impact *	18.5%	13.4%	8.4%	0.0%

*Residential customer with 5/8" meter and 6 ccf of monthly water usage.

Overall Rate Adjustments Excluding Implementation of Proposed Wastewater Wholesale Rates

	FY 2007	FY 2008	FY 2009	FY 2010
Water Rate Adjustments	17.5%	10.0%	5.75%	0.0%
Wastewater Rate Adjustments	24.5%	15.0%	11.75%	0.0%
Combined Customer Impact *	21.1%	13.4%	9.9%	0.0%

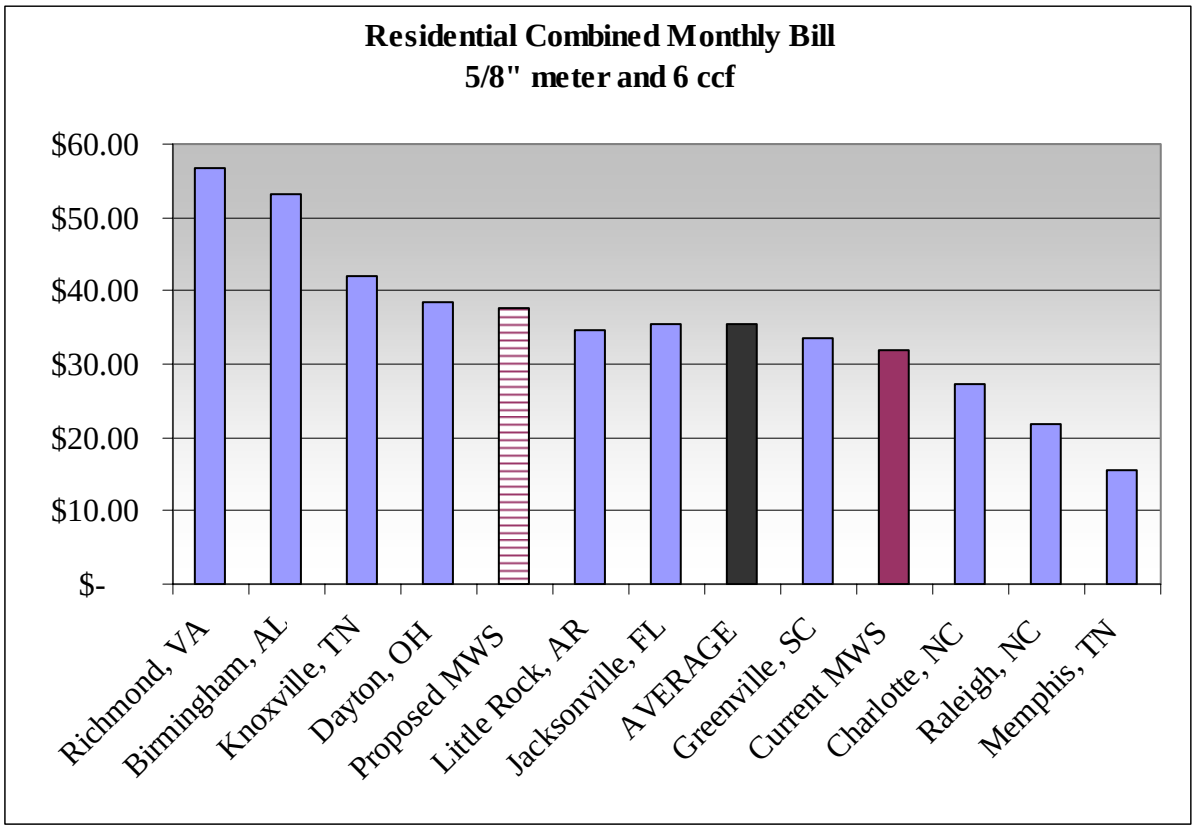
*Residential customer with 5/8" meter and 6 ccf of monthly water usage.

The majority of MWS customers are residential customers with 5/8" meters. The rate adjustments necessary to meet revenue requirements in FY 2007 would result in an 18.5% increase in the combined average monthly bill for a residential customer who uses 6 ccf of water. These rates remain comparable with those of other communities, as shown in the chart below, and fall within the affordability guidelines as established by the EPA's Financial Capability Assessment publication[3]. For instance, MWS has an average overall median household income ("MHI") of $39,797[4]. The ratio of annual water and wastewater costs for MWS ($452.76 for residential customers using 6 ccf per month) is approximately 1.14% of MHI, which is less than the EPA's 4% guideline (2% of MHI for water and 2% of MHI for wastewater).

[3] Combined Wastewater Overflows: Guidance for Financial Capability Assessment and Schedule Development (Environmental Protection Agency, march 1997) page 19.
[4] Obtained from MWS website: http://www.nashville.org/flashpgs/demographics.htm.

Exhibit ES-2

Projection of Residential Monthly Bills



The rate adjustments and customer impacts can be mitigated by either reducing revenue requirements or increasing revenues from other sources. For example, the Rate Model was used to evaluate the impact on overall rate adjustments of changing the level of projected O&M expenses and CIP costs, while still meeting targeted criteria including debt service coverage ratios and reserve fund balances. Examples of ways to mitigate rate adjustments, and the expected impact, in total, over the four-year forecast period, include the following:

- Reducing annual O&M expenses by 1% (approximately $900,000) causes rate adjustments to be decreased by approximately 2%;
- Reducing total capital investments by $5 million annually causes rate adjustments to be decreased by approximately 1%;
- Extending the term of the proposed revenue bonds from a twenty-five year term to a thirty-year term, causes rate adjustments to be decreased by approximately 2%;
- Eliminating multiple accounts on contiguous properties causes rate adjustments to be decreased by approximately 1.5%;

- Eliminating the summer cap causes rate adjustments to be decreased by approximately 3%; and,
- Eliminating the inclusion of the first 2 ccf of water and wastewater usage causes rate adjustments to be by decreased by approximately 14%.

It should be noted that eliminating contiguous accounts, the summer cap, or no longer including the first 2 ccf of water and wastewater usage in the monthly minimum charge, will have more significant impacts on certain customer classes. For example, the elimination of the first 2 ccf allowance in the monthly minimum charge would cause the largest percentage increase for low volume residential customers, thus impacting the affordability of water and wastewater service for low income, fixed income, or other economically disadvantaged customers. In each case, the potential benefits in additional revenues need to be weighed against the level of expected customer impacts and the types of customers affected.

B. Wholesale Study

As part of the cost of service analysis performed for the Metro Government in September 2004, RFC was asked to review the existing wholesale rates charged for water and wastewater and to evaluate whether the current rates being charged to MWS wholesale customers were adequate to recover those costs identified in the cost of service analysis as reasonably and appropriately attributable to the provision of wholesale services. As a result of the initial analysis, it appeared that the existing wholesale water rate for the sole water wholesale customer (Brentwood) compared favorably with the calculated cost of service rate, which suggested that significant changes to this rate methodology were not warranted at this time. For the wastewater wholesale customers, the cost of service analysis indicated that the existing wholesale rates being charged, specifically to those trunk and treatment customers that were a part of the MWS 201 Facilities Planning Agreement, were not generating sufficient revenues to cover the costs of providing service to them. Whereas the cost of service study was based on actual (historical) results and costs for a specific year (FY 2004), the next step, as part of the rate study, was to refine the methodology and to develop a Rate Model to calculate an equitable rate based on the next year's budgeted costs, as a basis for developing a new contract to serve those trunk and treatment customers.[5] In addition, the "new" rate would also apply to Goodlettsville, which is not a 201 Participant, but whose previous contract term has expired and has been extended until July 2008, when MWS' new rate methodology can be implemented.

[5] Trunk and treatment customers or 201 Participants include Belle Meade, Brentwood, Hendersonville, Millersville, La Vergne and Old Hickory Utility District.

To begin fine tuning the assumptions made in the cost of service analysis for the wastewater wholesale rate, RFC participated in individual meetings with MWS wastewater wholesale customers to gain a more thorough understanding of the operating environment and relationship between MWS and each of its wholesale customers. Wholesale customers were given the opportunity to share and supply data and information to RFC, so that their individual concerns could be addressed in the updated rate study. The information obtained during these meetings was factored into the wholesale rate calculation in order to provide a more thorough, comprehensive analysis.

To develop the updated wastewater wholesale rates, RFC used the Utility Approach to rate setting. The Utility Approach is the same approach that was recommended in the cost of service analysis, and is consistent with industry guidelines as provided by the American Water Works Association ("AWWA") and the Water Environment Federation ("WEF"). Part B, Section I of this report provides additional information and a more detailed explanation of the approach and recommended methodology.

The Utility Approach looks at two primary cost components: an operation and maintenance ("O&M") component and a capital component. The sum of the calculated O&M cost and calculated capital cost, expressed as a rate per 100 cubic feet, is the maximum cost or unit rate that could be charged to wastewater wholesale customers who have not made prior capital contributions to MWS. Exhibit ES-3 summarizes these costs and the calculated wholesale rate, based on FY 2006 cost information.

Exhibit E-3

Summary of Wholesale Cost Calculations and Projected Wholesale Rate

Type of Costs	Wastewater
Calculated O&M Cost per 100 cubic feet	$0.95
Calculated Capital Cost per 100 cubic feet	$0.56
Wholesale Cost per 100 cubic feet	**$1.51**

All MWS wastewater wholesale customers will be responsible for paying the same calculated O&M cost per 100 cubic feet for treated wastewater flow. However, the calculated capital cost component will vary depending on the level of any prior capital contributions made to MWS by each individual wholesale customer. During RFC's meetings with individual wholesale customers, one of the key areas of concern was recognition of prior capital contributions made to MWS in calculating adjusted rates.

The calculated capital cost shown above is the cost per 100 cubic feet for treated wastewater flow that those wholesale customers who have made no prior capital contributions (e.g. a new

customer) will be responsible for paying. For the wholesale customers that have made individual contributions (assets and cash) to MWS, primarily 201 Participants, credit is given for their contributions. Exhibit ES-4 shows the resulting capital unit cost for each wholesale customer that has made prior capital contributions. Capital contributed by each MWS wholesale customer was amortized to reflect the timing of the contribution as well as the service life of the assets for which that contribution was made.

Exhibit ES-4

Capital Component Adjusted for Prior Capital Contributions

Wholesale Customer (201 Participants)	**Per Unit Cost ($)** Capital Component
Belle Meade	$0.52/ccf
Brentwood	$0.19/ccf
Hendersonville	$0.35/ccf
Millersville	$0.35/ccf
La Vergne	$0.44/ccf
Old Hickory	$0.54/ccf

For those contracts with expirations in FY 2006, the calculated per unit costs provides a reasonable estimate of the expected rate to be charged beginning in FY 2007. For those wholesale customers with FY 2008 contract expirations, per unit costs shown are projections, as the data required to calculate the actual rate will not be available until closer to the expiration dates of the contracts. In order to calculate the actual rates for the contracts expiring in FY 2008, updated budget and fixed asset information will be needed. In addition, the calculated weighted average cost of capital or rate of return will also need to be revisited. Exhibit ES-5 shows a projection of estimated rates for the various wholesale customers, which include both the O&M component and the capital component.

Exhibit ES-5

Projection of Estimated Wastewater Wholesale Rates ($'s/ccf)

Wholesale Customer	**FY 2006** ($/ccf)	**FY 2007** (1) ($/ccf)	**FY 2008** ($/ccf)	**FY 2009** ($/ccf)	**FY 2010** ($/ccf)
Goodlettsville (2) / New Customer	1.51	1.53	1.55	1.58	1.60
Belle Meade	1.46	1.49	1.51	1.54	1.56
Brentwood	0.39	0.52	0.52	1.21	1.24
Hendersonville	0.39	0.52	1.35	1.37	1.40
Millersville	1.30	1.32	1.34	1.37	1.40
La Vergne	1.38	1.41	1.43	1.46	1.48
Old Hickory	0.39	0.52	1.53	1.56	1.58
Mount Juliet (3)	1.35	1.38	1.40	1.43	1.45
Ridgetop (3)	1.35	1.38	1.40	1.43	1.45
White House (4)	2.59	2.59	2.59	2.59	2.59

(1) It is assumed that MWS will implement the updated trunk and treatment rate of $0.52 per ccf in FY 2007. This rate is assumed constant for FY 2008 for the purpose of this projection.

(2) Madison Suburban Utility District bills Goodlettsville at MWS' wastewater rates and remits 41% of collected revenues to MWS. Goodlettsville's contract expires in 2008 and therefore they would not begin paying the rate stated above until FY 2009.

(3) Wholesale rate predetermined by existing wholesale contract with MWS. Rate is adjusted annually by CPI index.

(4) White House Utility District pays the same rate as the large commercial rate for MWS retail customers.

By FY 2009, it is assumed that all current trunk and treatment wholesale customers (201 Participants) will be charged wholesale rates based on the methodology presented and contained in this report. Exhibit 4 compares current estimated wastewater wholesale revenues (FY 2006) to a projection of estimated wastewater wholesale revenues for FY 2009 when all customers are assumed to be paying the revised rates. FY 2009 estimated revenues are projections, as the data available to calculate actual rates will not be available until closer to that time frame.

Exhibit ES-6

Projection of Estimated Wastewater Wholesale Revenues

City	FY 2006 Revenues (1)	FY 2009 Revenues (2)
Goodlettsville / New Customer	$ 1,000,329	$ 2,868,560
Belle Meade	$ 281,356	$ 1,117,903
Brentwood	$ 1,169,890	$ 2,622,765
Hendersonville	$ 1,017,582	$ 3,609,867
Millersville	$ 70,143	$ 248,296
La Vergne	$ 438,603	$ 1,651,042
Old Hickory	$ 109,370	$ 439,727
Mount Juliet	$ 1,168,775	$ 1,233,707
Ridgetop	$ 34,305	$ 36,210
White House	$ 179,662	$ 179,662
Total Wastewater	**$ 5,470,013**	**$ 14,007,740**

(1) FY 2006 revenues assume rates currently charged by MWS. FY 2006 rates shown in Exhibit ES-5 are a projection of rates to be implemented by MWS if it chooses to implement rates before the termination of FY 2006.
(2) FY 2009 projected revenues based on current wastewater wholesale flows (same as for FY 2006).

As a final note, during RFC's meetings with MWS wholesale customers, MWS wastewater wholesale customers shared with both MWS and RFC that they had formed the Metro Sewer Users Association ("MSUA") and had retained a consultant, Consolidated Technologies, Inc. ("CTI") to represent them. During the course of this Rate Study, CTI prepared a report to formally address MSUA's concerns with the cost of service analysis titled "Task 1, Review of Metro Water Services Wholesale Cost of Service Analysis" dated August 2005 ("CTI Report"). RFC has reviewed the CTI report and addresses these concerns in the wholesale section of this report.

The remainder of this report is divided into two parts. Part A, Sections I through IV provide more detailed information on the results of the retail rate study and Part B, Section I provides more detailed information on the wholesale rate study.

I. INTRODUCTION

A. Background

In October of 2003, the Internal Audit Division of the Metropolitan Government of Nashville and Davidson County ("Metro Government") engaged Raftelis Financial Consultants, Inc. ("RFC") to perform a comprehensive water and wastewater cost of service study for Metro Water Services ("MWS") in order to evaluate opportunities to improve the effectiveness and equity of revenue recovery. The cost of service study was completed in the fall of 2004. Based on the results of the cost of service study, RFC was engaged to conduct a retail rate study in order to determine adjustments to the current rates and charges over the four-year forecast period for fiscal year ("FY") 2006 to FY 2010.

It should be noted that the results of the cost of service study were based on unadjusted water and wastewater flow. A number of MWS' customers are categorized as multiple accounts on contiguous properties and are allowed to aggregate their flow for purposes of being re-classified (or adjusted) as either an intermediate or large user. In effect, multiple accounts on contiguous properties are allowed the benefit of being charged a lower volumetric rate than if they were classified as individual customers. These contiguous accounts make up approximately 8% of water flow and 8% of wastewater flow. One of the first tasks of the more detailed rate study involved reconciling billable flow to actual revenues collected, which was accomplished by matching the billable flow per customer class with actual revenue entries posted to the general ledger. It was during this process that RFC determined that billing data used for the cost of service study should have been based on adjusted flow to account for the reclassification of multiple accounts on contiguous properties. Since the cost of service study was based on older and unadjusted flow data, the results of the cost of service study are different than those explained and shown in the following sections of the rate study report.

B. Objectives of Rate Study

The general objective of the retail rate study was to develop a financial planning and rate model ("Rate Model") to project rates and charges over a four-year forecast period and to model alternative rate structures. Specific study objectives included the following:

1. Forecast revenue requirements over the four-year forecast period;
   - Project MWS' operating budget over the forecast period;
   - Determine the appropriate funding for the capital improvement program ("CIP"), including cash and bond funding sources;

- Determine the appropriate level of targets for debt service coverage over the forecast period;
- Determine the appropriate level of liquidity (cash reserves) over the forecast period;

2. Forecast revenues, including miscellaneous fees, over the forecast period;
3. Determine the necessary rate adjustments to achieve overall revenue sufficiency; and,
4. Identify and model viable rate structure alternatives and resulting customer impacts.

II. HISTORY OF RATE STRUCTURE AND ALTERNATIVES

A. History of MWS Rate Structure

From 1977 to 1986, MWS' retail rate structure included a quarterly minimum meter charge based on meter size and a decreasing volumetric block rate structure for both water and wastewater customers. The minimum meter charge included the first 6 hundred cubic feet ("ccf") of water and wastewater flow. In 1987, the rate structure was changed, presumably to address differences in the costs to serve different customer classes. Separate meter charges, based on meter size, were established for each customer class and a separate volumetric rate was established for each customer class. The rates and meter charges assessed were the same for both water and wastewater customers. Then, in 1993 the rate structure was changed to include separate rates and charges for water and wastewater customers. In addition, the billing period was changed from quarterly to monthly, and the minimum meter charge was adjusted to include only the first 2 ccf of water and wastewater flow.

As shown in Exhibits 1 and 2, rate increases for each customer class were implemented from 1987 to 1992. In 1993, separate rates were established for water and wastewater customers and wastewater rates were increased by approximately 12% annually from 1993 through 1995 (three years). Wastewater rates have remained unchanged since 1996. Water rates were left unchanged until 1999 when a decrease ranging from 5% to 25% was implemented. Water rates have not been adjusted since 1999.

The compound annual volumetric rate adjustments for residential customers for the twenty-year period are approximately 1.6% for water and 4.8% for wastewater. Over a more recent time frame, the compounded annual volumetric rate adjustments for residential customers from 1996 to 2004 are approximately -3.5% for water and 0% for wastewater. In comparison, during this timeframe (1996 – 2004) the median water and wastewater charges for residential customers for utilities throughout the US have increased 4.3% and 4.1% annually, for water and wastewater respectively. [6] In effect, water and wastewater rates for many utilities have increased by approximately 30% over this timeframe (1996-2004), but have remained essentially unchanged, or even decreased, for MWS customers.

[6] *2004 Water and Wastewater Rate Survey*; American Water Works Association/ Raftelis Financial Consultants, Inc.; 2004; page 5.

Exhibit 1

History of Water Rate Adjustments

	1986	1987	1988	1989	1990	1991	1992	1993-1997	1998	1999-2006	Compound Rate 86 -'06	Compound Rate 96 - '04
	Water & Sewer Rates							WATER RATES				
Meter Charges												
Residential 5/8"	$ 2.95	$ 3.13	$ 3.35	$ 3.58	$ 3.83	$ 4.06	$ 4.30	$ 4.30	$ 3.60	$ 2.70	**-0.44%**	**-5.65%**
Small 5/8"	$ 2.95	$ 3.13	$ 3.35	$ 3.58	$ 3.83	$ 4.06	$ 4.30	$ 4.30	$ 4.30	$ 3.44	**0.77%**	**-2.75%**
Intermediate 1"	$ 13.94	$ 15.41	$ 16.05	$ 17.63	$ 19.45	$ 20.62	$ 21.86	$ 21.86	$ 21.86	$ 18.58	**1.45%**	**-2.01%**
Large 6"	$ 126.52	$ 531.78	$ 543.32	$ 550.41	$ 558.37	$ 591.87	$ 627.38	$ 627.38	$ 627.38	$ 596.01	**8.06%**	**-0.64%**
Average Increase per year		***85.8%***	***5.1%***	***6.2%***	***6.4%***	***6.0%***	***6.0%***	***0.0%***	***-4.1%***	***-16.3%***		
Volumetric Charges												
Residential 5/8"	$ 1.48	$ 1.94	$ 2.08	$ 2.23	$ 2.39	$ 2.53	$ 2.68	$ 2.68	$ 2.68	$ 2.01	**1.55%**	**-3.53%**
Small 5/8"	$ 1.48	$ 1.94	$ 2.08	$ 2.23	$ 2.39	$ 2.53	$ 2.68	$ 2.68	$ 2.68	$ 2.14	**1.87%**	**-2.77%**
Intermediate 1"	$ 1.48	$ 1.37	$ 1.51	$ 1.72	$ 1.94	$ 2.06	$ 2.18	$ 2.18	$ 2.18	$ 1.85	**1.13%**	**-2.03%**
Large 6"	$ 1.48	$ 0.99	$ 1.19	$ 1.32	$ 1.46	$ 1.55	$ 1.64	$ 1.64	$ 1.64	$ 1.56	**0.27%**	**-0.62%**
Average Increase per year		***5.6%***	***11.2%***	***9.8%***	***9.4%***	***6.0%***	***5.9%***	***0.0%***	***0.0%***	***-16.3%***		

Exhibit 2

History of Wastewater Rate Adjustments

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996 -2006	Compound Rate 86 -'06	Compound Rate 96 - '04
	Water & Sewer Rates							SEWER RATES					
Meter Charges													
Residential 5/8"	$ 2.95	$ 3.13	$ 3.35	$ 3.58	$ 3.83	$ 4.06	$ 4.30	$ 4.82	$ 5.40	$ 6.05	$ 6.05	**3.66%**	**0.00%**
Small 5/8"	$ 2.95	$ 3.13	$ 3.35	$ 3.58	$ 3.83	$ 4.06	$ 4.30	$ 4.82	$ 5.40	$ 6.05	$ 6.76	**4.23%**	**0.00%**
Intermediate 1"	$ 13.94	$ 15.41	$ 16.05	$ 17.63	$ 19.45	$ 20.62	$ 21.86	$ 24.48	$ 27.42	$ 30.71	$ 34.40	**4.62%**	**0.00%**
Large 6"	$ 126.52	$ 531.78	$ 543.32	$ 550.41	$ 558.37	$ 591.87	$ 627.38	$ 702.67	$ 786.99	$ 881.43	$ 987.20	**10.82%**	**0.00%**
Average Increase per year		***85.8%***	***5.1%***	***6.2%***	***6.4%***	***6.0%***	***6.0%***	***12.0%***	***12.0%***	***12.0%***	***8.9%***		
Volumetric Charges													
Residential 5/8"	$ 1.48	$ 1.94	$ 2.08	$ 2.23	$ 2.39	$ 2.53	$ 2.68	$ 3.00	$ 3.36	$ 3.76	$ 3.76	**4.78%**	**0.00%**
Small 5/8"	$ 1.48	$ 1.94	$ 2.08	$ 2.23	$ 2.39	$ 2.53	$ 2.68	$ 3.00	$ 3.36	$ 3.76	$ 4.21	**5.38%**	**0.00%**
Intermediate 1"	$ 1.48	$ 1.37	$ 1.51	$ 1.72	$ 1.94	$ 2.06	$ 2.18	$ 2.44	$ 2.73	$ 3.06	$ 3.43	**4.30%**	**0.00%**
Large 6"	$ 1.48	$ 0.99	$ 1.19	$ 1.32	$ 1.46	$ 1.55	$ 1.64	$ 1.84	$ 2.06	$ 2.31	$ 2.59	**2.85%**	**0.00%**
Average Increase per year		***5.6%***	***11.2%***	***9.8%***	***9.4%***	***6.0%***	***5.9%***	***12.0%***	***12.0%***	***12.0%***	***9.0%***		

B. Current Rate Structure and Rates

Currently, MWS retail customers are segregated into four customer classes, defined as follows:

- Residential – Up to two housing units on a common meter;
- Small commercial – Up to 1,600 cubic feet per month;
- Intermediate commercial – 1,600 to 200,000 cubic feet per month; or
- Large commercial/Industrial - Over 200,000 cubic feet per month

The water and wastewater rate structures, as shown in Exhibits 3 and 4, include a separate minimum (fixed) charge that includes the first 2 ccf (approximately 1,500 gallons) of usage. The minimum charge varies by meter size and by customer class. For usage above 2 ccf per month, a volume rate is applied per ccf of water used, with a separate volumetric rate for each customer

class, for both water and wastewater. Wastewater, or wastewater usage, is based on metered water consumption. However, MWS has a summer water use policy that affects the calculation of wastewater bills during the summer months. Title 15 of the Metropolitan Code of Laws states that customers can not be charged for wastewater based on water consumption that is not returned to the wastewater system. In order to recognize the use of water for irrigation in the summer, the residential wastewater charge for the billing period between April 1 and November 30 is limited to, or "capped", at the maximum of 130% of each customer's average water consumption during the months of January, February and March. Each April, MWS recalculates the winter average consumption for each residential customer.

Exhibit 3

Existing Water Rate Structure

	Residential	Small Commercial	Intermediate Commercial	Large Commercial
Meter Size				
5/8 INCH	$ 2.70	$ 3.44	$ 11.96	$ 515.91
3/4 INCH	$ 9.17	$ 9.78	$ 16.97	$ 521.49
1 INCH	$ 11.03	$ 11.77	$ 18.58	$ 523.31
1-1/2 INCH	$ 16.22	$ 17.30	$ 23.07	$ 528.32
2 INCH	$ 21.85	$ 23.30	$ 28.19	$ 534.04
3 INCH	$ 28.84	$ 30.76	$ 35.28	$ 539.07
4 INCH	$ 47.00	$ 50.13	$ 55.85	$ 562.06
6 INCH	$ 73.79	$ 78.71	$ 86.22	$ 596.01
8 INCH	$ 115.40	$ 123.10	$ 134.22	$ 652.55
10 INCH	$ 115.40	$ 123.10	$ 134.22	$ 652.55
Volume Charge (per ccf)	**$ 2.01**	**$ 2.14**	**$ 1.85**	**$ 1.56**

Exhibit 4

Existing Wastewater Rate Structure

Meter Size	Residential	Small Commercial	Intermediate Commercial	Large Commercial
5/8 INCH	$ 6.05	$ 6.76	$ 22.14	$ 854.53
3/4 INCH	$ 17.17	$ 19.23	$ 31.40	$ 863.77
1 INCH	$ 20.68	$ 23.16	$ 34.40	$ 866.77
1-1/2 INCH	$ 30.40	$ 34.05	$ 42.72	$ 875.08
2 INCH	$ 40.94	$ 45.85	$ 52.18	$ 884.55
3 INCH	$ 54.02	$ 60.50	$ 65.31	$ 892.86
4 INCH	$ 88.03	$ 98.59	$ 103.38	$ 930.97
6 INCH	$ 138.23	$ 154.82	$ 159.61	$ 987.20
8 INCH	$ 216.17	$ 242.11	$ 248.46	$ 1,080.84
10 INCH	$ 216.17	$ 242.11	$ 248.46	$ 1,080.84
Volume Charge (per ccf)	**$ 3.76**	**$ 4.21**	**$ 3.43**	**$ 2.59**

It should be noted that MWS assesses an additional 10% surcharge to the calculated wastewater bill to cover debt service associated with Tennessee Local Development Agency ("TLDA") loans. The TLDA loans and the revenues from the 10% assessment are excluded from this analysis, since they do not appear as revenues or debts on the MWS financial reports.

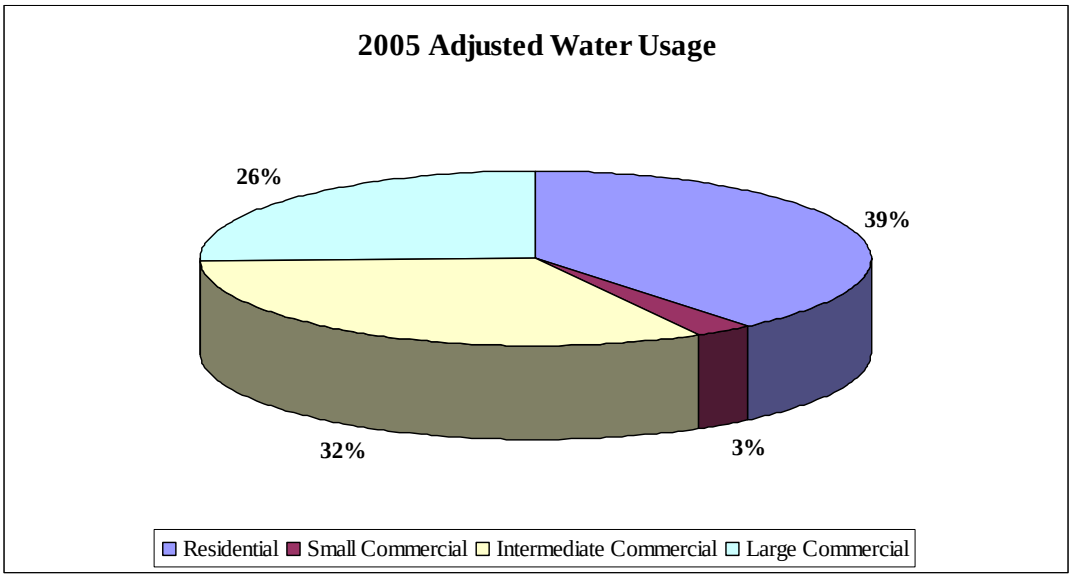
C. Usage Characteristics

Water System

As shown in the graph below, 39% of MWS' adjusted retail water usage is attributed to the residential class, 32% to the intermediate commercial class, 26% to the large commercial class and 3% to the small commercial class. The adjusted water usage reflects the reclassification of the multiple accounts on contiguous properties.

Exhibit 5

Adjusted Retail Water Usage



While 39% of the water flow is attributable to the residential class, this class represents approximately 90% of MWS' water customer base, the majority of which have 5/8" meters. The next largest customer group is the small commercial class which represents 6% of the total water customers.

Water usage has remained relatively unchanged since 2001. Water usage decreased slightly in FY 2002 and 2003 and then increased slightly in FY 2004 and 2005. The average monthly usage per customer class is as follows:

Exhibit 6

Average Monthly Water Usage per Customer Class

Customer Class	Average Monthly Water Usage (ccf)
Residential	6
Small Commercial	5
Intermediate Commercial	130
Large Commercial	6,200

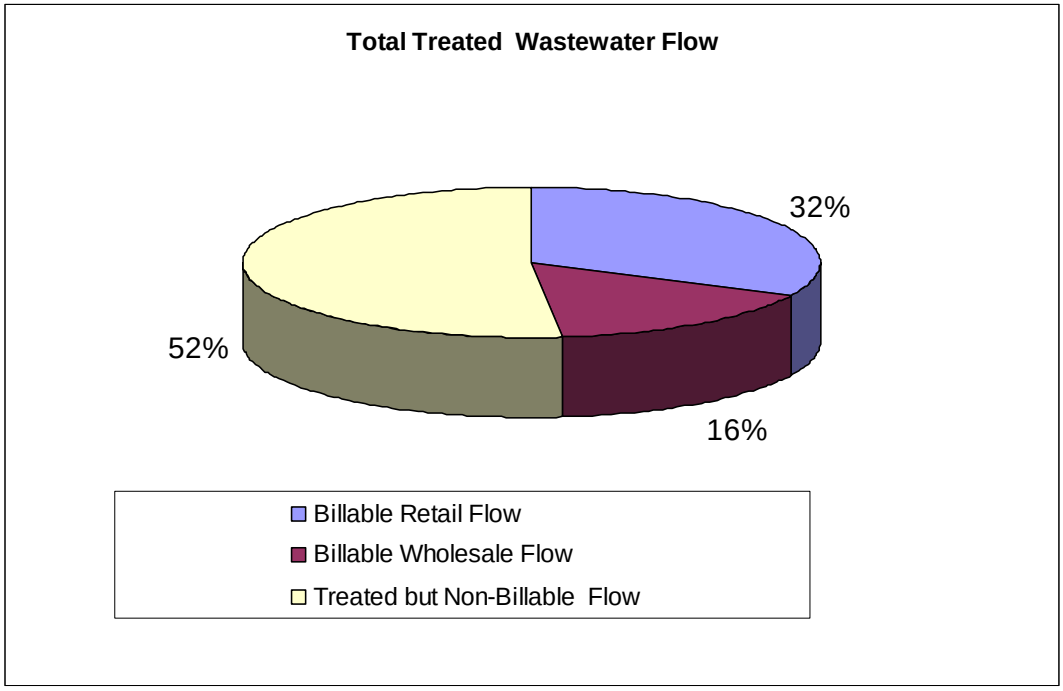
Wastewater System

For MWS' billable retail wastewater flow, 40% is attributable to the residential class, 34% to the intermediate commercial class, 23% to the large commercial class and 3% to the small commercial class. Of more interest is the comparison of billable wastewater flow to total treated

wastewater flow. As shown below, 52% of the wastewater flow received at the wastewater treatment plants is attributable to combined sewers and other inflow and infiltration from stormwater and other sources into the MWS wastewater collection system. In other words, billable flows represent less than half of the treated wastewater flows at the plants.

Exhibit 7

FY 2005 Treated Wastewater Flow



The majority of the MWS' wastewater customer base is comprised of residential customers, or approximately 90%. Wastewater flow has decreased slightly on an annual basis since 2001, which is likely due, at least in part, to efforts by MWS to eliminate combined sewers. The average monthly usage per customer class is as follows:

Exhibit 8

Average Monthly Wastewater Usage per Customer Class

Customer Class	Average Monthly Wastewater Flow (ccf)
Residential	6
Small Commercial	5
Intermediate Commercial	70
Large Commercial	5,000

D. Pricing Objectives and Policy Issues

The water and wastewater rate structure has changed over the years in an effort to promote certain pricing objectives such as affordability, self-sufficiency among utilities, and equity among customer classes. Each of these pricing objectives and policy issues was considered during the process of identifying viable rate structure alternatives.

Affordability and Equity Among Customer Classes

MWS has included 2 ccf per month (or 6 ccf per quarter) in the minimum base charge since at least 1997. It appears that the inclusion of the first 2 ccf of water and wastewater flow was implemented in an effort to promote affordability among low income or disadvantaged customers. In addition, MWS assesses different monthly meter charges for each customer class in order to address equity among customer classes.

In order to evaluate the combined effect of including the first 2 ccf of usage and the differences in monthly meter charges and volumetric rates among customer classes, RFC calculated the average unit costs for the monthly bills for the average customer in each class. The average customer is defined as using the average flow for each class and the most common meter size within each class (5/8" inch meter for all customer classes except for the large commercial class, the majority of which use 6"meters). (See Exhibit 9). The resulting average unit costs are then compared to the actual volumetric rates assessed to each customer class. For example, the average residential customer who uses 6 ccf per month is billed $10.74 for water usage. This translates into an average unit cost (per ccf) of $1.79 ($10.74 divided by 6 ccf), which can be compared to the volumetric rate of $2.01. When this calculation is performed for the average customer in each customer class, for both water and wastewater, the following observations can be made:

- The unit cost for the average residential water customer using 6 ccf per month is $1.79 which is less than the actual volumetric rate of $2.01. Therefore, the inclusion of the first 2 ccf of usage and the low meter charge of $2.70 helps mitigate the higher volumetric rate, promoting affordability. The same holds true for wastewater. The unit cost for the average residential wastewater customer with 6 ccf of flow is $3.52 which is less than the volumetric rate of $3.76, which is the result of the relatively low meter charge of $6.05.
- The unit cost for the average small commercial water customer using 5 ccf per month is $1.97 which is less than the actual volumetric rate of $2.14. Again, the inclusion of the first 2 ccf of usage and the discounted meter charge of $3.44 helps mitigate the high volumetric rate. The unit cost for the average small commercial wastewater

customer with 5 ccf of flow is $3.88, which is also less than the volumetric rate of $4.21.

- The unit cost for the average intermediate commercial water customer using 130 ccf per month is $1.91 which is higher than the actual volumetric rate of $1.85. The higher meter charge of $11.96 (for a 5/8" meter) causes the intermediate customer to pay a higher unit cost than the actual volumetric rate. The unit cost for the average intermediate commercial wastewater customer using 70 ccf per month is $3.65 which is higher than the actual volumetric rate of $3.43. Again, the higher meter charge compared to other customer classes, results in an increased average unit cost.
- The unit cost for the average large commercial water customer using 6,200 ccf per month is $1.66 which is higher than the actual volumetric rate of $1.56. The higher meter charge of $596.01 (6" meter) causes the large customer to pay a higher unit cost than the actual volumetric rate. For wastewater, the unit cost for the average large commercial customer using 5,000 ccf per month is $2.79 which is higher than the actual volumetric rate of $2.59, again because of a relatively high meter charge.

The general implications of these observations is that, for the most part, the differences in volumetric rates among the customer classes is offset by the level of the monthly service fees, such that the average revenues generated from customers in different classes is closer than is indicated by simply comparing the volumetric rates among the customer classes.

Exhibit 9

Average Unit Cost per Customer Class (5'8" meter except large commercial)

	WATER UNIT COST per ccf			
Usage	**Res**	**Small**	**Intmd.**	**Large**
5	$ 1.75	$ 1.97	$ 3.50	$ 120.14
6	$ 1.79	$ 2.00	$ 3.23	$ 100.38
130	$ 2.00	$ 2.13	$ 1.91	$ 6.12
6200	$ 2.01	$ 2.14	$ 1.85	$ 1.66
	Volumetric Rate per ccf			
	$ 2.01	$ 2.14	$ 1.85	$ 1.56

= Indicates the average monthly usage per customer class.

	WASTEWATER UNIT COST per ccf			
Usage	**Res**	**Small**	**Intmd.**	**Large**
5	$ 3.47	$ 3.88	$ 6.49	$ 198.99
6	$ 3.52	$ 3.93	$ 5.98	$ 166.26
70	$ 3.74	$ 4.19	$ 3.65	$ 16.62
5000	$ 3.76	$ 4.21	$ 3.43	$ 2.79
	Volumetric Rate per ccf			
	$ 3.76	$ 4.21	$ 3.43	$ 2.59

= Indicates the average monthly usage per customer class.

Self-Sufficiency Among Utilities

As mentioned previously, in 1993 separate rates were established for the water and wastewater utilities. It appears that this change in the rate structure was implemented in order to promote the self-sufficiency of each utility. Based on data received from MWS staff, the allocation of the budget (or O&M costs) is approximately 40% for water and 60% for wastewater. However, 25% percent of MWS' total system assets are attributed to the water system and 75% are attributed to the wastewater system. Typically, debt service costs would be allocated to each utility based on the specific projects funded with the bonds or based on the proportion of system assets. It is, therefore, reasonable to expect that the majority of debt service would be allocated to the wastewater system versus the water system. Since more costs are attributable to the wastewater utility, the wastewater rates would need to be adjusted more aggressively than the water rates. MWS raised wastewater rates between 1993 and 1996 by approximately 12% per year while water rates were left unchanged until 1999 when a reduction in water rates was implemented. These adjustments appear to have been implemented in order to promote the self-sufficiency of each utility.

Policy Issues

MWS has implemented several policies which affect water and wastewater rates and the identification of viable alternative rate structures. As mentioned previously, MWS allows certain non-residential customers with multiple contiguous accounts to be grouped together for purposes of receiving a lower volumetric rate. These accounts are typically part of a larger entity but have separate meters. The policy allows the accounts to be charged the meter charge for the customer class they have been assigned to based on flow, just like all other customers, but the usage for these accounts is combined so that they can qualify for the intermediate or large commercial volumetric rate, which is lower.

E. Alternative Rate Structures

As part of the rate study, RFC identified various modifications to the current rate structure and modeled these rate structure alternatives in order to determine the overall impact on customers. Each modified rate structure was modeled from a revenue neutral standpoint, meaning the same level of revenues would be generated from each rate structure, though the revenues generated among each class could differ. The customer impacts were then analyzed and compared with MWS' pricing and rate objectives and policies to determine the viability of each alternative rate structure.

Modified Monthly Meter Charges

Currently, MWS assesses different monthly meter charges for each customer class, with 2 ccf of usage included as part of the monthly meter charge regardless of meter size or customer class. Typically, monthly meter charges only vary by meter size, not by customer class. This is because monthly meter charges are typically structured to recover two general categories of costs. The first category includes the costs associated with billing, collection, customer service, and meter reading which are the same for all customer classes. The second category represents a "readiness-to-serve" component which recovers a portion of debt service or other fixed costs necessary to provide the core facilities required to serve any, and all, customers. The "readiness-to-serve" component varies based on meter size, and not by customer class, by reflecting the difference in potential demand that can be placed on the system by larger meters.

RFC calculated monthly meter charges using both components, a per customer charge that is the same for all customers and a meter charge that varies by meter size, but not by customer class. RFC calculated the monthly meter charges assuming that these charges would continue to include the first 2 ccf of water usage for both water and wastewater. The resulting rate structure under this modified approach would have all customers paying the same monthly water meter charge based on the size of their meter regardless of customer class. A similar but separate set of

monthly meter charges was calculated for wastewater customers. Since the current monthly meter charges for customers in different classes vary significantly for any given meter size, these modified monthly meter charges would create a broad range of impacts, both positive and negative. In particular, for residential customers, the monthly meter charge for water and wastewater would increase. Even though this increase would only be a few dollars, for customers with low monthly usage, and a correspondingly low bill, this increase would represent a significant percentage, or proportional increase in their bill, compared to other customers with higher usage. This higher charge would not be consistent with the apparent policy objectives of the existing rate structure to promote affordability for low income and disadvantaged customers. In addition, the changes in the monthly meter charges would likely result in a redistribution of revenues recovered from each customer class, affecting the equity of cost recovery among classes. As a result, it was determined that modified monthly meter charges should not be pursued at this time.

Modified Volumetric Charges

RFC also identified two potential modifications to the volumetric rates. One modification involved the calculation of revised rates for each customer class based on cost of service principals, as determined in the cost of service study completed in the fall of 2004. The calculation of rates based on cost of service principals uses peaking factors from each customer class to determine rates for each customer class. Peaking factors indicate the demand each customer class places on the utility's system. However, calculation of appropriate cost justified, and cost of service based, rates for each of the existing customer classes is complicated by a number of factors. First, the existing customer classes, other than residential, are defined based on usage levels rather than customer type. More typical customer classes would include commercial, industrial, institutional (such as schools and/or hospitals), and governmental, rather than small, medium, and large commercial. In addition, it is often beneficial to distinguish between residential single-family customers and residential multi-family customers as separate classes. These more typical classifications tend to demonstrate more distinctive differences in usage patterns and peaking factors. In addition, the policy of allowing multiple accounts on contiguous properties to be re-categorized into other customer classes results in less accurate peaking factors and billing information, and the calculated costs of service based rates may not accurately reflect the actual cost of serving each customer class. And finally, the existing policy-driven monthly meter charges, which effectively provide a discount for the first 2 ccf of usage, results in further distortions in the proportional share of costs recovered from each customer class, making the calculation of an equitable cost of service rate even more difficult. As a result, the development of an equitable cost of service based rates structure would require significant revisions to both the monthly meter charges and the volumetric rates for each customer class.

The second modification involved the calculation of a uniform rate, calculated separately for water and wastewater, to be applied regardless of customer class. Since the re-categorization of

multiple accounts on contiguous properties causes peaking factors to be skewed due to flows for all different types of customer classes being aggregated, then a uniform rate would more accurately reflect the treatment of multiple accounts on contiguous properties. Under the current rate structure, volumetric rates vary by customer class such that when they are combined with the monthly meter charges, that also vary by customer class, the net effect generally appears to provide reasonable equity among customer classes. Under a uniform rate, the volumetric rate for residential and small commercial customers would likely decrease. Again it would be necessary to adjust the monthly meter charges to avoid a redistribution of cost recovery, resulting in a broad range of customer impacts, depending on class, usage level and meter size. There is also a concern that with this many changes to the rate structure, the impact on revenues generated would be more difficult to predict, making it equally more difficult to accurately estimate the level of rate adjustments needed to meet the forecast revenue requirements and ensure revenue sufficiency. As a result, it was determined that changing the volumetric rate structure also was not advisable at this time.

All of the rate structure alternatives might produce short-term customer impacts that are inconsistent with various pricing objectives, and that might reduce the stability and effectiveness of revenue recovery as these changes are implemented. These concerns become critical in light of the need to significantly increase total revenues to address immediate revenue deficiencies facing MWS based on the forecast revenue requirements generated by the Rate Model. In fact, the preliminary modeling efforts demonstrated this to be the case. The proposed rate structure changes resulted in a broad range of variable customer impacts, depending on customer class and usage levels. Because of this range of customer impacts, and inconsistencies with current pricing objectives and policy issues, the alternative rate structures identified by RFC were not considered appropriate for implementation at this time. Therefore the focus of the retail study was to determine the level of the across-the board rate adjustments for each utility, without changing the current rate structure, necessary to meet revenue requirements and achieve revenue sufficiency.

III. REVENUE REQUIREMENTS

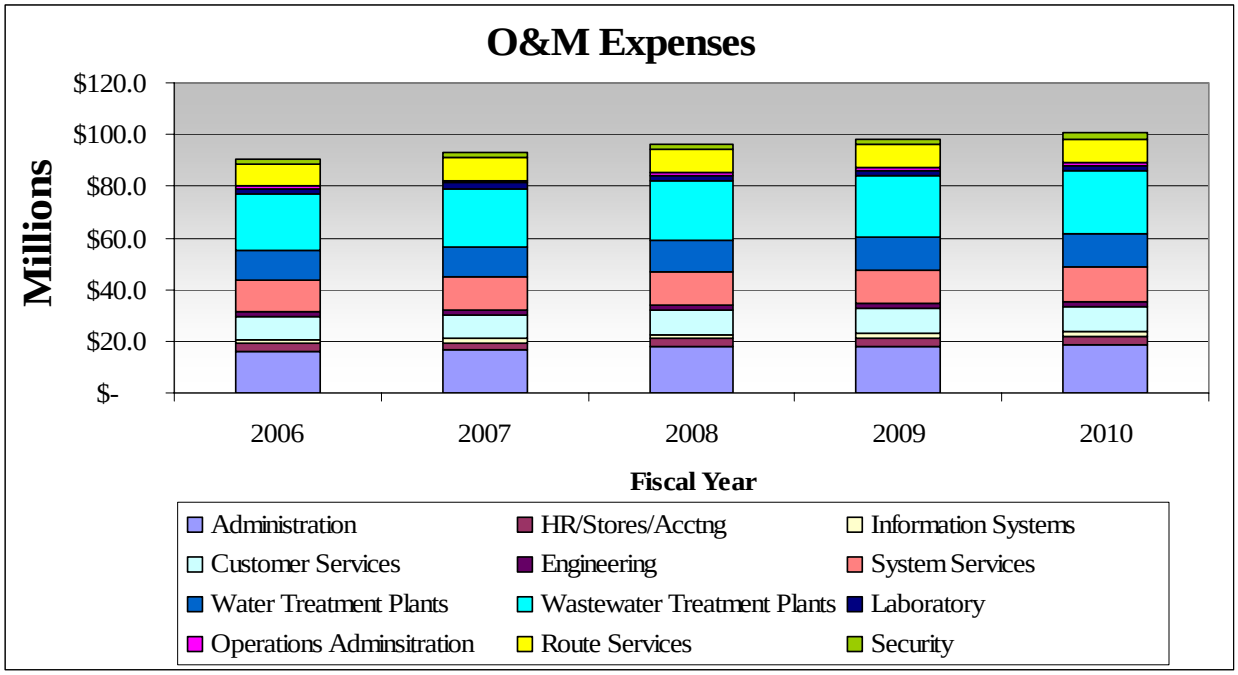
In order to forecast the level of rate adjustments over the four-year forecast period, revenue requirements must be identified and projected into the future. Revenue requirements include all costs incurred by MWS to operate the water and wastewater utilities. Revenue requirements not only represent the cash-needs of each utility but must also address liquidity and debt coverage requirements.

A. Operating and Maintenance Expenses

The identification and projection of revenue requirements begins with MWS' budget, which represents the operations and maintenance costs of the water and wastewater utilities. MWS' total budget for both water and wastewater for FY 2006, approximately $90.5 million, was used as the base year. Each line item for each division of the FY 2006 budget was entered into the Rate Model. Each line item was then escalated by 2.5% (as a general inflation factor), with the exception of costs for local overhead cost allocations ("LOCAP") which are escalated at 3.8%, and the transfer to stormwater which is anticipated to increase from $8.7 million in FY 2007 to $10 million in FY 2008. As shown below in Exhibit 10, on average, total operating and maintenance expenses for FY 2006 to 2010 are anticipated to increase by 2.7% per year.

Exhibit 10

MWS Budget

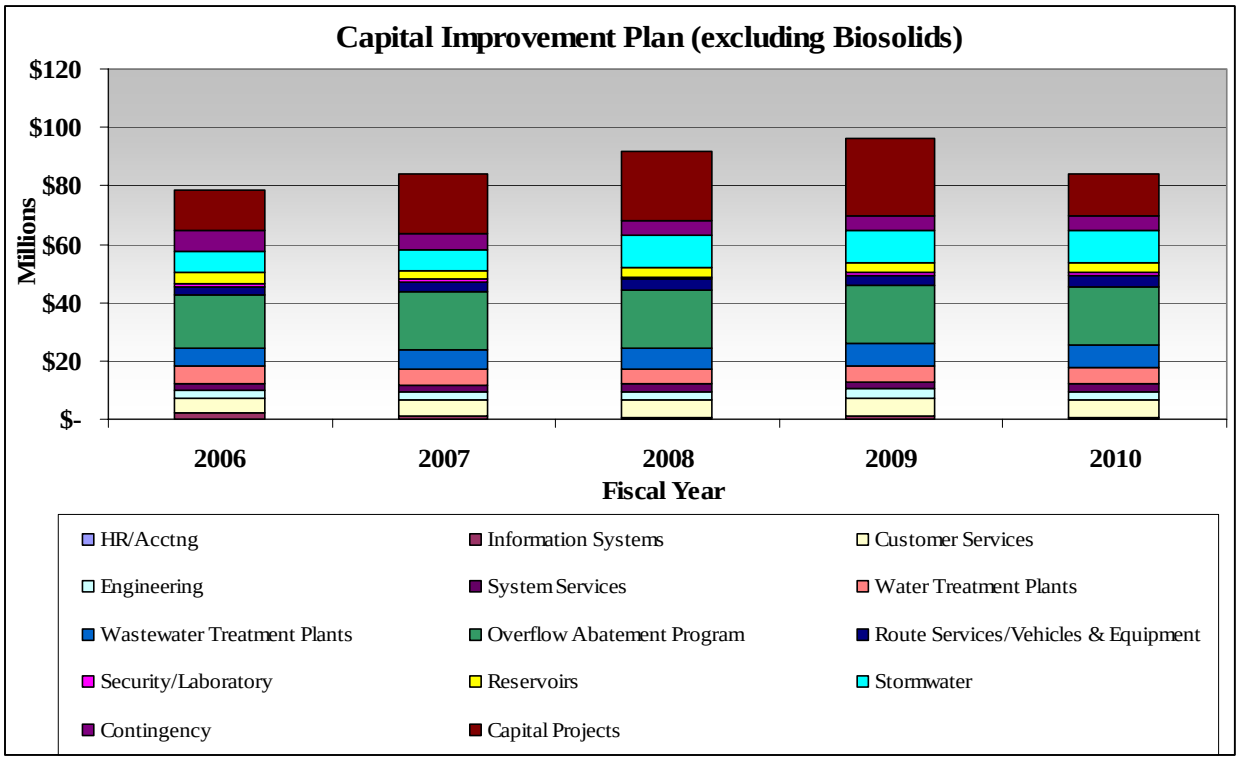


B. Capital Costs

The next step in the projection of revenue requirements involves MWS' capital improvement plan. The CIP for FY 2006 to 2010 was entered into the Rate Model. The total amount of water and wastewater projects for this five-year time period is $435 million, plus an additional $180 million for odor control and biosolids projects identified in previous years, which will be funded in the next several years (2006 -2008) using SRF loans and TLDA loans. As shown below, on average, the amount of CIP projects to be funded in each FY is approximately $87 million. The most significant categories of projects which together make up almost 50% of projected capital investments include overflow abatement projects (to address improvements to the combined sewers) and other "capital projects", which consist mostly of upgrades and maintenance to water transmission and wastewater collection mains. The next largest portion of costs, approximately 11%, is attributed to stormwater projects.

Exhibit 11

Five-Year Capital Improvement Plan



In recent years, MWS has been funding annual CIP costs primarily through reserves. However, reserve fund balances have decreased over the past several years and therefore the CIP for FY 2006 to 2010 will have to be funded with a combination of revenues generated from rates and proceeds from revenue bonds. In order to evaluate the potential to use revenue bonds to fund the

$435 million CIP, RFC held discussions with MWS' investment advisor, Public Financial Management ("PFM") to request guidance on the level of liquidity and coverage ratios required in order to maintain favorable credit ratings on future revenue bond issues. Based on these discussions, plus additional discussions with MWS and Metro Government, a set of assumptions was developed for how the CIP could be funded that included:

- Two revenue bond issues totaling $238 million;
- TLDA loans totaling $5 million; and,
- Reserves, funded with cash from rates, totaling $192 million.

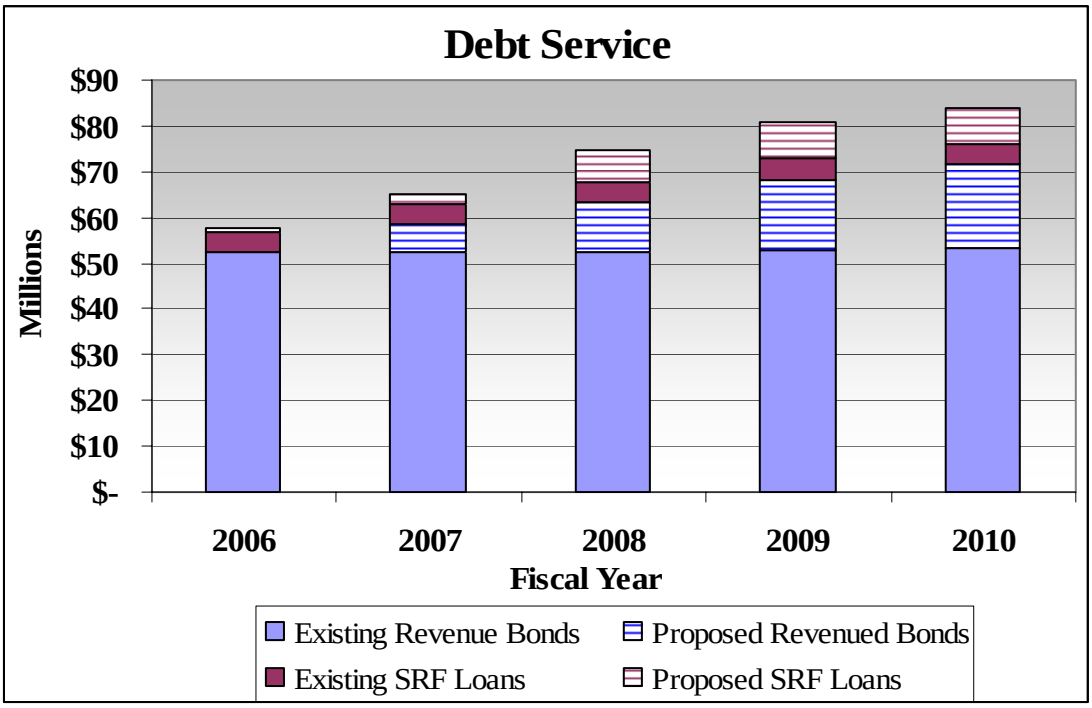
It should be noted that while the model assumes that two revenue bonds are issued, a number of alternative financing approaches are available, including the use of short-term financing vehicles, such as commercial paper, to provide the initial funding and delay the need to issue revenue bonds. As a result, the model focuses on developing a more straight-forward projection that will likely be more conservative, suggesting somewhat higher rate increases than may result under the final financing plan.

C. Debt Service

Revenue requirements also include both existing and projected debt. MWS's existing debt service obligations include revenue bonds and state revolving fund loans. (Debt service on TLDA loans was excluded since this is paid with revenues generated from the 10% surcharge applied to the wastewater bill.) Proposed revenue bond debt service, which is assumed to be used to fund a significant portion of the CIP, was estimated assuming an interest rate of 5.5%, a 25-year term, and insurance and issuance costs of 5.5% of the par amount. The forecast is based on the assumption that bonds will be issued in calendar years 2006 and 2008. Debt service payments during the fiscal year that the bonds are issued (FY 2007 and FY 2009) are limited to interest costs only for nine months, and then total principal and interest payments will begin in the following fiscal year. As a result, the impact of the additional borrowing, including the additional SRF loans already secured for the biosolids and odor control projects, will produce steadily increasing annual debt service costs during the forecast period. As shown below, debt service costs are forecast to increase from approximately $58 million in FY 2006 to approximately $83 million by FY 2010.

Exhibit 12

Projection of Existing and Proposed Debt Service



D. Reserve Funds and Debt Service Coverage Requirements

Revenue requirements also should be set to maintain adequate reserve funds and to meet debt service coverage requirements. MWS has a policy in place which establishes a minimum fund balance for its Extension and Replacement ("E&R") Fund. At a minimum, MWS must maintain a fund balance in the E&R Fund at least equal to the sum of the following financial components:

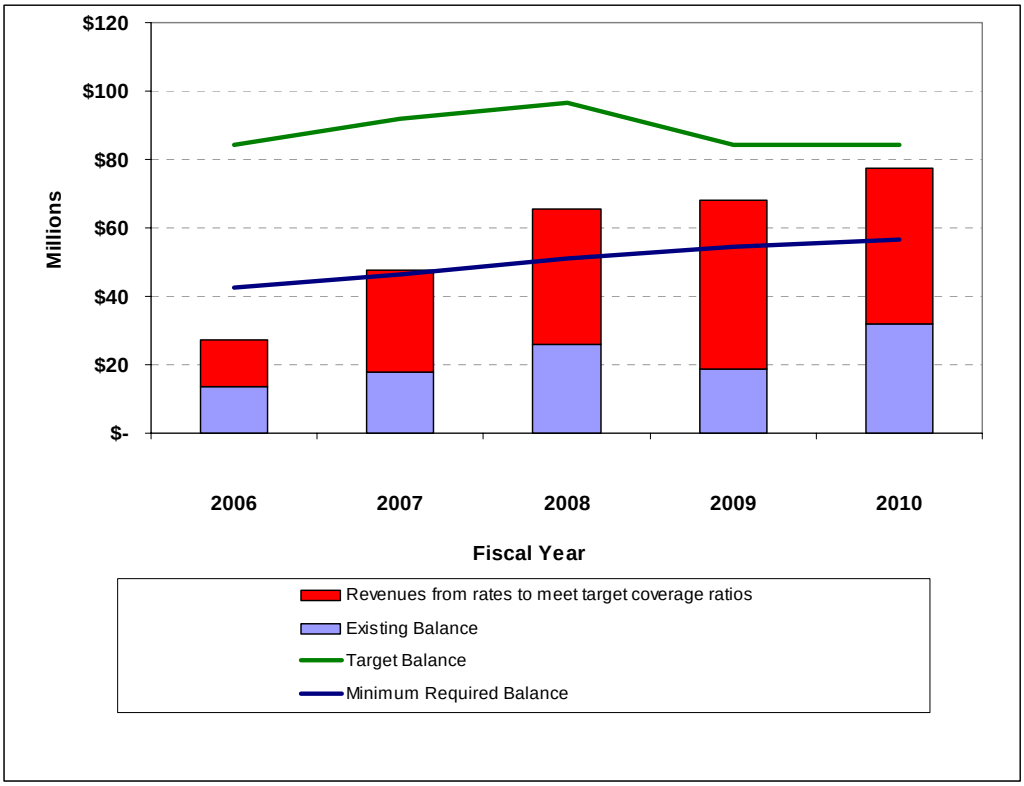
- ½ of principal payments and ¼ of interest payments for revenue bonds for current fiscal year;
- one month's revenues; and,
- 1/8th of operating budget.

The sum of these components is projected to be approximately $50 million per year for FY 2006 to 2010. However, this is the minimum required cash balance. Historically, MWS has *targeted* a higher level of E&R Fund balance equal to at least the next fiscal year's CIP costs. As mentioned previously, the average annual cost of CIP projects for the four-year forecast period is approximately $87 million. In prior year's, MWS was able to generate enough revenues from

rates and charges to maintain adequate fund balances in the E&R Fund. However, as MWS' O&M and CIP project costs have increased over the past several years, and in the absence of any offsetting rate increases, the E&R Fund has been significantly reduced. By the end of FY 2006, MWS anticipates having an E&R Fund balance of only $27 million. Since the projected E&R Fund balance is inadequate, revenue requirements should be set to ensure that enough revenues from rates are generated to rebuild the E&R Fund balance. For the purpose of developing the financial forecast the E&R Fund balance is assumed to be increased gradually to meet the overall funding objectives. This means that the *target* E&R Fund balance (equal to next year's CIP costs) would not be met initially, but the minimum fund balance requirement (the sum of components shown above) would be achieved. The revenue requirements (i.e. cash from rates and charges) needed to meet the minimum balance requirements in the E&R Fund are shown below.

Exhibit 13

Projection of Reserve Funds



The revenue requirements including reserves not only assist with meeting the minimum and/or target balance requirements, but also assist in meeting debt service coverage requirements. The Department's Water and Wastewater Revenue Bond Resolution No. R85-762 adopted November 5, 1985, ("Resolution") requires that projected revenues for each year must be equal to at least 110% of the combined total projected operating expenses for that fiscal year plus annual debt

service costs for all revenue bonds issued pursuant to the Resolution. The debt service coverage ratio is calculated by dividing total revenues by the sum of O&M expenses and debt service on revenue bonds, and must be at least 1.10. This ratio is tracked in the Rate Model to verify that this minimum requirement can be met. Other coverage ratios are also tracked in the Rate Model that address total debt, not just the revenue bond debt addressed in the Resolution. In fact, the requirements set forth in the Resolution are not representative of the types of coverage ratios typically required in more modern bond documents, or with the ratios typically evaluated by rating agencies to establish credit ratings for government utilities. The debt service coverage ratio for a standard coverage test is calculated by dividing net operating income (revenues less O&M expenses) by total debt service, including both revenue bonds and SRF loans. MWS' investment advisor, PFM, indicated that in order to maintain the current credit rating, the target level for this standard coverage ratio should be around 1.9, and MWS should have at least 200 days of cash balance (ending cash balance in each fiscal year divided by the quotient of O&M expenses divided by 365) on hand in any given year. In order to achieve this target coverage ratio, the model calculates the level of revenues from rates that must be generated (which are shown in red in Exhibit 13). Funding reserves through rates in effect causes a surplus from rates to be generated. This surplus in turn funds not only reserves, but also generates sufficient revenues to meet both the debt coverage ratio defined by the Resolution and standard debt service coverage ratios targeted by bond rating agencies.

IV. REVENUE SUFFICIENCY AND RATE ADJUSTMENTS

A. Revenue Sufficiency

Exhibit 14 shows the total projected revenue requirements for FY 2006 through FY 2010 to meet the following objectives as discussed in the previous section:

- Fund the entire five-year CIP over the four-year forecast;
- Achieve a standard bond coverage ratio close to 1.90 in each fiscal year;
- Maintain at least 200 days of cash balance on hand in each fiscal year; and
- Maintain the minimum required balance in the E&R Fund in each fiscal year.

As shown in Exhibit 14, revenue requirements increase more significantly for FY 2007 through FY 2009 as debt service for both the proposed revenue bonds and committed SRF loans commence. Exhibit 14 also shows the revenues (including revenues from proposed wastewater wholesale rates) generated if current water and wastewater rates are assumed to remain unchanged until FY 2010. If the current rates are maintained over the forecast period, it will not be possible to fund the majority of the current CIP. As mentioned, it is anticipated that the CIP will be funded through a combination of reserves (funded from rates) and revenue bonds. As shown in Exhibit 14, if rates remain unchanged, reserves will not be adequately funded and revenues will not be adequate to support the proposed debt service. However, and more importantly, MWS will be in default of the Resolution since the debt coverage ratio on the existing revenue bond debt, as defined in the Resolution, drops below 1.10. Projected debt coverage ratios, assuming current rates remain in place and based on the forecast revenue requirements, are shown in Exhibit 15. In FY 2007, the debt service coverage ratio is estimated to be 1.08 and therefore does not meet the debt service coverage requirement of at least 1.10, indicating that either revenues must be increased for FY 2007 or O&M expenses must be reduced in order to meet the requirements of the Resolution.

Exhibit 14

Projection of Revenue Sufficiency Under Existing Rates

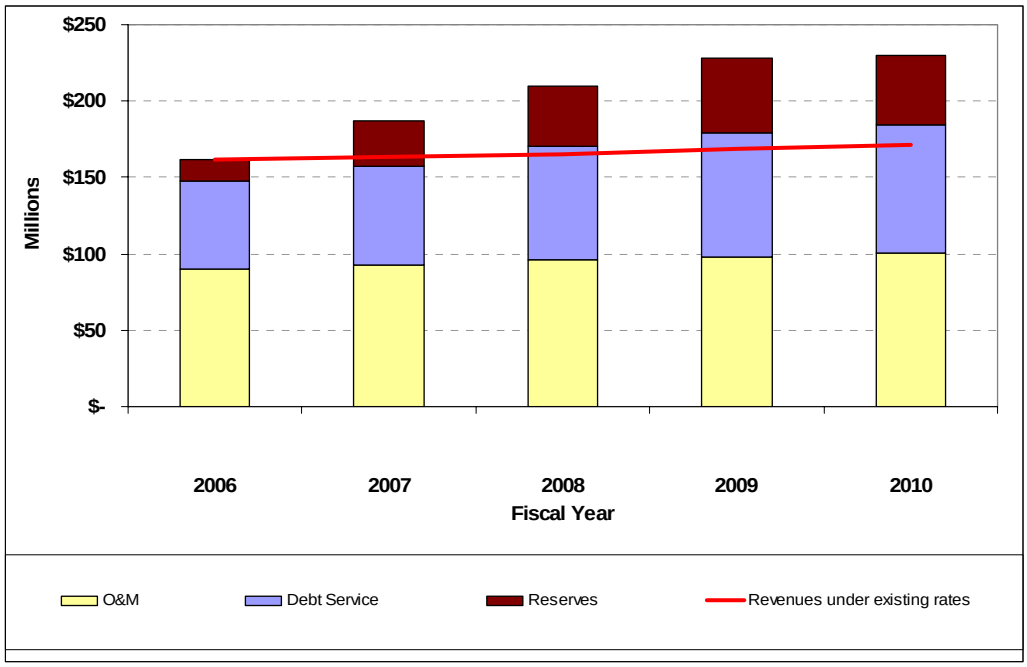
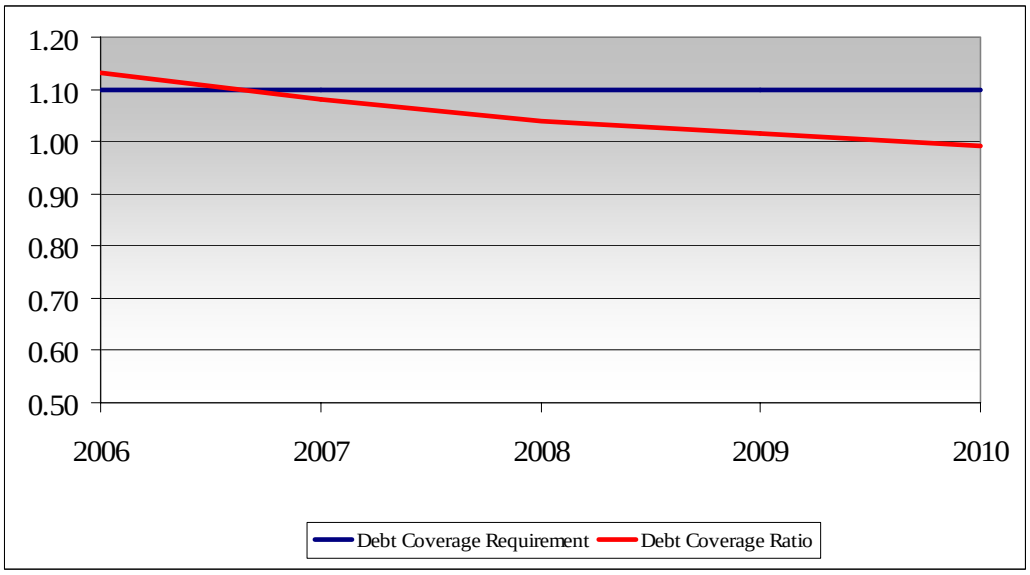


Exhibit 15

Projection of Debt Service Coverage Under Existing Rates



While rates have been able to remain unchanged in recent years, the current water and wastewater rates based on the forecast from the Rate Model will not be sufficient to fund the CIP or to meet debt service coverage requirements in future years.

B. Allocation of Revenue Requirements

As an enterprise fund, water and wastewater operations are financed and operated as a distinct business enterprise. Appropriate fees and charges should be established to ensure that the water and wastewater operations can operate on a self-sustaining basis. For the water and wastewater utilities, the majority of revenues are normally derived through user charges. User charges are defined as service fees, rates, and billings that are charged to the beneficiaries of the water and wastewater services. The utilities also generate other revenues such as customer service charges and tap fees and non-operating revenues such as interest earnings. These other revenues are also referred to as offsets because they are used to reduce, or offset, the total revenue requirements to determine net revenue requirements, which represent the amount to be recovered from the retail user rates and charges for each utility.

In order to determine the net revenue requirements and necessary rate adjustments for each utility, each component of the revenue requirements identified in the previous section, as well as offsets, was allocated to each utility based on various allocation factors as described below:

- *Operating and Maintenance Expenses* – The budget is allocated between water and wastewater using various allocation factors provided by MWS staff, based on water and wastewater operating system statistics, or using a composite allocation.

- *Capital Costs* – The capital improvement plan is allocated to water and wastewater based on input from MWS staff.

- *Debt Service Costs* – The existing annual debt service cost for MWS was allocated between water and wastewater based on fixed asset information. Approximately 25% of all fixed assets are water system assets, compared to 75% for wastewater system assets. These percentages were used to allocate the debt service payments for revenue bonds and state revolving fund ("SRF") loans between each utility. Proposed SRF debt service payments for the odor control and biosolids projects as estimated by MWS staff were allocated 100% to the wastewater utility.

- *Reserve Funds and Debt Service Coverage Requirements* – The amount of reserve funds to be maintained is allocated to each utility based on the proportion of CIP projects, since the reserves are used to fund a portion of the CIP.

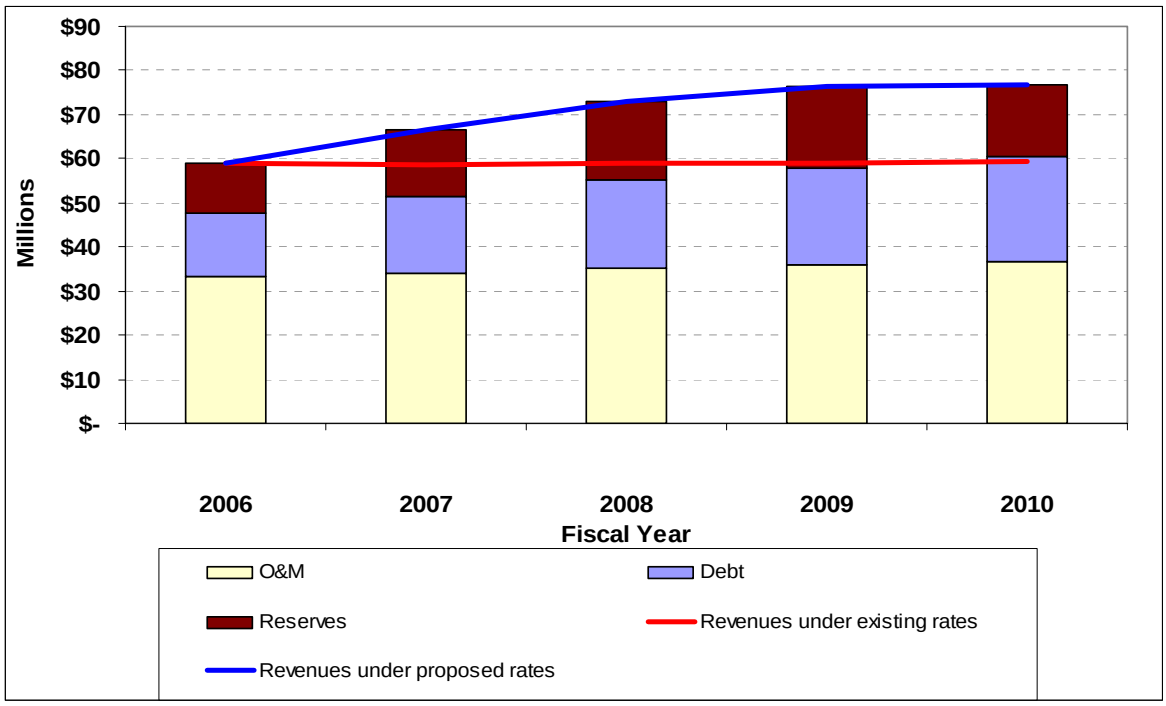
- *Offsets* – Each offset was reviewed and allocated to each utility based on input from MWS staff, the proportion of meters, or based on the overall budget allocation.

C. Water Rate Adjustments

The resulting allocation of revenue requirements for the water utility is shown in Exhibit 16. On average, O&M expenses are projected to increase by 2.7% per year. Debt service costs increase on average 13% per year as debt service payments associated with the proposed 2006 and 2008 revenue bonds commence. Contributions to reserve funds generated from rates are forecast to increase by an average of 11% per year in order to fund a portion of the CIP, and to meet minimum fund balance requirements and debt service coverage ratios.

Exhibit 16

Projection of Water Revenue Requirements and Adjustments



As shown in Exhibit 16, *total* annual water revenue requirements increase by approximately 7% per year. However, revenues generated under current rates are insufficient to meet these revenue requirements. In order to meet the water revenue requirements over the forecast period, the necessary across-the-board water rate adjustments and the corresponding monthly meter and volumetric charges are shown in Exhibit 17. The rate adjustments are shown both including and excluding the implementation of proposed wholesale wastewater rates (discussed in Part B, Section I). (While the proposed wholesale rates only affect wastewater wholesale customers, various revenue offsets and revenue requirements are allocated using factors that are impacted by the inclusion or exclusion of revenues based on the proposed wholesale rate increases. As a result, the inclusion or exclusion of the revenues from proposed wastewater wholesale rates affects not only the projected wastewater rate adjustments, but also the projected water rate adjustments).

Exhibit 17

Projected Water Rate Adjustments

	Current Rates	Proposed Water Rates With Wholesale Rate Adjustments			
Base Charges (5/8" meter)	2006	2007	2008	2009	2010
Residential	**$ 2.70**	$ 3.11	$ 3.42	$ 3.59	$ 3.59
Small Commercial	**$ 3.44**	$ 3.96	$ 4.35	$ 4.57	$ 4.57
Intermediate Commercial	**$ 11.96**	$ 13.75	$ 15.13	$ 15.89	$ 15.89
Large Commercial	**$ 515.91**	$ 593.30	$ 652.63	$ 685.26	$ 685.26
Volume Charges					
Residential	**$ 2.01**	$ 2.31	$ 2.54	$ 2.67	$ 2.67
Small Commercial	**$ 2.14**	$ 2.46	$ 2.71	$ 2.84	$ 2.84
Intermediate Commercial	**$ 1.85**	$ 2.13	$ 2.34	$ 2.46	$ 2.46
Large Commercial	**$ 1.56**	$ 1.79	$ 1.97	$ 2.07	$ 2.07
Water Rate Adjustments		**15.00%**	**10.00%**	**5.00%**	**0.00%**

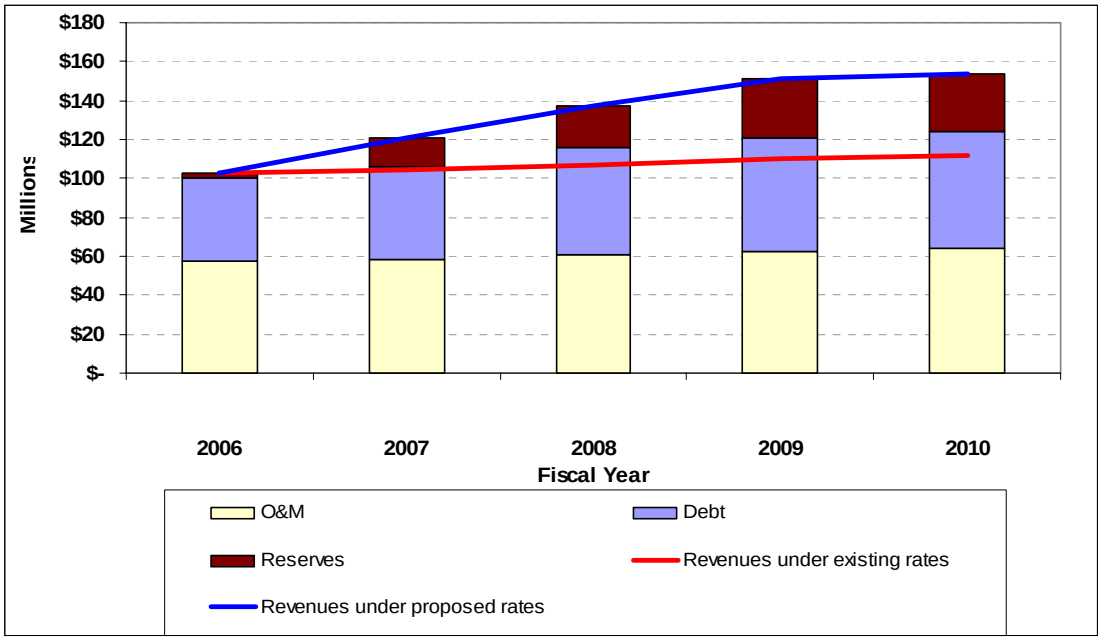
	Current Rates	Proposed Water Rates Without Wholesale Rate Adjustments			
Base Charges (5/8" meter)	2006	2007	2008	2009	2010
Residential	**$ 2.70**	$ 3.17	$ 3.49	$ 3.69	$ 3.69
Small Commercial	**$ 3.44**	$ 4.04	$ 4.45	$ 4.70	$ 4.70
Intermediate Commercial	**$ 11.96**	$ 14.05	$ 15.46	$ 16.35	$ 16.35
Large Commercial	**$ 515.91**	$ 606.19	$ 666.81	$ 705.16	$ 705.16
Volume Charges					
Residential	**$ 2.01**	$ 2.36	$ 2.60	$ 2.75	$ 2.75
Small Commercial	**$ 2.14**	$ 2.51	$ 2.77	$ 2.92	$ 2.92
Intermediate Commercial	**$ 1.85**	$ 2.17	$ 2.39	$ 2.53	$ 2.53
Large Commercial	**$ 1.56**	$ 1.83	$ 2.02	$ 2.13	$ 2.13
Water Rate Adjustments		**17.50%**	**10.00%**	**5.75%**	**0.00%**

D. Wastewater Rate Adjustments

The resulting allocation of revenue requirements for the wastewater utility is shown in Exhibit 18. On average, O&M expenses increase 2.7% per year. Debt service costs increase on average 9% per year as debt service payments associated with the proposed 2006 and 2008 revenue bonds commence, as well as additional debt service for new SRF Loans. Contributions to reserve funds increase significantly as the wastewater utility is currently not generating a significant surplus to fund reserves. However, in order to fund a portion of the CIP, meet minimum fund balance requirements and debt service coverage ratios, contributions to reserve funds will have to increase significantly in future years. The total projected wastewater revenue requirements are shown in Exhibit 18.

Exhibit 18

Projection of Wastewater Revenue Requirements and Adjustments



As shown in Exhibit 18, *total* annual wastewater revenue requirements increase by approximately 10.7% per year. However, revenues generated under current wastewater rates are insufficient to meet revenue requirements. As mentioned previously, these revenues are shown both with and without the implementation of proposed wholesale wastewater rates. In order to meet the projected wastewater revenue requirements over the forecast period, the necessary across-the-board wastewater rate adjustments and corresponding rates are as follows:

Exhibit 19

Projected Wastewater Rate Adjustments and Resulting Rates

	Current Rates	Proposed Wastewater Rates With Wholesale Rate Adjustments			
	2006	2007	2008	2009	2010
Base Charges (5/8" meter)					
Residential	**$ 6.05**	$ 7.26	$ 8.35	$ 9.18	$ 9.18
Small Commercial	**$ 6.76**	$ 8.11	$ 9.33	$ 10.26	$ 10.26
Intermediate Commercial	**$ 22.14**	$ 26.57	$ 30.55	$ 33.61	$ 33.61
Large Commercial	**$ 854.53**	$ 1,025.44	$ 1,179.25	$ 1,297.18	$ 1,297.18
Volume Charges					
Residential	**$ 3.76**	$ 4.51	$ 5.19	$ 5.71	$ 5.71
Small Commercial	**$ 4.21**	$ 5.05	$ 5.81	$ 6.39	$ 6.39
Intermediate Commercial	**$ 3.43**	$ 4.12	$ 4.73	$ 5.21	$ 5.21
Large Commercial	**$ 2.59**	$ 3.11	$ 3.57	$ 3.93	$ 3.93
Wastewater Rate Adjustments		**20.00%**	**15.00%**	**10.00%**	**0.00%**

	Current Rates	Proposed Wastewater Rates Without Wholesale Rate Adjustments			
	2006	2007	2008	2009	2010
Base Charges (5/8" meter)					
Residential	**$ 6.05**	$ 7.53	$ 8.66	$ 9.68	$ 9.68
Small Commercial	**$ 6.76**	$ 8.42	$ 9.68	$ 10.82	$ 10.82
Intermediate Commercial	**$ 22.14**	$ 27.56	$ 31.70	$ 35.42	$ 35.42
Large Commercial	**$ 854.53**	$ 1,063.89	$ 1,223.47	$ 1,367.23	$ 1,367.23
Volume Charges					
Residential	**$ 3.76**	$ 4.68	$ 5.38	$ 6.02	$ 6.02
Small Commercial	**$ 4.21**	$ 5.24	$ 6.03	$ 6.74	$ 6.74
Intermediate Commercial	**$ 3.43**	$ 4.27	$ 4.91	$ 5.49	$ 5.49
Large Commercial	**$ 2.59**	$ 3.22	$ 3.71	$ 4.14	$ 4.14
Wastewater Rate Adjustments		**24.50%**	**15.00%**	**11.75%**	**0.00%**

E. Customer Impacts

One of the most important components of the rate study was an analysis of how the projected rate adjustments would impact the monthly bills of water and wastewater customers. RFC worked closely with MWS staff to ensure that appropriate revenue requirements would be recovered, while monitoring and minimizing related impacts on customers. Because the Rate Model is structured to maintain the existing rate structure (across-the-board rate increases), the average combined impact per customer for FY 2007 is approximately 18.5%, regardless of customer class or the level of usage. Since the majority of customers are residential customers with 5/8" meters, the combined effect of both the water and wastewater rate adjustments for FY

2007 for this customer class are shown below in Exhibit 20. The combined monthly bill for the average residential customer who uses 6 ccf of water will increase from $31.83 to $37.73.

Exhibit 20

Residential Customer Impacts (5/8"meter)

Residential Customer Impacts Combined Water and Wastewater Bill			
Usage	**Current Rates 2006**	**Projected Rates 2007**	**% Change**
4	$ 20.29	$ 24.05	18.5%
6	$ 31.83	$ 37.73	18.5%
12	$ 66.45	$ 78.77	18.5%
18	$ 101.07	$ 119.81	18.5%
20	$ 112.61	$ 133.49	18.5%
24	$ 135.69	$ 160.85	18.5%
30	$ 170.31	$ 201.89	18.5%
36	$ 204.93	$ 242.93	18.5%

F. Comparison with Other Utilities

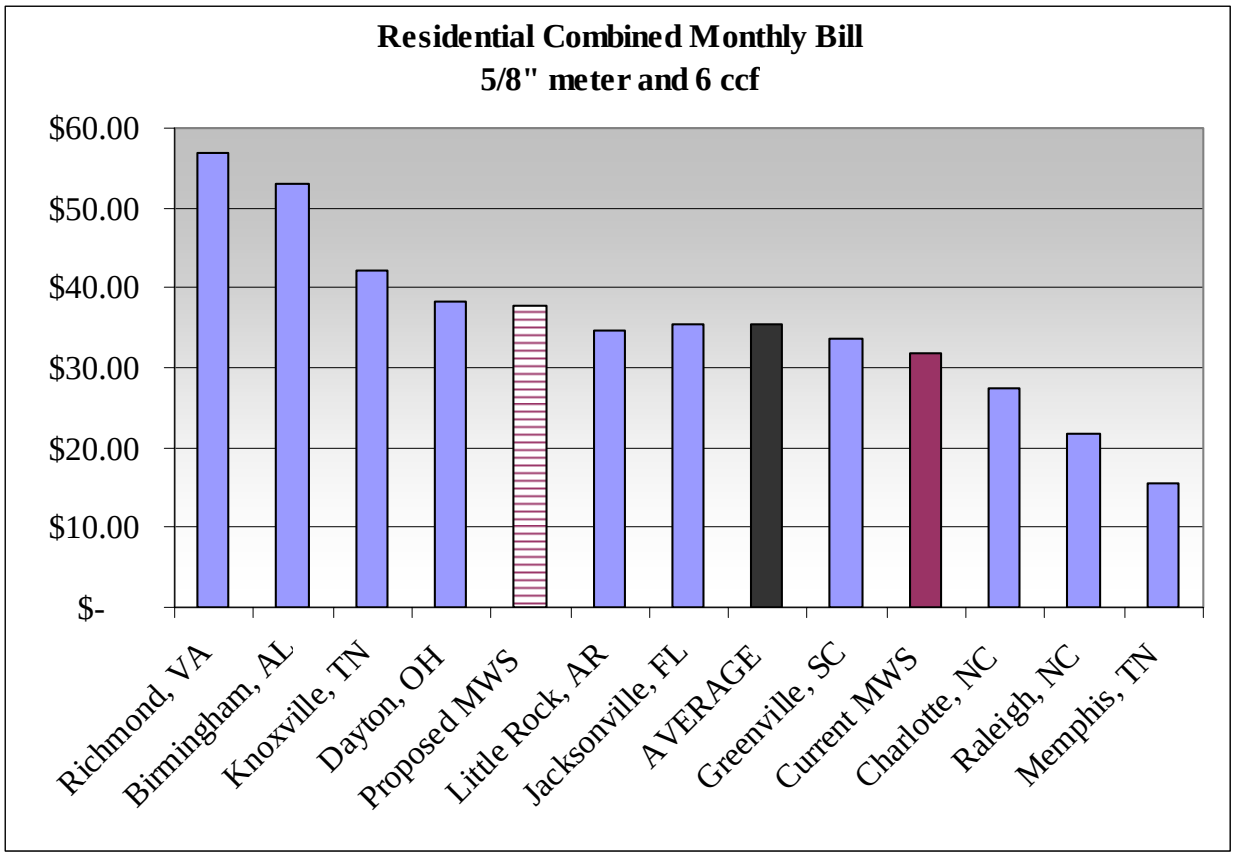
Exhibits 21 through 24 provide a comparison of monthly water and wastewater bills, for various customer types, with other representative, regional communities, including costs for MWS customers before and after the forecast rate increases. (The monthly bills assume that wastewater wholesale rate increases are implemented). Comparing water and wastewater bills with other representative communities can provide insights regarding a utility's pricing policies related to water and wastewater services. However, care should be taken in drawing conclusions from such a comparison, as higher bills may not necessarily mean the utilities are operated and managed poorly. Many factors affect the level of costs and the pricing structure employed to recover those costs. Some of the most prevalent factors include geographic location, demand, customer constituency, level of treatment, level of grant funding, age of system, level of general fund subsidization, and rate setting methodology. Furthermore, it should be noted that the majority of the representative communities assesses a separate charge for stormwater services. MWS does not assess a separate charge for stormwater services. Therefore wastewater rates must recover both wastewater and stormwater O&M costs and capital costs.

The residential rate comparison is based on 6 ccf of water and wastewater flow and assumes a meter size of 5/8". While the combined cost increase for a residential and small commercial customer using 6 ccf gallons per month (the average for MWS) is approximately 18.5% for FY 2007, the rates remain comparable with those of other communities. In addition, MWS has an

average overall median household income ("MHI") of $39,797[7]. The ratio of annual water and wastewater costs for MWS ($452.76 for residential customers using 6 ccf per month) is approximately 1.14% of MHI. This figure falls well within the affordability guideline of 2% for water and 2% for wastewater, as identified by the EPA's Financial Capability Assessment publication[8].

Exhibit 21

Residential Rate Comparison with Regional Communities



[7] Obtained from MWS website: http://www.nashville.org/flashpgs/demographics.htm.
[8] Combined Wastewater Overflows: Guidance for Financial Capability Assessment and Schedule Development (Environmental Protection Agency, march 1997) page 19.

Exhibit 22

Small Commercial Rate Comparison with Regional Communities

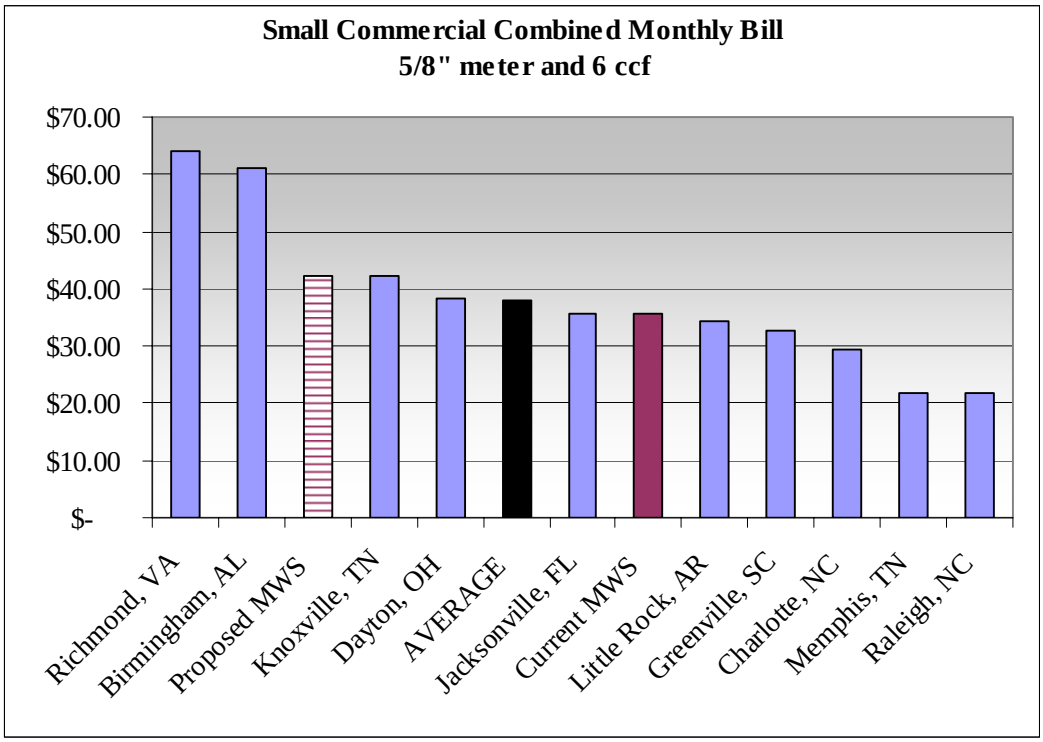


Exhibit 23

Intermediate Commercial Rate Comparison with Regional Communities

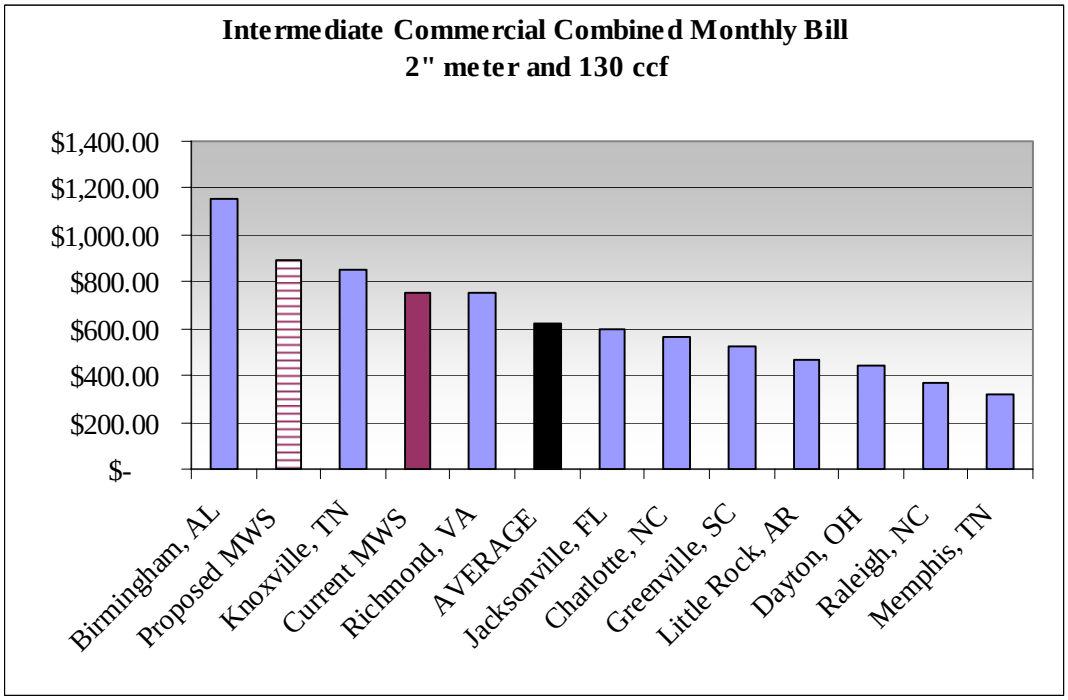
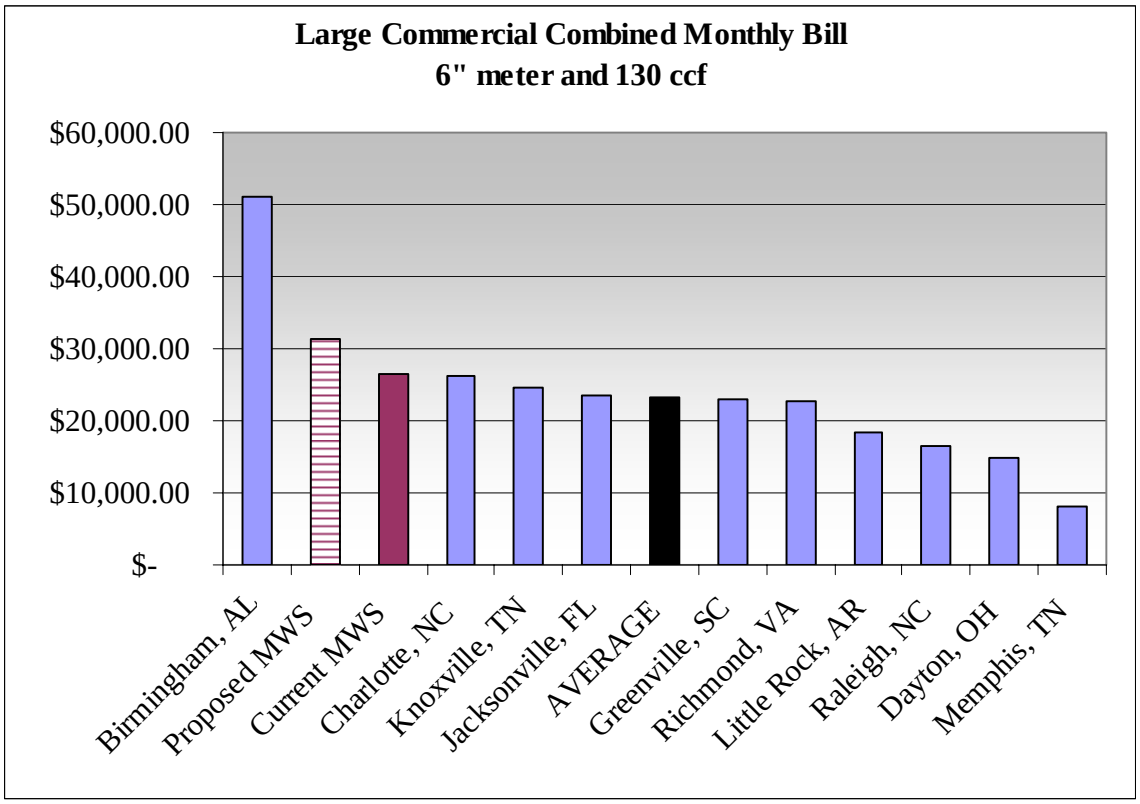


Exhibit 24

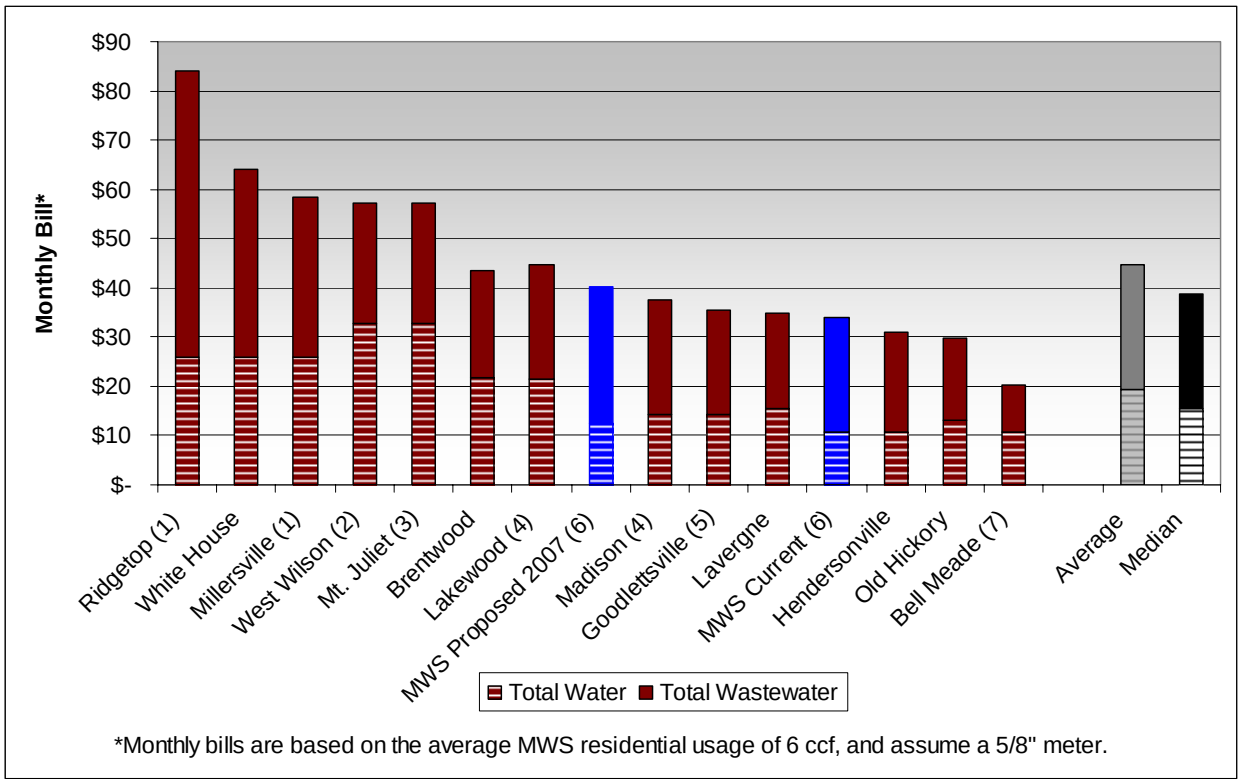
Large Commercial Rate Comparison with Regional Communities



As shown in Exhibit 25, a rate comparison of monthly water and wastewater bills for residential customers (assuming 6 ccf of water usage and a 5/8" meter) was also performed for local communities. As shown, both the current and projected FY 2007 monthly bills for residential customers are less then the average monthly bill for the entire group, based on the rates currently in place for each of these communities, and are comparable to the median monthly bill for the entire group.

Exhibit 25

Residential Rate Comparison with Local Communities



(1) Water rates are those charged by White House.
(2) Sewer rates are those charged by Mt. Juliet.
(3) Water rates are those charged by West Wilson.
(4) Sewer rates are those charged by MWS.
(5) Water rates are those charged by Goodlettsville and sewer rates are those charged by MWS.
(6) Sewer rates include a 10% surcharge for TLDA loans.
(7) Water rates are those charged by MWS. Sewer rates are MWS' T&T rate plus a Belle Meade surcharge.

G. Sensitivity Analysis

The Rate Model can be used to conduct sensitivity analyses to determine the impact on rate adjustments of changes to key variables and assumptions, while still meeting targeted criteria including debt service coverage ratios and reserve fund balances. Reducing forecast revenue requirements by changing the level of projected O&M expenses, CIP costs, and/or terms on revenue bonds, allows the level of overall rate adjustments to be reduced. Rate adjustments can also be mitigated by adjusting certain existing MWS rate setting policies to provide additional

revenues. The Rate Model was used to evaluate the effect of a number of potential adjustments to the assumptions used to forecast revenue requirements, as well as certain policy changes, over the four-year forecast period.

Changes in Revenue Requirements:

- Decrease annual O&M expenses by 1% (approximately $900,000), which would decrease overall rate adjustments by 2% in total, over the four-year forecast period.
- Reduce annual CIP cost by $5 million which would decrease overall rate adjustments by 1%, in total, over the four-year forecast period.
- Extend the term for proposed revenue bonds from 25 years to 30 years, reducing total debt service payments in the four-year forecast period by approximately $3.1 million, which would decrease overall rate adjustments by 2%, in total, over the four-year forecast period.

It should be noted that decreases in O&M costs cause larger decreases in rate adjustments than reductions in the CIP because the entire reduction in O&M costs will take place in each year, whereas a portion of the CIP is funded with revenue bonds that have principal and interest payments that are spread out over the 25-year term of the bonds. Therefore decreases in O&M costs will have a greater favorable impact on rate adjustments than an equivalent reduction in CIP costs.

Changes in Existing Policies:

- Eliminate multiple accounts on contiguous properties, which comprise approximately 8% of billable water flow and 8% of billable wastewater flow (excluding the 2 ccf captured in the minimum monthly charge). This policy change would allow MWS to generate an additional $2 million per fiscal year, resulting in a reduction in overall rate adjustments of approximately 1.5% over the four-year forecast period.

- Eliminate the cap that limits billable summer flow for wastewater service to residential customers to a maximum of the winter average usage plus 30%. Currently, approximately 16% of water use is excluded from wastewater billing due to the summer cap. If this flow is included as billable wastewater flow, then an additional $4.2 million in revenues per fiscal year would be generated, thus allowing overall rate adjustments to be reduced by approximately 3% over the four-year forecast period. (However, it is not unreasonable to expect that this policy change, as well as the potential rate increases, may affect future customer behavior and demand as these utility services become more expensive. This will have a corresponding impact on future revenues and the actual rate adjustments that may be required in the future.)

- Eliminate the inclusion of the first 2 ccf in the monthly minimum charge. Currently, approximately 12.5% of water flow and 14.5% of wastewater flow is flow that is included as part of the monthly minimum charge. If customers are billed for this flow based on the existing volumetric rates, while also maintaining the current minimum charges, then an additional $19.5 million per fiscal year will be generated in revenues, thus allowing overall rate adjustments to be reduced by approximately 14% over the four-year forecast period.

Any change in the existing policies may produce a wide range of customer impacts. For example, eliminating the multiple accounts on contiguous properties will adversely affect some of MWS' largest clients. Eliminating the cap and the inclusion of the first 2 ccf of usage in the monthly minimum charge will produce adverse customer impacts for residential customers. Specifically, the elimination of the inclusion of the first 2 ccf in the monthly minimum charge would cause the largest percentage increase for low volume residential customers, thus impacting the affordability of water and wastewater service for low income, fixed income, or other economically disadvantaged customers.

I. WHOLESALE RATES

A. Background

As part of the cost of service analysis performed for the Metro Government in September 2004, RFC was asked to review the existing wholesale rates charged for water and wastewater and to evaluate whether the current rates being charged to MWS wholesale customers were adequate to recover those costs identified in the cost of service analysis as reasonably and appropriately attributable to the provision of wholesale services. As a result of the initial analysis, it appeared that the current wastewater rates being charged to the wholesale customers, specifically those trunk and treatment customers that were a part of MWS 201 Facilities Planning Agreement ("201 Agreement"), were not providing sufficient revenues to cover the costs of providing service to them. These results were summarized in the report to MWS titled Cost of Service Analysis, dated August, 2005 (the "Cost of Service Report").

After the release of the Cost of Service Report, MWS hosted a meeting with wastewater wholesale customers to discuss and answer questions regarding the results of the wholesale analysis.[9] The results of the analysis were presented to wholesale customers, and it was indicated that the results were based on a fairly broad or higher-level analysis designed mainly to determine if additional, or more detailed analyses of wholesale rates were warranted. During this meeting, several issues were raised regarding the appropriateness of the allocation of certain cost categories to the wholesale customers. Additional concerns were raised related to properly accounting for and recognizing previous financial contributions made by wholesale customers to fund assets maintained and operated by MWS. During this meeting, RFC indicated to the wholesale customers that based on the results of the cost of service analysis, the next phase of the analysis would be to develop a more comprehensive, detailed rate study (the "Financial Planning and Rate Study") that would examine and address the types of issues and questions being raised by the wholesale customers, and that these issues would certainly be addressed before calculating actual rates to be charged to the wholesale customers.

To begin this endeavor, RFC made several trips to the Nashville area to meet with each of the wholesale customers. The purpose of these meetings was to gain an understanding of the operating environment and relationship between MWS and each of its wholesale customers. Specifically, physical connections and interconnections were discussed, as well as financial contributions made to MWS by individual wholesale customers during the course of their contracts with MWS. MWS wholesale customers were also given an opportunity to raise any additional issues that had not been raised in the initial meeting, and for those wholesale

[9] Wholesale customers were invited to attend a meeting held on October 26, 2004 to review and discuss the results of the Cost of Service analysis that would provide the basis for the Financial Planning and Rate Study.

customers that did not attend the initial meeting, the meetings provided an opportunity to react to the cost of service analysis.

It was during these meetings that wholesale customers shared with both MWS and RFC that they had formed the Metro Sewer Users Association ("MSUA") and had retained a consultant, Consolidated Technologies, Inc. ("CTI") to represent them. During the course of the Rate Study, CTI prepared a report to formally address MSUA's concerns with the cost of service analysis titled "Task 1, Review of Metro Water Services Wholesale Cost of Service Analysis" dated August 2005 ("CTI Report"). RFC has reviewed the CTI report and addresses these concerns at the end of this report.

The following discussion documents the results of the Rate Study related to wholesale wastewater rates, and reflects the additional information gathered during RFC's meetings with MWS wholesale customers to develop a more comprehensive understanding of the relationships MWS has with its wastewater wholesale customers.

It is important to note that for those MWS wastewater wholesale customers that are not part of the 201 Agreement, including Mount Juliet, Ridgetop, and White House Utility District, the following analysis assumes that the current contracts in place between MWS and those entities will remain unchanged. These contracts are relatively new contracts for MWS with expiration dates further in the future, with rates that are not determined based on the methodology used for the participants in the 201 Agreement ("201 Participants"). As a result, the updated analysis and revised wholesale wastewater rate calculations focuses specifically on the rates to be charged to those 201 Participants where, based on the cost of service study, the existing rate structure does not provide adequate or equitable cost recovery. These 201 Participants include Belle Meade, Brentwood, Hendersonville, Millersville, La Vergne and the Old Hickory Utility District. In addition, the proposed rates would also apply to Goodlettsville, which is not a 201 Participant, but whose current contract has expired and has been receiving wholesale wastewater service based on annual contract extensions until a new contract, and rate methodology, could be implemented.

The following discussion of wholesale rates focuses solely on wholesale wastewater rates and service. The original cost of service analysis indicated that the existing wholesale water rate for the sole water wholesale customer compared favorably with the calculated cost of service, which suggested that significant changes to this rate methodology were not warranted at this time.

B. Development of Wholesale Wastewater Rates

To develop MWS' wastewater wholesale rates, RFC recommends using the Utility Approach to rate setting. The Utility Approach is the same approach that was used in the cost of service analysis, and is consistent with industry guidelines as provided by the American Water Works Association ("AWWA") and the Water Environment Federation ("WEF").

As was discussed in the Cost of Service Report, government-owned utilities most often use the Utility Approach to determine outside-city rate differentials and to calculate wholesale rates since it provides a more effective methodology for compensating the utility for the risk associated with providing service to customers located outside the corporate limits of a government-owned utility. In addition, the Utility Approach also provides a measure of protection for the wholesale customers against inconsistent or changing capital financing decisions or inequitable rate-setting practices of the "owner" or service provider, often resulting in more stable rates and/or more moderate rate adjustments. (The specific cost components recovered using the Utility Approach are identified in more detail below.) In comparison, the Cash Needs Approach, which is typically used by government-owned utilities to set retail rates and charges, including the retail rate adjustments documented in this report, may generate wholesale rates that fluctuate from year to year depending on the level of cash funding used to pay for capital investment and the timing of new debt issues or the retirement of existing debt issues.

Whereas, the Financial Planning and Rate Study utilizes the same methodology that was used for the cost of service analysis, the Rate Study "fine tunes" many of the assumptions and variables used in the initial cost of service analysis. The Rate Study makes an effort to account for <u>all</u> assets, both cash and utility plant, contributed to MWS by wholesale customers and other government entities, such as the Environmental Protection Agency ("EPA") in the form of grants. In addition, the information used to allocate costs to wastewater wholesale customers, based on wastewater flow, has been changed and updated. The flow information used to allocate costs is based on both treated flows delivered to the plants and their relative strength loadings, which affect treatment costs. The wastewater flow information used is discussed in more detail later in this report. Some of the more significant adjustments to the analysis include the following:

- Cost information was updated to reflect FY 2006 budget information.
- Flow information was updated to reflect FY 2003 through FY 2005 data for each individual wastewater wholesale customer and for each of the individual wastewater treatment plants.

- A "credit" was calculated to recognize actual capital contributions made by each individual wholesale customer outside of any debt service paid as part of the trunk and treatment rate for 201 Participants.
- Credit was given for those assets identified in the trunk and treatment contract to be funded by the debt service component of the trunk and treatment rate calculated as part of the annual *Trunk and Treatment Analysis*.
- Budget allocation percentages were updated to reflect the most current analyses as to the split of O&M expenses between water and wastewater.
- Allocation percentages for both water and wastewater were updated to appropriately reflect those costs shared by both wholesale and retail customers ("joint") and those costs specific to retail customers only ("retail").
- Stormwater related costs were removed from the wholesale rate calculation.
- The weighted average cost of capital (i.e. rate of return) for MWS was updated to reflect more current economic indices and market conditions.

As discussed in the Cost of Service Report, the Utility Approach looks at two primary cost components:

1. An operation and maintenance ("O&M") component which includes an allocated share of direct costs for operation of the assets used to provide wastewater service to wholesale customers;
2. A capital component which includes a rate of return applied to an allocated portion of the investment in assets used to serve wholesale customers, and an allocated portion of the depreciation expenses associated with these assets.

These two components are allocated to the wholesale customers based on their pro-rata share of usage, as determined from an analysis of historical flows, which includes adjustments to address differences in the types or strengths of wastewater flow delivered by different customer classes. Each of these components is discussed in more detail below.

O&M Component

To determine the O&M component of the wastewater wholesale rates, budgeted FY 2006 O&M costs, including general, administrative and overhead costs, but exclusive of debt service costs, capital outlay, CIP projects, and stormwater, were allocated between water and wastewater. O&M costs for wastewater, were then allocated between two categories of costs:

1. Joint costs – Includes costs for the operation of facilities that provide benefit to both wholesale and retail customers. Typically this would include costs associated with the operation of all core system assets including wastewater treatment plants, wastewater interceptors or transmission lines, and pump stations.
2. Retail costs – Includes costs for the operation of system components that generally do not benefit wholesale customers. This would include costs associated with local service wastewater collection lines, as well as customer service and billing and collection costs.

O&M costs were assigned to both joint and retail categories with the focus being on the joint costs which represent the shared wholesale and retail costs. These joint costs were allocated between wholesale and retail customers based on an analysis of billing information (billed water usage), metered wastewater flows delivered by wholesale customers, metered flows received at the wastewater treatment plants and the type or strength of flows received at the plants. The objective was to develop a reasonable basis to recognize and capture differences between billed flows and treated flows for different customer groups.

Currently, billable flows represent less than half of the total wastewater treated at the three wastewater treatment plants. For retail customers, billed wastewater flows are based on metered water delivered to customers which does not include inflow and infiltration ("I/I") from stormwater and other sources into the MWS wastewater collection system. For the retail customers, this I/I component is significant given that certain portions of the MWS collection system are "combined" systems that captures stormwater run-off, as well as sewage, for delivery to the wastewater treatment plant. In comparison, billable flows for the wholesale customers are based on wastewater flows that are metered at the point each customer's flows are delivered to the MWS system (with certain exceptions, that are being addressed) and that includes, or measures, all of the I/I contributed by the wholesale customers.[10] For wholesale customers, the I/I component makes up a much smaller percentage of the total flows since there are no "combined" systems within their wastewater collection systems.

However, it must also be recognized that the portion of flow attributable to I/I does not require the same level of treatment as regular strength wastewater flow. Dividing the joint costs by total treated wastewater flow would not represent the true unit rate for O&M costs, because each unit of flow does not cost the same to treat. In order to address this situation, RFC determined that it

[10] Currently, the Madison Suburban Utility District ("MSUD") provides water service to Goodlettsville and provides the billing and collection activities for wastewater service to Goodlettsville. MSUD bills Goodlettsville at MWS' wastewater rates, based on their water flows, and remits 41% of collected revenues to MWS for providing wastewater collection and treatment. For the purpose of the calculation of new wholesale rates as provided in the analysis, Goodlettsville's treated flows have been provided to MWS and RFC. It is assumed that under the new contract between MWS and the City of Goodlettsville, MWS will provide wastewater service and will bill Goodlettsville based on these treated flows. Old Hickory Utility District is currently billed and assumed to continue to be billed based on a combination of meter flows and water meter readings. All other wholesale customers are metered.

would first be necessary to segregate the wastewater treatment costs among key treatment parameters. Specifically, we used an analysis developed by RFC for MWS in 2004 to address the calculation of surcharges for high strength wastewater applicable to industrial customers. This analysis allocates costs for treatment plant operations to functional categories (e.g. pretreatment, sludge removal, etc.) and then to the specific treatment parameters of flow or volume, biological oxygen demand ("BOD"), total suspended solids ("TSS"), and nitrogen removal (in the form of ammonia). These are the parameters that the MWS wastewater treatment plants must address in order to comply with the requirements of their EPA discharge permits. The results of this analysis are summarized below in Exhibit 1:

Exhibit 1

Allocation of Wastewater Treatment Costs to Treatment Parameters

Treatment Parameter	Allocated Percentage of Wastewater Treatment Costs
Volume	10.25 %
Removal of Nutrients & Solids	
BOD	45.56 %
TSS	38.94 % → 89.75 %
Ammonia	5.26 %

Approximately 10.25% of total treatment process costs are associated with the flow of the water through the plant. These costs are allocated to wholesale and retail customers based on a pro-rata share of treated flows at the plants (15.09% wholesale and 84.91% retail as shown in Exhibit 2). The remaining 89.75% of the total treatment plant process costs are associated with the removal of nutrients and solids to meet treatment standards. These costs are allocated to wholesale and retail customers based on a pro-rata share of treated flows exclusive of inflow and infiltration, since inflow and infiltration is not subjected to the same treatment process costs associated with the removal of nutrients and solids.

Exhibit 2

Wastewater Flow Information [11]

Flow Data (ccf)	FY 2003	FY 2004	FY 2005	Average	% Total Treated Flow
Total Treated	73,355,517	70,716,845	69,738,906	71,270,423	
Total Billable	32,982,174	33,347,372	33,719,139	33,349,562	
Wholesale	10,368,296	10,750,703	11,152,264	10,757,088	15.09 %

To allocate the treatment process costs associated with the removal of nutrients and solids between wholesale and retail customers, wholesale flows were adjusted to remove an estimate of the flows attributable to I&I to put the wholesale flows on a comparable basis with the retail billable flows. Total wholesale flows (based on the 3-year average) were reduced by 21% as an estimate of the portion of these flows attributable to I/I (10,757 088 ccf – (10,757,088 ccf * 21.0%) = 8,498,099 ccf). The factor of 21% is based on the median annual inflow and infiltration as reported in the *2004 Water and Wastewater Rate Survey* produced by AWWA and RFC.[12] The adjustment for the inflow and infiltration creates a comparable basis for measuring wholesale metered flows (8,498,099 ccf) relative to retail billable flows (33,349,562 ccf - 10,757,088 ccf = 22,592,474 ccf). These flows are representative of the flows that are subject to the removal of nutrients and solids. Wholesale customer flows represent 27.33% (8,498,099 / 31,090,573) of these flows, with the remaining 72.67% attributable to retail customers.

A percentage is then calculated that represents the wholesale customer's share of the volume related treatment plant costs and their share of the treatment plant costs associated with the removal of nutrients and solids. This percentage is calculated to be 26.08% as shown in Exhibit 3.

[11] Flow Data provided by Metro Water Services. Total Billable flows include both retail billable flows based on metered water usage and wholesale billable flows based on metered wastewater delivered to MWS. All flows are expressed in units of hundred cubic feet (1 "ccf" equals 748 gallons).

[12] *2004 Water and Wastewater Rate Survey*, American Water Works Association and Raftelis Financial Consultants, page 11.

Exhibit 3

Calculation of Wholesale Customers' Share of O&M Costs

Treatment Parameter	% of Related Costs (A)	% Attributable to Wholesale (B)	(A) times (B)
Volume	10.25 %	15.09 %	1.55 %
Removal of Nutrients & Solids	89.75 %	27.33 %	24.53 %
			26.08%

In comparison, based on an approach that considers only *billable* flows (based on metered water usage for retail customers and metered wastewater flows for wholesale customers), and with no adjustment for wastewater strength, approximately 32% of the costs would be allocated to wholesale customers, rather than 26.08% under the revised analysis.

The joint costs are multiplied by this percentage to determine the wholesale customers' proportionate share of O&M costs. This share is divided by a historical three-year average of wholesale flows to get to a per unit O&M cost per 100 cubic feet ("ccf") of wholesale flow, as shown below in Exhibit 4.

Exhibit 4

Calculation of O&M Cost per 100 cubic feet of Wholesale Flow

Total Joint Costs	$ 39,084,402
Wholesale Share of Joint Costs	x 26.08%
Total Joint Costs Allocated to Wholesale	$ 10,193,796
Total Wholesale Flow (ccf)	10,757,088
Costs per 100 cubic feet	**$ 0.9476/ccf**

Capital Component

The capital component of the wholesale rate incorporates both the return on assets calculation and the recovery of an allocated portion of depreciation expense. The return on assets component is intended to cover the annual interest costs of the debt-financed portion of the routine capital costs while also providing a fair rate of return on the equity-funded portion of the assets. The portion of the depreciation expense is designed to reimburse MWS for the annual loss in service value not restored by current maintenance of depreciable utility assets. The

depreciation component can also be thought of as a mechanism to compensate MWS for on-going reinvestment in the system to replace and rehabilitate existing assets in order to maintain the service capability of the assets. This type of reinvestment represents capital expenditures, and is not included, if treated properly, as a component of annual O&M expenses, and so is not recovered through the O&M component of the wholesale rates.

Return on Assets

The return on assets is calculated by multiplying a rate of return factor times the value of the assets used to serve wholesale customers. The asset value in our analysis is based on the original cost less depreciation ("OCLD"), or net book value ("NBV") of the assets. MWS provided a detailed list of wastewater system assets that contained the original cost of the wastewater system assets, the net book value of those assets, and the annual depreciation associated with those assets.

Whereas the OCLD approach provides the most appropriate measure for the value of the existing assets, it is also important to address the value of on-going capital investments, particularly those expenditures already made, but not yet booked to fixed assets, as measured primarily by Construction Work In Progress ("CWIP"). CWIP information was provided by MWS and was included in the allocation of assets to the wholesale customers since this represents a significant investment in utility assets.

Since it is not appropriate to earn a return on assets not paid for by MWS, all contributed capital was deducted from the assets and CWIP. Contributed capital included EPA grants and assets paid for with the debt service component of the trunk and treatment contract as explained in detail below. The objective is to develop an estimate of the total value of the assets that are used to provide service to wholesale customers that were contributed or paid for, by MWS. Individual capital contributions from wholesale customers were considered as well, but were deducted as a separate exercise for each individual wholesale customer.

Once the value of the assets is identified using the OCLD approach, the next step is to allocate those assets between those that benefit both wholesale and retail customers and those that benefit only retail customers. The wastewater treatment plant assets, including sludge management and odor control facilities, pump station assets, and wastewater trunk lines and large force mains were determined to benefit both wholesale and retail customers, while all other wastewater assets do not provide benefit in delivering service to wholesale customers.[13] The total OCLD value of core wastewater assets associated with wastewater treatment and transmission is approximately $394.7 million, including CWIP, as of June 30, 2004. Since the wastewater treatment plants,

[13] Large force mains benefit all wholesale customers with the exception of Hendersonville Utility District which has its own force main directly to the Dry Creek Wastewater Treatment Plant.

pump station and major interceptors must be sized to address both average and peak flows, the OCLD value is then multiplied by the wholesale customers' proportion of the total metered flows received at the wastewater treatment plants. Again, based on a three-year average (FY 03–05') of wastewater wholesale flows as compared to the total system, a factor of 15.09% was applied, resulting in approximately $59.5 million in OCLD value for wholesale customers.

The OCLD value ($59.5 million) attributable to wholesale customers is then reduced by a relevant portion of capital contributed to the MWS wastewater system. Similar to determining the OCLD value of the assets that serve the wholesale customers, the proportionate amount of contributed capital for wholesale customers is determined by multiplying the estimated total contributed capital (EPA grants) by the wholesale customers' proportion of wastewater flows (15.09%). A small portion of MWS' contributed capital came to MWS as part of the 201 Participant Contracts or Trunk and Treatment Contracts ("T&T Contracts") that apply to six of the wastewater wholesale customers. As part of the T&T Contract, 201 Participants paid for approximately 10.0% of the debt service for loans identified in that contract that were used to pay for wastewater assets identified in the contract. As such, the contributed capital that is part of the T&T Contracts is multiplied by 10.0% to determine the proportionate amount of contributed capital from wholesale customers. Total contributed capital allocated to wholesale customers and used to offset the OCLD value of $59.56 million is $11.7 million, resulting in $47.86 million in OCLD value for wholesale customers, as shown in Exhibit 5.

Exhibit 5

Wastewater Capital Allocation – Return on Assets

	$ OCLD All Assets	$ OCLD Assets Related to Wholesale[14]	$ OCLD to Wholesale	$ Return on Assets
Wastewater Assets	$ 917,010,190	$ 386,616,015	$ 58,355,629	$ 4,828,972
Construction Work In Progress	12,706,761	8,039,189	1,213,382	100,408
Less: Contributed Capital	84,457,653	84,457,653	(11,704,926)	(968,591)
		Total	**$ 47,864,085**	**$ 3,960,789**

The next step is to determine a rate of return to apply to these asset values. The rate of return is set equal to the weighted average cost of capital ("WACC") of approximately 8.28%. The WACC considers both the cost of debt and the cost of equity for MWS. Exhibit 6 shows the

[14] Excludes assets not related to wholesale customers such as local collection lines and the combined wastewater system.

calculation of WACC and the resulting rate of return used to calculate the return component used in the wholesale analysis.

Exhibit 6

Weighted Average Cost of Capital or Rate of Return

WACC – RATE OF RETURN	
COST OF DEBT CAPITAL	
MWS Weighted Average Cost of Debt (1)	5.75%
COST OF EQUITY CAPITAL	
Risk Free Rate – Long Term U.S. Treasury Bond Yield (2)	4.80%
Equity Risk Premium (2) times Beta (3) (7.2% *0.65)	4.68%
Total Buildup of Cost of Equity Capital	**9.48%**
DEBT STRUCTURE (4)	
Debt as Percentage of Capital	32.3%
Equity as Percentage of Capital	67.7%
WEIGHTED AVERGE COST OF CAPITAL	
Weighted Cost of Debt	1.86%
Weighted Cost of Equity	6.42%
Weighted Average Cost of Capital	**8.28%**

(1) MWS weighted average cost of debt based on outstanding bond issues listed in Official Statement for the MWS Series 2002 Bonds.

(2) Key Variables in Estimating the Cost of Capital, SSBI Valuation Edition 2005 Yearbook.

(3) Value Line's Sample Water Industry Report, October 29, 2004.

(4) Department of Water and Wastewater Services, The Metropolitan Government of Nashville and Davidson County Financial Statements, June 30, 2004.

Since MWS does not issue stock, there is no clear cost of equity for MWS. Instead, the cost of equity for the water utility marketplace is used as a proxy for the cost of equity for MWS. The cost of equity is comprised of several components, including a risk-free rate of return plus various risk premiums. The risk free rate can be determined by looking at the yield on long-term U.S. treasury bonds. For this analysis, the risk free rate is assumed to be 4.80%. The beta is a measure of the volatility of the particular industry's returns as compared to the marketplace. Value Line's Sample Industry Report provides betas for publicly traded private water companies on a quarterly basis. Value Line's average beta for these companies, used for this analysis, is .65. The return on risk associated with investing in equity (referred to as the equity risk premium) is 7.20%, which can be determined by comparing the return on equity investments

versus the risk free rate. An analysis is performed by Ibbotson Associates each year that calculates the equity risk premium[15].

The calculated weighted average cost of capital, or rate of return, is approximately 8.28%. This rate of return is then multiplied times the OCLD value of the assets benefiting wholesale customers to derive a return component of approximately $3.96 million (See Exhibit 5 above). This return component is then added to the depreciation expense, discussed below, and divided by the three-year average of wholesale wastewater flows in order to derive a per unit cost for the capital component of the wholesale rate. The resulting unit cost or rate would be appropriate to charge to any new wholesale customer or any wholesale customer that has not made prior individual capital contributions to MWS. As mentioned previously, for those existing wholesale customers that have made prior capital contributions, additional individual adjustments are taken into consideration to determine each customer's wholesale rate, as discussed below.

Depreciation Expense

The depreciation cost component is calculated by determining the annual depreciation on all of the assets identified as providing service to wholesale customers. The same percentages as used in the return on assets calculation were applied to the depreciation expense for each category of assets to determine the portion of the depreciation expense associated with assets that provide benefit to wholesale customers ($16.86 million) as shown in Exhibit 7. There is no CWIP included in this number, since there is no depreciation associated with CWIP. The depreciation expense associated with the assets that provide benefit to wholesale customers is then multiplied by the wholesale customers' proportion of the total metered flows received at the wastewater treatment plants. The three-year average (FY 03–05') of wastewater wholesale flows as compared to the total system (15.09%) was applied, resulting in approximately $2.54 million in depreciation expense for wholesale customers.

This depreciation expense ($2.54 million) is then reduced by a relevant portion of depreciation expense related to the capital contributed to the MWS wastewater system. The proportionate amount of depreciation expense for contributed capital related to wholesale customers is determined by multiplying the depreciation expense for the contributed capital (EPA grants) by the wholesale customers' proportion of wastewater flows (15.09%). A small portion of MWS' contributed capital came to MWS as part of its' 201 Participant Contracts. As part of the Trunk and Treatment Contract, 201 Participants paid for approximately 10.0% of the debt service for loans identified in the contract used to pay for wastewater assets identified in the contract. As such, the depreciation expense for the contributed capital that is identified in the contract is multiplied by 10.0% to determine the proportionate amount of depreciation expense for

[15] Key Variables in Estimating the Cost of Capital, SSBI Valuation Edition 2005 Yearbook, by Ibbotson Associates.

contributed capital for wholesale customers. Total depreciation expense for contributed capital allocated to wholesale customers is $0.5 million. The depreciation expense for contributed capital ($0.5 million) is used to offset the depreciation expense for MWS' wastewater assets ($2.54 million) resulting in $2.04 million in an annual depreciation cost applicable to wholesale customers as shown in Exhibit 7.

Exhibit 7

Wastewater Capital Allocation – Depreciation Component

	$ OCLD All Assets	$ Annual Depreciation	$ Annual Dep. Related to Wholesale	$ Depreciation to Wholesale
Wastewater Assets	$ 917,010,190	$ 31,858,353	$ 16,861,069	$ 2,544,940
Construction Work In Progress	12,706,761	-	-	-
Less: Contributed Capital	84,457,653	3,660,879	(3,660,879)	(509,091)
		Total	**$ 13,200,190**	**$ 2,035,849**

The total annual capital cost, including the return on assets component and the depreciation expense component, is shown below in Exhibit 8.

Exhibit 8

Wastewater Wholesale Cost Calculation – Capital Component

	$3,960,789	Return on Assets
+	2,035,849	Depreciation Allocated to Wholesale Customers
=	$5,996,638	Annual Capital Cost

The annual capital cost component is then divided by the three year historical average of wastewater wholesale flows to determine the actual capital cost per 100 cubic feet ($5,996,638 / 10,757,088 ccf = $0.56 per 100 cubic feet). The wastewater capital charge is determined to be $0.56 per 100 cubic feet as shown in Exhibit 9.

Exhibit 9

Calculation of Capital Cost per 100 cubic feet of Wholesale Flow

Total Joint Dollars	$ 5,996,638
Total Wholesale Flow (ccf)	10,757,088
$ Dollars per 100 cubic feet	**$ 0.5575/ccf**

The sum of the calculated O&M cost and calculated capital cost per 100 cubic feet is the maximum cost or unit rate that could be charged to wholesale customers. Exhibit 10 summarizes these costs and the calculated wholesale rate.

Exhibit 10

Summary of Wholesale Cost Calculations and Projected Wholesale Rate

Type of Costs	Wastewater
Calculated O&M Cost per 100 cubic feet	$0.95
Calculated Capital Cost per 100 cubic feet	$0.56
Wholesale Cost per 100 cubic feet	**$1.51**

All MWS wastewater wholesale customers will be responsible for paying the same calculated O&M cost per 100 cubic feet for treated wastewater flow. However, as previously acknowledged, the calculated capital cost component will vary depending on the level of any prior capital contributions to MWS made by each individual wholesale customer.

Individual Capital Contributions from Wholesale Customers

For the wholesale customers that have made individual contributions (assets and cash) to MWS, primarily 201 Participants, additional credit is given for their contributions. The OCLD value used for all new wholesale customers or existing customers that have not made prior capital contributions, is used as a starting point for this calculation.

For each of the wholesale customers that have made individual contributions, the amortized value of their contribution is credited against their proportionate OCLD value before the rate of return is applied. To do this, the total OCLD value attributable to all wholesale customers ($47.86 million) is pro-rated for each wholesale customer based on individual historical wholesale flows. This results in an OCLD value per wholesale customer as shown in Exhibit 11. This value is used as the starting point for further adjustments based on the amortized value of contributed capital for each of the 201 Participants.

Exhibit 11

OCLD per Wholesale Customer (201 Participants)

Wholesale Customer (201 Participant)	**Portion of Flow** (%)	**Allocated OCLD** (**% * $** 47,864,085)
Belle Meade	6.76 %	3,235,727
Brentwood	28.11 %	13,454,306
Hendersonville	24.45 %	5,293,976
Millersville	1.69 %	806,679
La Vergne	10.54 %	5,044,147
Old Hickory	2.63 %	1,257,806

Capital contributed by each MWS wholesale customer was amortized to reflect the timing of the contribution as well as the service life of the assets for which that contribution was made. Since the asset value used in the analysis is based on OCLD, it is appropriate that the value of the contributed capital is amortized, or depreciated, as well. This calculation results in adjusted OCLD asset values for individual wholesale customers as shown in Exhibit 12. The calculated rate of return (WACC) of 8.28% is then applied to the adjusted OCLD values for each wholesale customer to determine an annual return component for each wholesale customer.

Exhibit 12

Adjusted OCLD Asset Values and Calculated Return

Wholesale Customer (201 Participant)	**Contract Expiration**	**Allocated OCLD**	**Contribution Value at Contract Term**	**Adjusted OCLD**	**Calculated Return**
Belle Meade	3-1-06	3,235,727	268,929	2,966,798	245,505
Brentwood	12-31-08	13,454,306	9,978,510	3,475,797	287,625
Hendersonville	3-1-08	5,293,976	90,680	5,203,296	430,577
Millersville	3-1-06	806,679	343,284	463,395	38,346
La Vergne	3-1-06	5,044,147	1,251,970	3,792,177	313,806
Old Hickory	3-1-08	1,257,806	57,549	1,200,257	99,322

Since the capital component of the wastewater wholesale rate includes both a return on assets component and a depreciation component, an effort has also been made to provide a credit or offset for individual contributions for the depreciation cost as well. Similar to the return on assets, the total annual depreciation attributable to all wholesale customers is pro-rated for each wholesale customer based on individual historical wholesale flows. This results in an annual depreciation cost per wholesale customer. This value is used as the starting point so that the depreciation associated with the contributed capital from each of the 201 Participants can be

credited against the annual depreciation cost per wholesale customer. Before being credited against the annual depreciation, the depreciation expense associated with the contributed capital has been adjusted to reflect the timing of the contribution, as well as the service life of the assets for which those contributions were made. See Exhibit 13.

Exhibit 13

Adjusted Depreciation

Wholesale Customer (201 Participant)	**Portion of Flow (%)**	**Allocated Depreciation**	**Contribution Depreciation**	**Depreciation to Recover**
Belle Meade	6.76 %	137,628	7,343	130,286
Brentwood	28.11 %	572,265	272,448	299,816
Hendersonville	24.45 %	497,761	2,476	495,286
Millersville	1.69 %	34,311	9,373	24,938
La Vergne	10.54 %	214,548	34,183	180,364
Old Hickory	2.63 %	53,499	1,571	51,928

The following table (Exhibit 14) shows the annual calculated return and the depreciation expense that needs to be recovered through each individual wholesale customer's rates. In addition the table shows the projected annual usage and the resulting per unit charge for each of the wholesale customers, for comparison to the rate of $0.56/ccf shown in Exhibit 9.

Exhibit 14

Calculation of Dollars to be Recovered by Individual Wholesale Customers

Wholesale Customer (201 Participant)	**Calculated Return ($)**	**Depreciation to Recover ($)**	**Annual Usage (ccf)**	**Per Unit Cost ($)** Capital Component
Belle Meade	$245,505	$130,286	727,205	$0.52/ccf
Brentwood	287,625	299,816	3,023,753	$0.19/ccf
Hendersonville	430,577	495,286	2,630,089	$0.35/ccf
Millersville	38,346	24,938	181,295	$0.35/ccf
La Vergne	313,806	180,364	1,133,634	$0.44/ccf
Old Hickory	99,322	51,928	282,682	$0.54/ccf

For those contracts with expirations in FY 2006, the calculated per unit costs provides a reasonable estimate of the expected rate to be charged beginning in FY 2007. For those wholesale customers with FY 2008 contract expirations, per unit costs shown are projections, as the data available to calculate the actual rate will not be available until closer to the expirations of the contracts. In order to calculate the actual rates for the contracts expiring in FY 2008,

updated budget and fixed asset information will be needed. In addition, the calculated weighted average cost of capital or rate of return will also need to be revisited. Exhibit 15 shows a projection of estimated rates for the various wholesale customers, which include both the O&M component and the capital component.

Exhibit 15

Projection of Estimated Wastewater Wholesale Rates ($'s/ccf)

Wholesale Customer	**FY 2006** ($/ccf)	**FY 2007** (1) ($/ccf)	**FY 2008** ($/ccf)	**FY 2009** ($/ccf)	**FY 2010** ($/ccf)
Goodlettsville (2) / New Customer	1.51	1.53	1.55	1.58	1.60
Belle Meade	1.46	1.49	1.51	1.54	1.56
Brentwood	0.39	0.52	0.52	1.21	1.24
Hendersonville	0.39	0.52	1.35	1.37	1.40
Millersville	1.30	1.32	1.34	1.37	1.40
La Vergne	1.38	1.41	1.43	1.46	1.48
Old Hickory	0.39	0.52	1.53	1.56	1.58
Mount Juliet (3)	1.35	1.38	1.40	1.43	1.45
Ridgetop (3)	1.35	1.38	1.40	1.43	1.45
White House (4)	2.59	2.59	2.59	2.59	2.59

(1) It is assumed that MWS will implement the updated trunk and treatment rate of $0.52 per ccf in FY 2007. This rate is assumed constant for FY 2008 for the purpose of this projection.

(2) Madison Suburban Utility District bills Goodlettsville at MWS's wastewater rates and remits 41% of collected revenues to MWS. Goodlettsville's contract expires in 2008 and therefore will not begin paying the rate stated above until FY 2009.

(3) Wholesale rate predetermined by existing wholesale contract with MWS. Rate is adjusted annually by CPI index.

(4) White House Utility District pays the same rate as the large commercial rate for MWS retail customers.

By FY 2009, it is assumed that all current trunk and treatment wholesale customers (201 Participants) will be charged wholesale rates based on the methodology presented and contained in this report. Exhibit 16 compares current estimated wastewater wholesale revenues (FY 2006) to a projection of estimated wastewater wholesale revenues for FY 2009, when all customers are assumed to be paying revised rates.

Exhibit 16

Projection of Estimated Wastewater Wholesale Revenues

City	FY 2006 Revenues (1)	FY 2009 Revenues (2)
Goodlettsville / New Customer	$ 1,000,329	$ 2,868,560
Belle Meade	$ 281,356	$ 1,117,903
Brentwood	$ 1,169,890	$ 2,622,765
Hendersonville	$ 1,017,582	$ 3,609,867
Millersville	$ 70,143	$ 248,296
La Vergne	$ 438,603	$ 1,651,042
Old Hickory	$ 109,370	$ 439,727
Mount Juliet	$ 1,168,775	$ 1,233,707
Ridgetop	$ 34,305	$ 36,210
White House	$ 179,662	$ 179,662
Total Wastewater	**$ 5,470,013**	**$ 14,007,740**

(1) FY 2006 revenues assume rates currently charged by MWS. FY 2006 rates shown in Exhibit 15 are a projection of rates to be implemented by MWS if it chooses to implement rates before the termination of FY 2006.

(2) FY 2009 projected revenues based on current wastewater wholesale flows (same as for FY 2006).

C. CTI's Concerns with the Cost of Service Analysis and RFC's Responses

The CTI Report addressed three general areas of concern with regard to the MWS Cost of Service Report dated August 2005. These areas of concern are listed below and addressed individually in the following sections.

1. In general, the CTI Report takes issue with the methodology ("Utility Approach") selected to calculate the cost of service for wholesale rates, as well as the reasons why the methodology was selected. The CTI Report addresses this as "Cost of Service Objectives".
2. The CTI Report raises a number of questions related to the appropriateness and accuracy of the wastewater flow information used in the cost of service analysis.
3. The CTI Report identifies a number of assumptions and allocations related to the types of costs included in the calculation of the wholesale rate and the allocation factors used to allocate certain costs between wholesale and retail customers.

Several of these concerns had already been identified and discussed with the wholesale customers in the meetings held at the beginning of the rate study process. As noted earlier in this report, RFC had already indicated in these discussions with the wholesale customers, and prior to RFC receiving the report developed by CTI, that many of these concerns would be addressed in the updated analysis.

Utility Approach As the Preferred Methodology for the Development of Wholesale Rates – Cost of Service Objectives

One of the first areas that CTI takes issue with in the wholesale cost of service analysis is the methodology used. CTI begins its report by stating that RFC utilizes the "appropriate methodology", however, that "some of the assumptions and allocation methodologies utilized in the MWS study do not appear to be consistent with the actual costs to wholesale customers". The report goes on to contradict itself by saying that the Utility Approach is not an appropriate methodology for the calculation of wholesale rates for MWS' wastewater wholesale customers. In the Cost of Service Report, RFC makes the statement that "the Utility Approach is typically used to calculate utility rates by private sector service providers (i.e. investor-owned utilities) regulated by public service commissions or similar agencies. However, the Utility Approach is also used by government-owned utilities to determine outside-city rate differentials and to calculate wholesale rates since it provides a more effective methodology for compensating the

utility for the risk associated with providing service to "non-owners" of the system. The CTI Report notes that "MWS is not an investor-owned utility" and goes on to state that "to describe the wholesale customers as "non-owners" of the system is inconsistent with the EPA regional planning process that established MWS as the regional wastewater treatment provider in the 1970's".

The Cost of Service report does not suggest or imply that MWS is an investor-owned utility, or that it should adopt the rate setting practices typically used by investor-owned utilities. The report simply indicates that, whereas the Utility Approach is used by most investor-owned utilities to set rates, including retail and wholesale rates, it is also the recommended methodology for calculating wholesale rates for government-owned utilities, such as MWS. In point of fact, there is nothing that would prohibit MWS from using either the Cash Needs or the Utility Approach to calculate retail rates or wholesale rates. However, most government-owned utilities do use the Cash Needs Approach for setting retail rates and this is the methodology used in the retail component of the rate study.

RFC is recommending the used of the Utility Approach be used to calculate wholesale rates for a number of reasons. First, because the Utility Approach includes a return on investment component, this component can be adjusted to account for differing levels of prior investments or capital contributions made by each wholesale customer, which was one of the adjustments requested by the MSUA. Second, rates set under the Utility Approach tend to be more stable over time as new assets are placed in service and depreciated. In comparison, a Cash Needs Approach, which includes an allocated share of total debt service (principal and interest) may result in more abrupt rate adjustments as new loans are issued and the additional debt service cost is incurred over a short period of time. Third, the rate of return component is also designed to provide the service provider with a level of compensation for the risk incurred in providing service to the "non-owners" of the system. Although most of the wholesale customers have made capital contributions to MWS, these contributions have not kept pace with the level of investments made by MWS to upgrade, replace and expand treatment capacity. The wholesale customers have not been asked to contribute up-front payments to maintain an "ownership interest" at a level equivalent with the capacity they are using and that has been reserved for their benefit. It is in this regard that they are considered "non-owners" of the system, and this terminology is not intended to imply that they are not an integral part of the customer base. In fact, MWS has always included the wholesale customer needs, and projected needs, in developing its long-range planning and capital investment planning, which was, and continues to be, a significant objective of the 201 regional planning process.

Lastly, CTI takes issue with the use of the Utility Approach to develop a methodology for setting wholesale rates that can be applied consistently to all wholesale customers. The CTI Report states' "On the face of it, this objective appears to be appropriate. However, current wholesale

wastewater rates for the ten regional customers vary significantly based on a number of factors including:

- Year when agreement was negotiated
- Capital contributions
- Wastewater delivery method(s)
- Wastewater metering method(s)
- Receiving treatment plant.

Based on these factors, it may continue to be necessary to have some variations in wholesale wastewater rates to reflect different circumstances."

A noted above, and in prior meetings with the wholesale customers, the original cost of service report was intended only to evaluate whether or not the existing rates and rate structure were providing for equitable cost recovery, and to introduce a revised wholesale methodology to address any inequities between the retail and wholesale rates. We have acknowledged, repeatedly, that consideration would be given to prior contributions, and that it would be unlikely that a uniform or consistent rate for all wholesale customers would be appropriate. The preceding sections have addressed the specific adjustments recommended for each wholesale customer.

Wastewater Flow Information

The CTI Report takes issue with the wastewater flow information used in the cost of service analysis to calculate the wastewater wholesale customer's proportionate share of O&M and capital costs. Specifically, the CTI Report cites RFC's use of metered *wastewater* flow for the wholesale customers versus metered *water* flow for MWS' retail customers. The report goes on to state that "It is very common that some portion of water metered to an individual establishment is not returned to the wastewater system; however in almost all instances, because of extraneous flows (I/I) entering the wastewater system through buried pipelines, actual wastewater flow is greater than the metered water flow." Essentially, the CTI Report is saying that the wholesale customers' share of costs is overstated because the flow information used understates the retail customers' flow which in return makes the wholesale customers share appear larger than it really is.

The CTI Report also identifies several places where inconsistent flow or billing information was used in the Cost of Service Report. Some of these references were pulled from "draft" supporting schedules that were not included as part of the Cost of Service Report. These schedules had some conflicting information due to several of the issues cited in the CTI Report that had not been completely resolved at the time the Cost of Service Report was issued, including wastewater delivery methods, wastewater metering methods, and the actual strength loadings of the wastewater delivered to the plants. RFC recognized this in the original cost of

service analysis and made an attempt to adjust metered water flows for retail customers by an extraneous flow or I/I factor. Lastly, as RFC began to revise and update the customer flow and billing information, it became apparent that it would also be important to make adjustments for the differences in the strength loadings of the flow delivered to the plants from retail and wholesale customers.

RFC has addressed these concerns related to wastewater flows and billing information in the revised wholesale rate calculations. The flow used in the study reflects all the metered flow at the plants, and metered flow from the wastewater wholesale customers. In addition, the updated study examines how much of the metered flow at the plants is a result of extraneous flow (i.e. I/I), and makes additional adjustments for the type of flow delivered to the plant and differences in the treatment requirements of those flows.

Assumptions and Allocations

The CTI Report identifies a number of assumptions and allocations included in the wholesale cost of service analysis that they believe should not be included in the costs allocated to the wholesale customers. Their report defines '"assumptions" as functional categories of costs included in the wholesale cost of service analysis and "allocations" as percentages of appropriate functional categories assigned to wastewater costs. The three "assumptions" cited in the CTI Report include the return on assets computation component of the Utility Approach, and the inclusion of both Stormwater and LOCAP ("Local Cost Allocation Plan") costs as costs to be recovered through the wholesale charge. Most of these points were reiterated in the discussion of specific allocations, as well as additional comments related to the flow based allocation factors.

The return on assets component is an integral part of the capital, or capacity, component of the Utility Approach. The CTI Report suggests dropping the return on assets component of the capital costs and replacing it with an "interest cost" component. However, this approach would not provide equitable cost recovery from the wholesale customers and is not consistent with the Utility Approach to rate setting. The return on assets component, along with the depreciation component, which combined make up the total capital component, is intended to offset or recover a proportional share of the costs for debt service costs (principal and interest) plus on-going reinvestment in the infrastructure to replace and/or rehabilitate assets. Addressing only the interest cost associated with existing debt service would not provide for adequate recovery of these costs. As an alternative, under the Cash Needs Approach, this capital component of the rate would be replaced with a proportional share of total debt service (principal and interest) plus a proportional share of annual cash, or rate funded, capital reinvestment in those assets that provide service to the wholesale customers. In theory, these two methodologies to address

capital costs should be roughly equivalent over time. However, as mentioned earlier, there is a risk of higher variability in the wholesale rates under a Cash Needs Approach depending on specific decisions related to financing mechanisms, the timing and structure of new debt service, the level of cash expenditures from rates or reserves used for capital investments, and the types of capital projects anticipated for each year. In addition, the Utility Approach provides a more appropriate mechanism to recognize prior contributions as a separate adjustment for each wholesale customer, which is not available under the Cash Needs Approach. Also, given the expectation for significant capital investment on core system assets from cash, reserves and additional borrowing over the next several years, it is likely that the Cash Needs Approach would result in higher wholesale rates over the next several years, compared to the Utility Approach.

The CTI Report suggests removing stormwater expenses from the wholesale calculation. This issue was discussed during prior meetings with both MWS and the wholesale customers before being raised in the CTI Report. During those meetings, RFC acknowledged that it was not appropriate to assess stormwater expenses to wholesale customers and those expenses have been removed from the calculation of the wastewater wholesale rates.

The CTI Report also questioned whether or not it was appropriate to include LOCAP costs in the wholesale rate calculation. The LOCAP represents costs assessed to MWS to pay for various administrative support services supplied by Metro Government to Metro Water Services. LOCAP is not a payment in lieu of taxes, and representatives from both MWS and Metro Government have indicated, specifically, that this assessment is not used to pay for the Titan's stadium. As a result, RFC maintains that the wholesale customers should be required to pay their proportional share of the costs for these administrative services.

Appendix A

Results of Benchmarking Analysis for Metro Water Services

Results of Benchmarking Analysis for Metro Water Services

As part of RFC's assistance to the Metropolitan Government of Nashville and Davidson County, RFC conducted a benchmarking study to assess the financial performance and cost efficiency of Metro Water Services ("MWS"). The objective of the benchmarking study was to evaluate the efficiency of MWS current operations as compared to other utilities, and to identify any areas where MWS appears to be less cost effective. The benchmarking study focuses on higher-level cost, rate and financial information, rather than specific operational metrics, in an effort to focus on the total cost and financial performance of MWS. The benchmarking study is based on information from three existing databases or surveys that contain information from MWS (MWS was a participant in these surveys) including:

- the American Water Works Association's ("AWWA") Waterstats database (1999),
- the American Metropolitan Wastewater Agencies' ("AMSA") wastewater database (2001), and
- RFC's 2004 Water and Wastewater Rate Survey ("Rate Survey") developed in conjunction with AWWA.

In addition to these databases, RFC also compared Metro Water Service's financial information to "in house" financial data from existing RFC clients. Where appropriate, certain operating metrics from the databases were compared to a separate set of internal operations and maintenance benchmark data compiled and provided to MWS by Brown and Caldwell.

The databases were compiled from survey data provided by a broad population of respondents and converted into a diverse group of performance metrics. After an initial review of the information and metrics it became apparent that there were a number of inconsistencies within and between the various databases that made it more difficult to support specific conclusions or observations related to MWS. For example, in some cases the range of results for certain metrics were so broad that the average and median values appeared to be skewed. Where possible, RFC made an attempt to normalize the databases to exclude outliers and/or to restrict the database to a smaller set of more comparable utilities, based primarily on total size or treatment capacity of the utility. However, we also noted inconsistencies related specifically to MWS when comparing some of the data reported in the older databases with more current information. Since both the Waterstats and the AMSA database were dated relative to the 2004 RFC Rate Survey, and the information collected for these databases occurred during MWS' initial re-engineering efforts, RFC decided to direct its focus on the 2004 Water and Wastewater Rate Survey database.

The financial information provided in the 2004 Rate Survey database for the majority of utilities surveyed was based on calendar year 2002 data or fiscal year 2003 data. For MWS, much of the

financial information was reported for water and wastewater as a combined utility. In order to provide better data for evaluating water and wastewater separately, RFC developed revised information for MWS, separated between water and wastewater, based on the 2003 audited financial statements, and used this information in place of the combined information originally reported. Costs were allocated between water and wastewater based on the allocation factors developed for the cost of service study recently completed by RFC, which also used fiscal year 2003 as the test year for evaluating cost of service. The one exception is information on projected capital needs, which is based on the data provided by MWS in the original survey, which was already segregated between water and wastewater. Since revised information was not available from the financial statements, and since the data submitted was consistent with the expected capital needs based on the information known at that time, this information was not revised for calculating the metrics.

Within the Rate Survey database, respondents are sorted into three groups based on size, as measured by million gallons per day ("MGD") of water billed and wastewater billed. For both water and wastewater, MWS was listed with the largest, or Group A, utilities, defined as having water sales greater than 75 MGD and billed wastewater flows greater than 60 MGD. In both cases, billable flows for MWS were only slightly above the cut-off levels, indicating that in terms of billable flow, MWS is smaller than most of the other utilities in the comparison group. However, with regard to other measures, such as treated flows (particularly for wastewater), MWS was not among the smallest utilities in the comparison group. As a result, the Group A utilities was determined to be the most appropriate comparison group for evaluating MWS performance. A complete listing of all of the Group A water and wastewater utilities, including some that may have ultimately been excluded, is provided at the end of this Appendix.

Observations:

To facilitate the comparisons, we chose to group the various metrics into several broader performance categories, and our observations are based on a comparison of MWS's results on all the metrics within each category. These four categories include: 1) financial leverage, 2) projected capital needs, 3) operating and total expenses, and 4) costs relative to full-time equivalent employees.

1) Financial Leverage:

   Financial leverage looks at the level of total long-term debt outstanding and the ability to issue additional debt to address capital needs, often referred to as debt capacity. High levels of debt typically result in higher fixed costs for debt service and may put additional pressure on rates and revenues to address coverage requirements. The metrics available

from the databases looked at total long-term debt per MGD produced/treated, number of customers, and population served, for water and wastewater, as shown in the tables below.

Water Metrics from Rate Survey	Long-Term Debt per MGD Produced	Long-Term Debt per Customer	Long Term Debt per Capita
Nashville, TN	**$ 1,438,851**	**$ 785**	**$ 267**
Average	2,505,657	1,852	377
Median	1,982,464	1,538	288
Min	6,704	314	41
Max	7,310,009	5,504	1,161
Count	40	37	40

Wastewater Metrics from Rate Survey	Long-Term Debt per MGD Treated	Long-Term Debt per Customer	Long Term Debt per Capita
Nashville, TN	**$ 2,793,013**	**$ 2,406**	**$ 736**
Average	3,747,972	336,730	490
Median	2,766,930	2,284	457
Min	273,585	161	33
Max	10,242,476	5,480,263	1,565
Count	26	26	26

The water metrics indicate that MWS is less leveraged, on average, than the other utilities in the comparison group. This represents a shift from the older data in the Waterstats database, where MWS showed higher than average long-term debt loads. Historically, MWS has incurred debt to add water treatment plant capacity, including a level of redundant capacity to provide an extra margin of safety and reliability. In more recent years, no additional debt has been needed for water infrastructure, while older debt has continued to be paid down and/or refunded with lower cost debt, resulting in the shift to a less leveraged financial position.

The wastewater metrics also demonstrate a positive financial position, although not as strong as on the water side. Long-term debt per MGD treated and per customer are lower than average (although the per customer average appears to be skewed in spite of efforts that were made to remove outliers to normalize the data). Long-term debt per capita is higher for MWS than the average, but this may be explained by inconsistencies in how

different utilities reported their service populations, particularly with regard to wholesale customers. Again, the results from the Rate Survey database are more favorable than indicated in the older AMSA database. This favorable trend toward lower leverage is likely the result of using cash and reserves to address capital needs in recent years, in lieu of additional borrowing.

These results are consistent with expectations that the wastewater utility would be more leveraged than the water utility, as compared to other systems. Over the last 15 to 20 years, MWS has made significant investments in wastewater treatment capacity to address increasing flows from stormwater due to the state imposed overflow abatement program. Until recently, a significant portion of this has been funded with debt, including state revolving fund ("SRF") loans.

2) Projected Capital Needs:

Where the Financial Leverage metrics provide a summary of the historical use of debt and an indication of debt capacity, it is also necessary to look forward at future capital needs as an important driver of future costs and rates. The metrics available in the databases focused on a five-year capital improvement plan ("CIP") and the capital needs identified per MGD produced/treated and per retail account, as shown below.

Water Metrics from Rate Survey	5- Year Capital per MGD Produced	5- Year Capital per Retail Account
Nashville, TN	**$ 1,282,353**	**$ 700**
Average	2,301,885	1,585
Median	2,101,962	1,417
Min	408,224	297
Max	7,682,036	4,892
Count	45	43

Wastewater Metrics from Rate Survey	5- Year Capital per MGD Treated	5- Year Capital per Retail Account
Nashville, TN	**$ 1,346,426**	**$ 1,160**
Average	2,581,822	1,605
Median	2,079,627	1,211
Min	183,317	201
Max	7,093,956	5,443
Count	32	32

The estimated five-year capital improvement plan metrics for both MWS water and wastewater operations are low based on this 2004 Rate Survey database. This lower level of planned capital expenditure is consistent with the observation that MWS has adequate capacity in their system, including redundant water treatment capacity to address growth and reliability concerns, and, on the wastewater side, the significant prior investment in capacity to address CSO/SSO (combined wastewater overflow/sanitary wastewater overflow) issues. However, the low five-year capital improvement plan metric could also be indicative of the fact that MWS has a reactive capital planning process where projected spending is continually adjusted to meet available funds from revenues generated from existing rates, rather than adjusting rates to generate adequate revenues to effectively address capital needs. Also, even though MWS's capital needs were relatively low compared to other utilities, this does not mean that the current capital improvement plan ("CIP"), which has increased significantly since the survey was completed, can be addressed without incurring additional debt or increasing revenues to address these costs. This point is discussed in more detail in the last section.

3) Operating and Total Expenses:

The 2004 Rate Survey information generates two metrics related to operating expenses: operating expenses per MGD produced/treated and operating expenses per retail customer. Other related metrics address total expenses per MGD, plus total and operating revenues per retail customer, as shown below.

Water Metrics from Rate Survey	Total Expenses per MGD Produced	Operating Expenses per MGD Produced	Operating Expenses per Retail Customer	Operating Revenues per retail customer	Total Revenues per retail customer
Nashville, TN	**$ 590,482**	**$ 287,520**	**$ 157**	**$ 317**	**$ 364**
Average	709,341	488,569	339	527	585
Median	638,377	444,887	328	527	559
Min	230,651	124,076	145	228	275
Max	1,865,448	1,475,271	856	851	990
Count	43	44	42	42	42

Wastewater Metrics from Rate Survey	Total Expenses per MGD Treated	Operating Expenses per MGD Treated	Operating Expenses per Retail Customer	Operating Revenues per retail customer	Total Revenues per retail customer
Nashville, TN	**$ 870,519**	**$ 285,738**	**$ 246**	**$ 565**	**$ 650**
Adjusted for Stormwater	**$ 828,411**	**$ 243,630**	**$ 210**		
Average	862,998	489,511	319	506	583
Median	753,446	392,523	246	467	514
Min	253,173	192,369	74	93	102
Max	2,039,267	1,637,096	1,170	1,349	1,449
Count	32	32	31	32	32

MWS compares favorably on the water side, with all metrics below the averages for the comparison group, particularly for operating expenses. MWS also compares favorably on the wastewater side, with lower than average operating expenses, particularly after making adjustments for stormwater costs, which are typically not included within the wastewater operating costs for most other utilities. These results related to operating expenses are reasonably consistent with similar, and more recent, metrics produced by Brown and Caldwell ("B&C") that look specifically at monthly O&M costs at the water and wastewater treatment plants, rather than total operating expenses, during the current fiscal year. The B&C metrics indicate that from July through December 2004, MWS water plant operations were slightly above AWWA averages, with the exception of the month of August which was below the AWWA average. Higher plant operating costs could be attributable to the additional costs associated with operating and maintaining two water treatment plants with redundant system capacity, and is not necessarily inconsistent with the indication that total operating expenses for the water utility (plant costs and distribution system costs) are well below average for the Rate Survey data. For the same time period, MWS wastewater plant operation and maintenance expenses were consistently below the monthly AMSA averages, consistent with the results shown above.

Although still positive, the situation does not appear to be as favorable when you move from operating expenses to total expenses. Total expense metrics for the MWS water utility, while still well below the average, are not as favorable as for operating expenses alone. Total expenses for wastewater operations are below average if you exclude stormwater costs, and slightly above average (within 1% of the average) when you include stormwater costs. Looked at another way, total expenses per MGD are approximately twice as high (2.05 times) as operating expenses per MGD for MWS, whereas, when you look at the whole comparison group, the average value for total expenses per MGD is approximately 1.45 times the average value for operating expenses per MGD. For wastewater, this ratio of total expenses to operating expenses is approximately 3.4 times if you exclude stormwater, and 3.05 times when you include stormwater, compared to a ratio of 1.76 times for the average values of the comparison group. The implication is that for MWS operating expenses make up a smaller portion of total expenses than the average for the comparison group, and conversely, non-operating expenses are proportionally higher for MWS, compared to the average for the comparison group.

Higher total expenses, relative to operating expenses, compared to other utilities, could be produced by a number of factors. For example, higher total expenses could be indicative of high indirect and overhead costs that may not be captured in operating expenses, and/or higher debt service costs. Based on the fiscal year 2003 data, MWS total costs would have included a payment in lieu of taxes ("PILOT") roughly equivalent to 6% of MWS' budget. Indirect costs allocated to water and wastewater utilities for general government services, either through a PILOT or other allocation methodology, typically range between 4% and 8% of total costs, and the PILOT charged to MWS falls in the middle of this range. In addition to these indirect costs, because MWS operates as a quasi-independent entity, it also incurs its own general administrative and overhead costs associated with engineering, customer service, information services, accounting and human resources functions.

Also included in this group of metrics are two measures related to revenues: operating revenues per retail customer and total revenues per retail customer. For the water system, these revenue metrics are, again, well below the average, consistent with the expense metrics discussed above. For the wastewater system, revenues per customer are higher than the average, which is consistent with the slightly higher than average level of total expenses for wastewater. Higher revenues per customer is also consistent with the fact that MWS has, in recent years, funded a substantial portion of on-going capital investments with rate generated revenues and reserves. In addition, MWS generates

significant revenues from wholesale wastewater customers that would tend to inflate the level of revenues measured per retail wastewater customer.

4) Costs Relative to Full-time Equivalent Employees:

The Rate Survey database also captured information to calculate two measures of costs per full-time equivalent employee ("FTE"), expressed in terms of operating expenses and total expenses for water and wastewater, as shown below.

Water Metrics from Rate Survey	Total Expenses Per FTE	Operating Expenses per FTE
Nashville, TN	**$ 166,471**	**$ 81,059**
Average	206,819	135,399
Median	184,614	117,443
Min	112,974	48,384
Max	383,720	289,520
Count	44	44

Wastewater Metrics from Rate Survey	Total Expenses Per FTE	Operating Expenses per FTE
Nashville, TN	**$ 350,021**	**$ 114,890**
Adjusted for Stormwater	**$ 333,090**	**$ 97,959**
Average	274,622	154,127
Median	215,425	123,639
Min	98,702	77,564
Max	777,547	331,023
Count	32	32

Both total and operating expenses per FTE for MWS water operations are below the average. For the MWS wastewater system, operating expenses per FTE are below average, which is consistent with the low operating expenses for the MWS wastewater system. However, total wastewater expenses per FTE are above the average, which is somewhat inconsistent with the lower than average total expenses indicated for the wastewater system, excluding stormwater. However, this may simply be a result of MWS having relatively lower staffing levels compared to the other utilities, which would

produce a higher cost level per FTE. In general, the metrics addressing expenses per FTE also support the observation that MWS compares more favorably in term of operating expense than total expenses, which again suggests that non-operating expenses make up a larger proportion of total expenses for MWS, relative to other utilities.

Conclusions:

In general, it is evident that MWS compares favorably to the average metrics in almost every category, based on the operational and financial data from 2003. Certain general conclusions can be drawn from these results related to the two key areas of debt capacity and the general level of both operating and total expenses.

- MWS does not appear to be overly leveraged in terms of long-term debt outstanding, particularly given that projected capital needs are low compared to the other utilities in the comparison group and that adequate water and wastewater treatment capacity is available to address expected water demand and wastewater flows. However, MWS is facing short-term capital needs to address certain wastewater improvements which will require additional borrowing, particularly SRF loans. The next step, as part of the on-going rate study, will be to evaluate projected changes in debt service costs as a component of total revenue requirements to determine an appropriate balance of debt funded and cash funded capital expenditures, and to ensure that debt service coverage targets are addressed.

  It should also be noted that, as mentioned above, the projected level of capital improvements and borrowing needs used to calculate the metrics was based on the five-year CIP information as provided by MWS staff at the time of the survey. Based on subsequent discussions with MWS staff, it is apparent that this capital investment information did not include infrastructure investments to address solids handling and odor abatement needs, which have added approximately $160 million to the current five-year CIP. Expenditure on these projects is scheduled to begin in FY 2006, and ultimately will be funded, in part, with an estimated $125 million in new SRF Loans, plus additional TLDA (Tennessee Local Development Authority) loans.

- Expenses for MWS, particularly operating expenses, are below the average as measured per MGD and per customer; which is an indication of cost effective and efficient operations. However, even though total expenses appear to be in line with or below the average, there is an indication that non-operating expenses are higher for MWS, as a percentage of total expenses, than the average for the comparison group. In addition, the fiscal year 2003 financial information used for this analysis does not include the additional indirect costs allocated to MWS beginning in FY 2004 through the local cost

allocation plan ("LoCAP"). Stormwater costs allocated to MWS have also increased in the last couple of years, which is not captured in the benchmarking comparisons.

The next step will be to assess the impact of these and other costs, particularly the impact of the current CIP and the additional borrowing associated with funding that plan, to determine the revenue sufficiency of the existing rates, and to evaluate the potential need to adjust rates, and/or to adjust the rate structure, to generate additional revenues. This information will be developed over the next several months as the rate and financial model is completed, which will integrate the capital planning needs into a five-year forecast of rates and customer impacts.

Metro Water Services
Waster & Wastewater Benchmarking Study
Water Comparison Group

City / County	Utility
New York, NY	New York City Water Board
Chicago, IL	Chicago Department of Water
Nashville, TN	**Metro Water Services**
Los Angeles, CA	Los Angeles Dept. of Water and Power
Dallas, TX	Dallas Water Utilities
Houston, TX	City of Houston, Public Works and Engineering
Phoenix, AZ	City of Phoenix Water Services Department
Miami, FL	Miami-Dade Water and Sewer Department
San Francisco, CA	San Francisco Public Utilities Commission
Greater Boston Area, MA	Massachusetts Water Resources Authority
Oakland, CA	East Bay Municipal Utility District
San Diego, CA	City of San Diego Water Department
Denver, CO	Denver Water
Suffolk County, NY	Suffolk County Water Authority
Greater Washington, DC	Washington Aqueduct
Philadelphia, PA	Philadelphia Water Department
Contra Costa, CA	Contra Costa Water District
Cleveland, OH	Cleveland Division of Water
New Rochelle, NY	United Water New Rochelle
Honolulu, HI	Honolulu Board of Water Supply
San Antonio, TX	San Antonio Water System
Laurel, MD	Washington Suburban Sanitary Commission
Fort Worth, TX	Fort Worth Water Department
Seattle, WA	Seattle Public Utilities
Sacramento, CA	City of Sacramento, Department of Utilities
Columbus, OH	City of Columbus, Division of Water
Austin, TX	Austin Water Utility
Santa Clara, CA	Santa Clara Valley Water District
Cincinnati, OH	Greater Cincinnati Water Works
Louisville, MO	Louisville Water Company
Milwaukee, WI	Milwaukee Water Works
Portland, OR	Portland Bureau of Water Works
Tucson, AZ	Tucson Water
El Paso, TX	El Paso Water Utilities
Riverside County, CA	Eastern Municipal Water District
Bridgeport, CT	Aquarion Water Company of CT
Delaware County, PA	Aqua Pennsylvania, Inc.
Tulsa, OK	Tulsa Metropolitan Utility Authority
Charlotte, NC	Charlotte-Mecklenburg Utilities
Omaha, NE	Metropolitan Utilities District of Omaha
Albuquerque, NM	City of Albuquerque Public Works Department
Kansas City, MO	City of Kansas City, Missouri, Water Services Department
Richmond, VA	City of Richmond
Salt Lake City, UT	Salt Lake City Public Utilities
Orlando, FL	Orlando Utilities Commission
Birmingham, AL	Birmingham Water Works Board
Oklahoma City, OK	Oklahoma City Water Utility

Metro Water Services
Waster & Wastewater Benchmarking Study
Sewer Comparison Group

City / County	Utility
New York, NY	New York City Water Board
Chicago, IL	Metropolitan Water Reclamation District of Greater Chicago
Chicago, IL	Chicago Department of Water
Los Angeles, CA	City of Los Angeles Bureau of Sanitation
Greater Boston Area, MA	Massachusetts Water Resource Authority
St. Paul, MN	Metropolitan Council
Philadelphia, PA	Philadelphia Water Department
Miami, FL	Miami-Dade Water and Sewer Department
Houston, TX	City of Houston, Public Works and Engineering
Phoenix, AZ	City of Phoenix Water Services Department
Dallas, TX	Dallas Water Utilities
San Antonio, TX	San Antonio Water System
Memphis, TN	City of Memphis
Denver, CO	Metro Wastewater Reclamation District
Laurel, MD	Washington Suburban Sanitary Commission
Milwaukee, WI	Milwaukee Metropolitan Sewerage District
Buffalo, NY	Buffalo Sewer Authority
Cleveland, OH	Northeast Ohio Regional Sewer District
Tempe, AZ	City of Tempe, Water Utilities Department
Columbus, OH	City of Columbus, Division of Sewerage and Drainage
Cincinnati, OH	Metropolitan Sewer District of Greater Cincinnati
Tampa, FL	Tampa Water
Sacramento, CA	Sacramento Regional County Sanitation District
Forth Worth, TX	Fort Worth Water Department
Nashville, TN	Metro Water Services
Louisville, KY	Louisville & Jefferson County Metropolitan Sewer District
Kansas City, MO	City of Kansas City, MO Water Services Department
Jacksonville, FL	JEA
Pompano Beach, FL	Office of Environmental Services
Austin, TX	Austin Water Utility
Charlotte, NC	Charlotte-Mecklenburg Utilities
San Francisco, CA	San Francisco Public Utilities Commission
Tulsa, OK	Tulsa Metropolitan Utility Authority
Denver, CO	Wastewater Management Division
Boston, MA	Boston Water and Sewer Commission
El Paso, TX	El Paso Water Utilities
Las Vegas, NV	City of Las Vegas Water Pollution Control Facility
Long Beach, CA	Long Beach Water Department
DeKalb County, GA	DeKalb County Water & Sewer