

*Broward County  
Water & Wastewater  
Service*



**Retail Rate Study  
Report for FY 2011**  
*September 2010*

***“Our Best in Every Drop”***

RETAIL RATE STUDY REPORT  
FOR FISCAL YEAR 2011

Prepared for  
WATER AND WASTEWATER SERVICES

Prepared by  
E. R. Neff, CPA, CGFM  
Director, Fiscal Planning  
Water and Wastewater Services

September 20, 2010

## ACKNOWLEDGEMENTS

I would like to acknowledge Steve Uhrick for his efforts and experience in reviewing large volumes of data and developing the principles underlying the establishment of the Capital Recovery Charges as documented in the Engineering Support Report included herein as Appendix D.

I would also like to acknowledge the editorial efforts of Cathlene Hammond, Cindy Yaboni and especially Lois McStravick without whom this report would have never been published. I would also like to thank Project and Community Coordination directed by Theresa Gillis-Gassett for designing the report cover.

## Table of Contents

---

<b>Section 1</b>	<b>Introduction</b> .....	8
<b>Section 2</b>	<b>Regulatory Requirements</b> .....	8
<b>Section 3</b>	<b>System Capacity</b> .....	10
<b>Section 4</b>	<b>Drought</b> .....	11
<b>Section 5</b>	<b>County Initiatives</b> .....	11
<b>Chapter 1</b>	<b>Rate Principles</b> .....	13
	1.1 Theory of Rate Setting.....	13
	1.2 Legal Authority.....	16
	1.3 Objectives.....	18
<b>Chapter 2</b>	<b>Cost of Service</b> .....	20
	2.1 Direct Charges.....	20
	2.2 Regional and Bulk Water Costs.....	20
	2.3 Capital Program.....	21
	2.4 Fiscal Plan.....	22
	2.5 Debt Service Costs.....	22
	2.6 Operating Budgets.....	23
	2.7 Cost Allocations.....	24
	2.8 Lines of Business.....	24
	2.9 Retail Revenue Requirements.....	25
	2.10 Regional Revenue Requirements.....	26

## Table of Contents

---

<b>Chapter 3</b>	<b>Retail Water and Sewer Rates</b> .....	27
	3.1 Cost of Service .....	27
	3.2 Minimum Monthly Charge .....	32
	3.3 Conservation Pricing .....	32
	3.4 Residential Blocks .....	33
	3.5 Commercial Blocks .....	36
	3.6 Irrigation Rates .....	38
	3.7 Adequacy of Rates .....	39
<b>Chapter 4</b>	<b>Capital Recovery Charges</b> .....	40
	4.1 Utility System Investment .....	40
	4.2 Impact Fees .....	40
	4.3 Water Consumption Analysis .....	41
	4.4 Equivalent Residential Unit .....	42
	4.5 Calculation of Capital Recovery Charge .....	43
<b>Chapter 5</b>	<b>Recommendations</b> .....	46
	5.1 Charges for Services .....	46
	5.2 Rate Impacts .....	49
	5.3 Future Rate Adjustments .....	52

# Table of Contents

---

Tables	
2011 Internal Cost Allocation .....	27
Customer Charge .....	29
2011 Water and Sewer Revenue Requirements .....	30
Water Retail and Resale Revenue Requirement .....	31
Water Conservation Adjustment .....	33
Residential Volume Charges .....	35
Residential – Rate Tiers .....	36
Commercial Volume Charges .....	37
Commercial – Rate Tiers .....	37
Irrigations Volume Charges .....	38
Irrigation – Rate Tiers .....	38
Water and Sewer Revenue Sufficiency .....	39
Comparative Survey Capital Recovery Charges .....	45
Residential Tiers .....	48
Commercial Tiers .....	48
Irrigation Tiers .....	48
Rate Impacts .....	49
Comparison of Percentage of Revenues by Blocks .....	50
Residential Customer Bill Impact .....	50
Commercial Customer Bill Impact .....	51
Average Bill Dollar Increase by Class .....	51

# Table of Contents

---

Appendix A

5 Year Retail Capital Improvement Program .....54

Appendix B

Debt Service Schedule Series 2003, 2003B .....56

Debt Service Schedule Series 2005A, 2009A .....57

Combined Debt Service Schedule .....58

Appendix C

2012 thru 2015 Retail Revenue Forecast .....60

Appendix D

Engineering Support for 2010 Rate Study .....62

# Retail Rate Study Report

## Section 1 Introduction

The last comprehensive Retail Rate Study for water and sewer services provided by Water and Wastewater Services (WWS) was completed in 2001. The Study addressed Retail Water and Sewer Rates, Water and Sewer Capital Recovery Charges and Miscellaneous Service Charges. The rate setting methodologies utilized were essentially the same methodologies that were previously adopted and used to develop rates in the 1994 Rate Study completed by CH2MHill and Dunn & Associates. Since 2001, several significant events have occurred that will have major impacts on the costs associated with the continued provision of water and sewer services. These include changes in regulations under which WWS operates and drought conditions that have continued since 2007. The drought and related restrictions have resulted in significant changes in usage by residential customers. Finally, ongoing 'green' initiatives have altered residential water consumption patterns and related wastewater returns throughout Broward County and the South Florida area.

## Section 2 Regulatory Requirements

**Water** - Traditionally, the Biscayne Aquifer which is a relatively shallow source of fresh water has been the primary source of water for WWS as well as all other water utilities in southeast Florida. The aquifer receives its fresh water supply from the Kissimmee River basin in central Florida and is also the primary source of water for the Florida Everglades. During recent years, there has been a drive to restore the Everglades to a more natural state and this has resulted in the South Florida Water Management District (SFWMD) adopting the Water Availability Rule.

The SFWMD is the Florida regulatory authority that issues consumptive use permits (CUPs) for withdrawal of water from the Biscayne Aquifer. They are now limiting withdrawals to the levels of withdrawal that occurred during any 12 consecutive month base period that occurred during the five years proceeding April 2006. Aside from temporary allocations until April 2013, all other water needs must be met by the water utilities from alternative water sources. The next most reliable and cost effective source of water is the Floridan Aquifer, which is a brackish water aquifer which lies below the Biscayne. Several utilities in Broward County already treat Floridan water using reverse osmosis to provide potable water for their customers. Other sources to offset or supplement potable water needs may include reclaimed water, seasonal surface water, and water conservation. Each of these options will either substantially increase water facilities and operating costs or reduce the amounts of potable water sold.

**Sewer** – The WWS retail sewer customers’ wastewater is collected then treated, and disposed of through two regional systems, the North Regional Wastewater System (NRWWS) which is owned and operated by Broward County and the South Regional Wastewater System (SRWWS) which is owned and operated by the City of Hollywood. Both regional systems utilize ocean outfalls to dispose of significant portions of wastewater effluent. In 2008, the State of Florida enacted a law which limits discharge capacities for ocean outfalls and requires that discharges meet advanced wastewater treatment standards for nutrient removal by December 2018. Further, all discharges through ocean outfalls must be eliminated by December 2025 with the exception as a backup to a functioning reuse system.

By 2025, 60 percent of the average effluent flow disposed of through ocean outfalls from 2003 through 2007 must be reclaimed and reused. For the NRWWS, this amounts to approximately 22.4 million gallons per day (MGD) that must be beneficially reused. Depending upon the methods actually used to reuse this effluent, costs for sewer service and/or costs for the provision of potable water may increase substantially. In addition, the amount of potable water sold may be reduced.

### **Section 3            System Capacity**

**Water** – As a result of the water availability rules, a portion of the existing facilities at the WTPs (water treatment plant) in District 1 and 2 will not be available to provide capacity for new customers. In the early 1990's, WTP 1A, was expanded from 10.5 MGD to 16 MGD and WTP 2A was expanded from 20 MGD to 40 MGD. Current usage during 2009 for these plants was 7.842 MGD and 12.73 MGD for WTP 1A and 2A respectively. The base period consumption for the 1A Wellfield, which is the sole source of raw water for WTP 1A is 9.2 MGD annual average day. The combined base period consumption for WTP 2A which obtains water from both the North Regional wellfield as well as the 2A retail wellfield is 15.91 MGD annual average day. These current permitted allocations effectively limit the available capacity in the water treatment plants.

If the WTPs were to provide service to other utilities, the unused capacity would be available to the extent additional withdrawals could be transferred to increase allowable withdrawals from the Biscayne Aquifer. It is not anticipated that other utilities transfer allocation to WWS for the purpose of providing potable water. The additional treatment capacity is only available to support maintenance activities. The existing facilities are only able to treat water from the Floridan Aquifer in nominal amounts when blended with Biscayne water.

**Sewer** – In 2007 construction was completed on the expansion of the North Regional Wastewater Treatment Plant which provides treatment and disposal services for the Large Users of the NRWWS (North Regional Wastewater System). The expansion will provide up to 100 MGD of treatment capacity to meet the needs of the Large Users, including WWS' Districts 1 and 2 through 2025 or buildout. As a result of the expansion, WWS increased its share of the reserved capacity in the system from 16.71 MGD to 19.42 MGD.

The City of Hollywood has allocated up to 5 MGD of capacity in the SRWWS (Southern Regional Wastewater System) to Broward County to provide treatment and disposal services for WWS' District 3. Current flows to the SRWWS are approximately 2.6 MGD but are projected to increase as sanitary sewer service is extended to currently unsewered customers within the Neighborhood Improvement Projects.

## **Section 4           Drought**

**Water restrictions** – Southeast Florida has been experiencing drought conditions since early 2007. Beginning in April 2007, the SFWMD instituted water restrictions that have resulted in significant impacts in the amount of water sold to retail customers. Since sewer service is used and billed on the basis of water consumption, sales of sewer service have also declined.

**Sales** – From a high of 31.19 MGD in 2005, sales of potable water have declined over 21% to 24.66 MGD in fiscal 2009. Billed sewer has also decreased from a high of 16.59 MGD to 14.98 MGD in 2009, a decrease in excess of 10%. The variation between the water and sewer reductions indicates that significant water reductions were achieved by residential customers whose charges for sewer service is capped at 15,000 gallons per month as well as the fact that the ongoing NIP's continue to add new sewer customers to the system.

## **Section 5           County Initiatives**

**County Vision** – The Broward County Board of Commissioners has adopted a vision statement for Broward County relating to a Pristine, Healthy Environment which states:

“We are a community that values a vibrant, healthy environment with substantial open space, equally distributed throughout the County. Our citizens enjoy pristine water bodies and clean air, with County standards that are the strictest in the state. All of our cities are our partners and best management models for sustainability, conservation of resources, environmental stewardship, landscape

maintenance, clean air and drinking water, and green building are embraced countywide. All County practices and codes reflect and further the Board's policies and vision."

A related goal statement affirms we shall "encourage and promote community stewardship of the environment and an ethic of conservation". To quantify this goal, the Public Works Department and WWS have determined to reduce water consumption 5% by 2011.

**County Ordinance** – In support of conservation goals and in recognition of ongoing climate change, The Board of County Commissioners adopted a County wide ordinance restricting irrigation. Under the ordinance, irrigation within the County from every source is restricted to no more than twice a week.

### **Conclusion**

The cumulative effect of these occurrences has been a significant change in the consumption patterns of WWS customers. Since these changes have not been consistent across customer classes, the simple across the board rate increases have over time resulted in uneven revenue recoveries. This along with the need to improve the price sensitivity for use of abnormal amounts of water have demonstrated the need to perform a comprehensive rate analysis to support rate restructuring and the continued generation of revenue sufficient to fund WWS activities.

# Chapter 1 – Rate Principles

## 1.1 Theory of Rate Setting

There are two distinct methods used for rate setting. These methods are the utility based approach and the cash needs approach. Each approach uses a defined rate year which is used to estimate the costs associated with the provision of service. Such costs may either be budgetary estimates or prior year estimates adjusted for defined factors including inflation. Whichever method is chosen, the estimated costs should be reasonably similar.

**Utility Based Approach** – the utility based approach starts with the estimated costs for the rate year. These include operations and maintenance (O&M) costs comprised of personal service, materials and supplies, energy, utility, motor pool, and contract services costs. They also include general and administrative costs necessary to support the O&M activities and generally include accounting, information technology, billing, procurement, engineering, and central services costs. Most privately owned utilities use the utility based approach and would also include payment of property taxes and/or special assessments.

In addition to recovering annual costs, the utility approach adds depreciation and return on equity to determine the total amount which must be recovered from rates, fees, and charges. Depreciation is the estimated cost of the facilities or assets consumed in the provision of services and is usually calculated based upon actual installed cost of property, plant and equipment divided by the estimated useful life of the facilities or assets. Return on equity is the amount determined by applying an appropriate investment rate to owner's equity which is the difference between the utility's assets and liabilities.

Under this approach certain risks associated with decisions made by owners or their representatives are not passed directly to rate payers. These risks include potential increased costs resulting from the timing of replacing facilities or other assets and how these replacements or new facilities are financed. Of course, where there are risks there are also possible rewards which may accrue relating to these decisions. Regardless, under the utility approach both risks and rewards would benefit owners usually through increasing or decreasing the payment of dividends to stockholders.

**Cash Needs Approach** – the cash needs approach also starts with the estimated costs for the base year. There is usually little difference between the amounts estimated under either the utility based or cash needs approach. The one area which may be different is that associated with payment of local property taxes or other assessments. This difference is not directly related to either approach but is based upon whether the utility is publically or privately owned. The cash needs approach is most commonly used by publically owned utilities which do not normally pay local taxes. In some jurisdictions publically owned utilities may be assessed a payment in lieu of taxes (PILOT) which may be more or less than what would have been assessed as property taxes. If charged a PILOT, these costs would be included in expenses.

The cash needs approach does not seek to recover depreciation. Instead, provision is made to recover debt service costs including principal, interest, and coverage requirements. In addition to debt service costs, provision is also generally made to cash finance a certain level of facilities costs. Many utilities using the cash needs approach will compare the total of debt service costs and cash financing needs to estimated depreciation in order to assure a financing plan sufficient to maintain the facilities necessary for the provision of service and the generation of revenue.

Most publically owned utilities use the cash needs approach because it reduces risk associated with rate setting. Although certain risk associated with estimating costs and

demand are the same under the utility and cash needs approaches, the risks associated with financing plans and facility replacements are eliminated.

**Rate Stabilization** – regardless of the best planning efforts of utilities costs may change significantly year to year. The changes may be the result of incurring unusual or infrequent expenses or through the execution of a plan of finance for new facilities. To deal with these variations several rate setting strategies have been developed to mitigate rate shock arising from large, uneven shifts in revenue requirements.

Although rates may be established for single or multiples years, rates should not be established without considering how they are expected to impact future rates. This is accomplished by completing a forecast of revenue requirements for a period of at least five and sometimes up to ten years. Typically this involves taking the base year requirements and adjusting them for inflation, financing plans or other factors which are probable and reasonably estimable through the forecast period. Concurrently, customer demand is estimated in order to evaluate probable future rate changes given the proposed rates.

Certain expenses which are significant and are not normally recurring may be amortized up to five years to levelize the impact on rates. These expenses may include master planning studies which are only completed every five or even ten years, storm related expenses, or regulatory expenses. Large step increases in ongoing current period expenses such as energy, fuel or chemical costs should not be amortized for rate stabilization purposes although losses incurred in a year may be recovered in subsequent years.

Other costs, principally related to future financings may result in large rate increases either during the year new debt is issued or the subsequent year. Many times these potential rate shocks can be avoided by increasing rates in advance of the borrowing. This allows a series of smaller rate increases to replace a single large increase and is

generally considered easier for customers to accept. This strategy may also result in reducing the ultimate borrowing if the excess revenue is applied to cash financed capital under the cash needs approach.

**Equity** – underlying all theory of rate setting is the principle that rates must be established on an equitable basis. There are at least two components of rate equity. The first is based upon the expectation that costs will be recovered from the customers using the system. This is particularly important when a utility provides multiple services. Under those circumstances costs must be carefully assigned to the appropriate service especially those general and administrative costs which are subject to allocation between services. The basis of allocation must reasonably approximate the actual benefit derived by the service from the shared cost.

The other component of equitable rate setting requires that rates be established based upon the customers' use of the system. If there are significant differences between certain customer classes in the way they use the system especially related to provision of peak or wholesale services, those differences and the costs thereof should be taken into account when setting rates.

## **1.2 Legal Authority**

Broward County is a home rule County established under the laws of the State of Florida. Under the general rules governing counties, Broward County is authorized to own and operate water and sewer systems. Currently, Broward County provides retail water and sewer service to customers within certain defined service areas within the county. The retail water service includes the provision of water to the City of Coconut Creek which purchases water for resale to their customers within the City. The County also provides regional services to large users for the transmission, treatment and disposal of wastewater and the provision of raw water. Rates for the provision of regional services are governed by their respective agreements and are not included in this rate study.

**County Administrative Code** – the County is a self regulated utility with the power to bind its customers for the payment of rates, fees, and charges established by the Board of County Commissioners. Under the general powers of the county board has the power under Sec. 34-4 to (5)... “fix and collect rates, fees, and other charges to persons or property or both for the use of the facilities and services provided by any water system or sewer system or combined water and sewer system and to fix and collect charges for making connections with any such water system or sewer system or combined water and sewer system and to provide for the imposition of reasonable penalties on any users or property for any such rates, fees or charges that are delinquent” and (11)...” require and enforce the use of its facilities whenever and wherever they are accessible.”

In addition Sec 34-6 requires ...”(a) that such rates, fees, and charges shall be so fixed and revised so as to provide sums, which, with other funds available for such purposes, shall be sufficient at all times to pay the expenses of operating and maintaining such water system or sewer system or combined water and sewer system, including reserves for such purposes, the principal of and interest on revenue bonds as the same shall become due and reserves therefore, and to provide a margin of safety over and above the total amount of any such payments, and to comply fully with any covenants contained in the proceedings authorizing the issuance of any bonds or other obligations of the county. The county shall charge and collect such rates, fees, and charges so fixed or revised, and such rates, fees and charges shall not be subject to the supervision or regulation by any other commission, board, bureau, agency or other political subdivision or agency of the county or state; (b) Rates, fees, and charges to be just and equitable. Such rates, fees, and charges shall be just and equitable and uniform for users of the same class and where appropriate may be based or computed either upon the quantity of water consumed or upon the number and size of sewer connections or upon the number and kind of plumbing fixtures in use in the premises or upon the number or average number of persons residing or working in or otherwise

using or occupying such premises or upon any other factor affecting the use of the facilities furnished or upon any combination of the foregoing factors as may be determined by the county board or on any other equitable basis.”

**Florida Statutes** – In addition to affirming the rights established in the County Administrative Code, Chapter 153.11 of the Laws of the State of Florida requires that... “c) Such rates, fees, and charges shall be just and equitable and may be based or computed upon the quantity of water consumed and/or upon the number and size of sewer connections or upon the number and kind of plumbing fixtures in use in the premises connected with the sewer system or upon the number or average number of persons residing or working in or otherwise connected with such premises or upon any other factor affecting the use of the facilities furnished or upon any combination of the foregoing factors.”

**Case Law** – On occasion lawsuits are filed which challenge the application of the law by individual utilities in the development of their rates, fees, and charges. When these cases are adjudicated the court opinions may establish certain definitions or guidelines that may serve as precedents in other lawsuits. For this reason staff should constantly strive to maintain awareness of any court decisions that may have a meaningful impact on the establishment or assessment of rates, fees, and charges for water and sewer service.

### **1.3 Objectives**

Since 1993, the following rate setting objectives have been used as guiding principles by WWS in the development of rates, fees, and charges. They are discussed here in their order of importance:

- **Cash Needs Approach** – the rates will be established on the cash needs basis utilizing the proposed budget to establish the base year requirements.
- **Financial Sufficiency** – the rates must generate the revenues from the sale of water and sewer services and from specific service charges to pay for the

obligations of the Water and Wastewater Fund including but not limited to Debt Service (including coverage of at least 20%), cash financed capital projects, operations, and maintenance of the system and for funding reserves.

- **Conservation** – the rate structure shall support the permit requirements of the South Florida Water Management District to encourage the conservation of water, a scarce natural resource.
- **Cost of Service** – the rates shall recover the costs to provide water service from water customers, the cost to provide sewer service from sewer customers, and the costs to provide specific services from the users of those services.
- **Impact on Customer Class** – rates shall be based upon use of the facilities.
- **Ease of Implementation** – the rates shall be straightforward and shall be billable using the existing utility billing system.
- **Avoidance of Discriminatory Relationships** – the impacts on customers shall be nondiscriminatory.
- **Legality** – the rates shall be defensible if challenged.

These objectives were developed to incorporate certain goals in developing rate recommendations which follow established principles of rate setting methodology.

## **Chapter 2 – Cost of Service**

### **2.1 Direct Charges**

The proposed Operating and Capital Budgets for the FY 2011 were the basis for all costs used to develop the recommended rates. The budget includes provisions for debt service, reserves required by bond covenants, capital requirements, and direct charges. Operating costs include both fixed and variable charges. In addition, certain costs which are associated with centralized services and administrative costs are allocated to WWS activities.

Fixed charges are costs that while they may vary year by year, do not change as a result of the actual level of service provided. These charges include costs to repair and maintain facilities that are in service and will continue to be repaired and maintained regardless of their use. Other fixed charges include personal service costs, insurance costs, permitting costs, debt service, and other miscellaneous charges. Fixed costs typically represent over 90% of total costs.

Variable costs include those that are dependent upon the actual water produced, purchased or wastewater treated. These include energy costs, chemical costs, and certain contract service costs.

### **2.2 Regional and Bulk Water Costs**

Direct charges for retail activities also include the retail share of regional system costs. WWS operates two regional systems, the North Regional Wastewater System which provides wastewater transmission, treatment, and disposal for 11 Large Users and the retail customers of WWS in Districts 1 and 2 and the Regional Raw Water System that provides water to four Large Users and a WWS water treatment plant in District 2. Costs for these regional services are allocated to the WWS retail customers using the

same basis that charges are allocated to Large Users in accordance with their agreements.

WWS is a participant in the regional wastewater system owned and operated by the City of Hollywood which provides transmission, treatment, and disposal service for the wastewater collected in District 3. In addition, WWS purchases water from the City of Hollywood for resale to retail customers in District 3. Charges for both of these services are governed by contracts with the city and are assessed on the basis of flow.

Generally the costs for services provided by large regional systems are less than that which would be incurred through operating smaller individually owned facilities. Through economies of scale, costs for constructing, maintaining, and operating regional systems are usually more competitive and may offer greater levels of service than could otherwise be achieved.

### **2.3 Capital Program**

The WWS capital program is intended to support the NIPs (Comprehensive Neighborhood Improvement Projects), consolidate and rehabilitate water and wastewater facilities, provide additional capacity in the Water Treatment Plants, and meet regulatory requirements. In order to better manage capital projects which may or may not result in a capitalized fixed asset, we categorize certain capital projects as renewal and replacement projects. The Capital Improvement Program (CIP) consists of a five year project plan which includes completion of ongoing projects as well as anticipated projects through the year 2015.

The five year program can be summarized as follows (in thousands):

Retail Water	\$ 109,437	NRWWS Treatment	87,372
Retail Sewer	40,472	NRWWS Transmission	<u>24,307</u>
		Total	\$261,588

## **2.4 Fiscal Plan**

The Fiscal Plan is designed to balance the operating requirements with the demands of the CIP. Operating requirements include the recovery of net operating revenue to assure meeting bond coverage requirements (currently 20% of debt service), maintenance of adequate or required reserves, and reinvestment in plant through cash financed capital projects. We have developed a five year plan which utilizes rate stabilization techniques when necessary as well as long-term financing of a portion of the CIP to mitigate future rate impacts on retail customers.

Our current fiscal plan anticipates the sale of approximately \$135 million of additional bonds during fiscal year 2012. The financing includes funds to finance \$125 million of construction costs. Of this amount approximately \$46.6 million and \$60 million are to finance retail capital projects for water and sewer respectively. The five year Capital Improvement Program for WWS is presented in [Appendix A](#).

During prior years, we have used commercial paper authorizations to provide budget authority to initiate certain projects. Commercial paper or other short term financing may be available to provide interim financing for capital projects, if necessary, prior to the actual issuance of bonds. Another \$210 million of bond funds may be required to complete the five year Capital Budget.

## **2.5 Debt Service Costs**

Water and wastewater utilities are capital intensive operations which require significant investment in treatment plants and distribution/transmission/collection infrastructure in order to provide service to customers. Although some facilities are contributed by developers in order to obtain service for their developments, most investment in plants to treat water and wastewater as well as transmission systems to send water to distribution systems or to collect wastewater from collection systems are typically financed by the sale of revenue bonds.

In prior years, most water distribution systems and sewer collection systems were constructed and donated to WWS by developers. In recent years most investment in these systems have been provided by WWS either as cash financed capital or particularly in the case of expansion of the sanitary sewer system within the WWS service area are financed through the sale of bonds. WWS has a policy of wherever practical, renewal and replacement of existing facilities that do not increase capacity or significantly extend the useful life of the asset should be cash financed.

Debt service costs include principal, interest, and coverage requirements on bonds outstanding. Coverage is a requirement in the bond resolution that net operating revenues must equal at least 120% of the principal and interest requirements for the period. However, for credit rating purposes, rating agencies expect actual coverage to exceed the minimum requirements. All else being equal, a history of higher coverage will result in stronger credit ratings. Better credit ratings can be expected to translate into lower financing costs when additional bonds are sold. Any excess net revenue including coverage is available pay for cash financed capital projects. A schedule of current Debt Service is presented in [Appendix B](#).

Debt service costs for additional debt issued during the forecast period have been estimated assuming level debt service payments with a 5.75 percent interest cost and 20-year amortization of principal. Additionally, it is assumed that new debt will be issued during the fiscal year such that the first year's debt service represents a half year payment requirement. This device serves to phase in the cost of new debt.

## **2.6 Operating Budgets**

The operating budgets for WWS Administration, Information Technology, Engineering, Fiscal Operations, and Operations total \$ 68,787,280 for the year 2011. The operating budget process includes allocation of central services and administrative costs as well as the segregation of costs to the lines of business provided by WWS operations.

## 2.7 Cost Allocations

Cost allocations include operating cost re-classes which are when practical based upon the level of service actually provided. For example, laboratory costs are allocated based upon the actual number of tests performed for each activity; insurance costs are allocated based upon the replacement value of facilities insured; and customer costs are allocated based upon a two step process which first recognizes the level of effort required especially for regional billings and then based upon the number of customer bills generated.

Centralized services including administration, purchasing, accounting, and information technology are then allocated based upon total direct and operating costs reclasses per line of business. Debt service cost is allocated based upon actual or projected use of bond proceeds.

## 2.8 Lines of Business

Water and wastewater activities are segregated into five lines of business:

**Retail Water** – includes raw water, purchased water, water treatment, and transmission and distribution costs for the provision of water to approximately 58,000 residential, commercial, and sale for resale customers. Costs associated with the provision of public and private fire protection services are also included.

**Retail Sewer** – includes collection, transmission, treatment and disposal of wastewater to approximately 42,000 residential and commercial customers.

**Regional Raw Water** – includes source of supply and transmission costs for raw water supplied to 5 Large Users and WWS WTP 2A.

**Regional Wastewater Treatment** – includes transmission, treatment, and disposal of wastewater for eleven Large Users and WWS’ retail customers in Districts 1 and 2. Also, included are operations of the Septage Receiving Facility and the reclaimed water system.

**Regional Wastewater Transmission** – includes transmission of wastewater from the Large Users’ collection systems to the NRWWS wastewater treatment plant.

## **2.9 Retail Revenue Requirements**

The revenue required to support the Water and Wastewater Fund is defined by bond covenants and is comprised at a minimum of operation and maintenance costs, debt service costs (including coverage), and reserve requirements. For retail rate setting purposes, revenue requirements also include the retail portion of the North Regional Wastewater System and Regional Raw Water System costs. Additionally, a provision of \$8.1 million to pay for the cash financed portion of the CIP is included. The revenue requirements for water and sewer are \$40,691,330 and \$30,750,290 respectively.

**Retail Rate Forecast** – The retail rate forecast is used to evaluate the impact of anticipated revenue requirements and the proposed fiscal plan on retail rate increases for the full five years envisioned in the CIP. Estimates of future revenue requirements assume a three percent rate of inflation per year.

Given the uncertainties related to growth in water consumption, no increases in water consumption were projected for the five year forecast period. For sewer, one percent per year growth in consumption was anticipated, given the effect of the Neighborhood Improvement Projects extension of the sanitary sewer systems. The forecast is presented in [Appendix C](#).

Rate increases are required during the next five years to preserve the operating margin and to reduce future financing. In addition, to preserve a reasonable level of cash financed capital, rate increases have been anticipated as follows:

	<u>Water</u>	<u>Sewer</u>
Year 2011	5.00%	4.98%
Year 2012	5.64%	3.62%
Year 2013	5.19%	4.72%
Year 2014	4.33%	6.32%
Year 2015	5.30%	4.88%

## **2.10 Regional Revenue Requirements**

Revenue requirements for the Regional Wastewater and Raw Water Systems are allocated to Large Users in accordance with their agreements.

## Chapter 3 – Retail Water and Sewer Rates

### 3.1 Cost of Service

The Water and Wastewater portion of the operating budget for the fiscal year 2011, not including reserves is \$192,224,590. The budget includes operating costs, debt service, and capital costs which are handled separately in the rate model. Certain costs for engineering services are charged to capital projects as are certain costs from WWS Administration and the Water and Wastewater Operations Division which also support capital projects. The net operating costs, including operating capital comprised of vehicle and equipment costs, which must be recovered from retail rates are \$68,787,280.

Operating costs are charged directly to either a water or sewer activity or are allocated through an internal cost allocation plan. Administrative, accounting and information system costs are allocated based upon the ratio of direct costs. Customer service costs are allocated between water and sewer based upon the number of customers to which each service is provided. The following is a schedule of costs allocated to each line of business:

<b>BROWARD COUNTY</b>						
<b>WATER &amp; WASTEWATER SERVICES RETAIL RATE STUDY REPORT</b>						
<b>2011 INTERNAL COST ALLOCATION</b>						
	<b>Retail Water</b>	<b>Retail Sewer</b>	<b>Regional Raw Water</b>	<b>Regional WW Treatment</b>	<b>Regional WW Transmission</b>	<b>WWS Total</b>
Direct Costs	\$19,538,170	\$8,112,190	\$1,083,310	\$16,771,070	\$2,838,620	\$48,343,360
OGA & WC	1,751,010	727,020	97,090	1,503,030	254,390	4,332,540
Insurance	1,050,710	0	0	1,910,040	0	2,960,750
WWS Admin	372,950	154,850	20,680	320,130	54,180	922,790
Information Systems	1,060,950	440,500	58,830	910,690	154,150	2,625,120
SCADA	457,410	189,920	25,360	392,630	66,450	1,131,770

<b>2011 INTERNAL COST ALLOCATION – continued</b>						
Customer Service	2,719,430	2,008,560	50,300	150,890	100,590	5,029,770
Finance	1,043,300	433,170	57,850	895,540	151,580	2,581,440
Engineering	347,460	144,270	19,270	298,260	50,480	859,740
Total Allocations	8,803,220	4,098,290	329,380	6,381,210	831,820	20,443,920
Total Costs	28,341,390	12,210,480	\$1,412,690	\$23,152,280	\$3,670,440	\$68,787,280
Retail Share of Regional	634,770	5,720,710	-\$634,770	-\$4,767,760	-\$952,950	\$0
Total Requirement	<u>\$28,976,160</u>	<u>\$17,931,190</u>				

Revenues generated through collection of specific service charges are recognized as a reduction to the revenue requirement. Service charge revenue includes delinquent fees assessed against past due accounts, specific service charges such as meter reread charges and fines such as tampering charges.

Customer costs are those associated with maintaining and reading meters and providing for the generation and mailing of monthly bills. Additional costs include customer accounting, payment processing and the provision of customer service. These costs are charged on a per bill basis and are charged to any user receiving a bill regardless of the number of services the customer may receive. The calculation of the customer charge is a fairly simple one in which the amount to be covered is divided by the estimated number of customers. The result is then divided by twelve to determine the monthly charge. The recommended charge is \$4.06, a two percent increase over the current charge of \$3.98.

<b>Water and Wastewater Services Retail Rate Study Report 2010 Customer Charge</b>	
Customer Service cost	\$4,727,990
	60%
	\$2,836,794
Bills per Year	699,480
Customer Charge	\$4.06

The remaining 40% of customer service costs are funded by the collection of delinquent charges and specific service charges. Since the current charges are sufficient to fund the remaining customer service costs no increase in these charges is recommended.

The Water/Wastewater Fund has four series of bonds currently outstanding. They are the 2003, 2003A, 2005A and 2009A Revenue Bonds. Each series has defined principal and interest requirements per year as well as the requirement that the rates generate enough revenue after payment of current expenses to equal at least 120 percent of the total payment requirement. This excess is referred to as the "Coverage Requirement" and is a component of the revenue requirement. The Debt Service requirement is (see [Appendix B](#)) allocated between water and sewer based upon the ratio at which the original bond proceeds were used to pay for water or sewer plant. Because the bonds were also used to finance certain assets of the North Regional Wastewater System, only those costs representing the retail share of the Regional System are included in the rate model.

The Capital Improvement Program has projects which are either water or sewer projects as well as general or comprehensive projects which are allocated between water and sewer based upon engineering estimates. We have established a goal of reinvesting through cash financed capital projects an amount at least equal to the annual depreciation recognized on the Water/Wastewater Fund financial statements. Through adjustment of cash financed capital and through anticipation of the sale of additional bonds we are able to stabilize the impacts of future rate increases beyond what is otherwise afforded by the use of reserves for rate stabilization.

Certain customer classes receive services which are not considered full or normal service. Among these are water for resale; reclaimed water; return water; and septage customers. Rates for water for resale are established similarly to those for retail water except that certain charges associated with the distribution system from which these resale customers receive no benefit are excluded.

The revenue requirements for Fiscal Year 2011 are:

BROWARD COUNTY			
WATER & WASTEWATER SERVICES RETAIL RATE STUDY REPORT 2010			
2011 WATER AND SEWER REVENUE REQUIREMENTS			
	TOTAL	WATER	SEWER
PERSONAL SERVICES AND O&M	\$46,907,350	\$28,976,160	\$17,931,190
OPERATING CAPITAL	1,115,840	689,290	426,550
TOTAL OPERATING APPROPRIATIONS	48,023,190	29,665,450	18,357,740
DEBT SERVICE	22,810,620	10,311,190	12,499,430
CASH FINANCED CAPITAL PROJECTS:	8,101,300	5,089,980	3,011,320
LESS REVENUES/CUSTOMER CHARGES	7,493,490	4,375,290	3,118,200
REVENUE REQUIREMENT	\$71,441,620	\$40,691,330	\$30,750,290

After the revenue requirements are divided between water and sewer, the water charges are again distributed between retail and resale requirements. The costs are finally segregated between fixed and variable charges. This allocation establishes a base line for the calculation of minimum monthly and volume charges.

Fixed charges are those that do not vary dependent upon the use of the system. These charges include costs incurred to make system capacity available and keeping it ready to serve. They include debt service costs, maintenance costs, and most operating costs. Variable costs which are dependent upon system usage consist primarily of energy and chemical costs. These costs are often referred to as commodity costs.

The fixed charges are subdivided between customer costs and capacity costs for both retail and resale water as follows:

<b>Water and Wastewater Services Retail Rate Study Report 2010</b>			
<b>Water Retail and Resale Revenue Requirement</b>			
	<b>Total</b>	<b>Retail</b>	<b>Resale</b>
<b>Revenue Requirement</b>	\$40,691,330	\$35,048,598	\$5,642,734
		35%	35%
<b>Minimum Monthly Charge Portion</b>		12,267,009	1,974,957
<b>Volume Charge Portion</b>		\$22,781,589	\$3,667,777
Flow (1,000 gallons)		6,857,100	1,728,506
Per 1,000 gallons			\$2.12
<b>Distribution</b>		\$4,030,892.77	
Flow		8,585,606	
Per 1,000 gallons		\$0.47	\$0.07
Volume Revenue Requirement		\$22,781,589	\$3,667,777
Resale Portion of Distribution Costs		-\$120,995	\$120,995
		\$22,660,593	\$3,788,772
<b>Total Retail Volume Charge</b>		\$3.30	
<b>Total Resale Volume Charge</b>			\$2.19

In order to support price sensitivity in the rates, a certain portion of the fixed costs of both retail water and sewer are reallocated to the capacity or volume charge calculation. To encourage conservation a larger portion of the costs are reclassified for water rates than are re-classed for sewer rates. Currently, approximately 65 percent of water costs and 50 percent of sewer costs are recovered through volume charges.

### 3.2 Minimum Monthly Charge

The remaining fixed charges for both water and sewer are allocated to residential customers based upon average use on a per unit basis and to commercial customers based upon average use per meter size.

The calculation of the minimum monthly charges then becomes a function of the meter equivalents (\$ required /meter equivalents /12) as follows:

#### WATER

Capacity Revenue Requirement	\$12,267,010
Meter Equivalents *	100,799
Monthly Capacity Charge	\$10.14

#### SEWER

Capacity Revenue Requirement	\$15,375,150
Meter Equivalents*	72,487
Monthly Capacity Charge	\$17.44

\*Average Consumption per class divided by residential consumption times number of accounts/units.

### 3.3 Conservation Pricing

Basic principles of economics recognize that demand for goods or service is highly dependent upon the price of that good or service. Generally, all else being equal the greater the price the smaller the demand. Conservation pricing attempts to use this principle to influence the way customers use their water service. Unlike more

conventional pricing techniques where the more you buy the lower the unit cost, conservation pricing reverses the technique so that the more you buy the greater the cost.

These principles are used to develop the volume charges applied to water usage. An inverted block rate structure is used for retail water so that different rates are charged for different levels of consumption.

<b>WWS Retail Rate Study Report 2010</b>			
<b>Water Conservation Adjustment</b>	<b>Total</b>	<b>Capacity</b>	<b>Commodity</b>
Retail Revenue Requirement	\$35,048,598	24,293,181	10,755,417
Conservation Adjustment		-12,026,172	12,026,172
Adjusted Retail Revenue Requirement		12,267,009	22,781,589
Resale Revenue Requirement	\$5,642,734	4,755,096	887,638
Conservation Adjustment		-1,087,318	1,087,318
Adjusted Resale Revenue Requirement		3,667,777	1,974,957

### **3.4 Residential Blocks**

For rate setting purposes, residential usage is divided into three categories: essential, discretionary, and excessive. They are defined as follows:

- Essential use is necessary for the health and public safety of the residents. This represents water used for drinking, cooking, bathing, and the elimination of wastes necessary to maintain a healthy environment. It does not include entertainment or pool and yard maintenance. Although, household size may have some influence on this portion of an individual customer's use, the difficulties (and costs) associated with maintaining per person information would exceed any benefits realized by just a few customers. In fact, over 68 percent of

residential customers' monthly water use is at 7,000 gallons of water or less. Over 93 percent of use never exceeds 12,000 gallons per month. However, at the high end, less than three percent of monthly usage exceeds 20,000 gallons with some residential customers' use reaching over 100,000 gallons per month.

- For purposes of establishing conservation pricing, essential use is split between a basic or nominal block and an additional block to representing consumption up to normal or average levels of use. The basic and normal block rates are subsidized by the revenues generated through the excessive water use block and create a reduced rate for customers using limited amounts of water.
- Discretionary use is that use which allows residential customers to maintain a higher standard of living and certain levels of ambiance and would include some use for pool and yard maintenance.
- Excessive use is that which greatly exceeds what would be expected from a normal customer.

Recognizing the essential nature of certain usage, the rate for the initial and the normal blocks of essential residential customer usage is set at 40 and 75 percent respectively of the average calculated volume charge. The discretionary block rate is set at 125 percent of the average while the rate for excessive use is set at almost twice the average. The excessive rate is set to eliminate any benefit large residential water consumers received from the cap placed on the sewer charges at 15,000 gallons per month. The blocks of consumption for Single Family residential customers are as follows:

- Basic up to 3,000 gallons per month
- Normal 4,000 to 6,000

- Discretionary 7,000 to 12,000 gallons per month
- Excessive 13,000 gallons per month or more

These block rates are designed to be revenue neutral and to encourage water conservation. It is anticipated that the total revenues generated through this pricing structure will meet the allocable share of revenue requirements for residential customers.

The block charges are then calculated as a percentage of the average volume rate as follows:

<b>WWS Retail Rate Study Report 2010</b>		
<b>Residential Volume Charges</b>		
Average Retail Volume		\$3.30
Tier 1	40%	1.32
Tier 2	75%	2.48
Tier 3	125%	4.13
Tier 4	195%	6.43

During periods of declared water emergencies, these blocks of consumption are adjusted to reflect the targeted reductions. The South Florida Water Management District regulates the use of water in the South Florida area. The District has established a program that recognizes four phases of a water emergency. Each phase has a goal of reducing water consumption by 15 percent. In the event an emergency is declared by the District, reduced blocks for residential customers are implemented consistent with the designated phase. This is done in lieu of standard drought related surcharges utilized by other utilities.

The following schedule presents the required adjustments to the standard block rates that should be used in the event the SFWMD institutes additional water restrictions as a result of drought conditions affecting South Florida. The blocks are adjustments for additional reductions of 15% and 30% over current year round restrictions:

<b>Retail Rate Study Report 2010</b>		<b>Standard</b>	<b>Drought</b>	<b>Extreme Drought</b>
<b>Residential Rate Tiers</b>				
<b>Residential - All meter sizes</b>				
<b>Single family - 1,000 gallons</b>				
Basic Tier		0-3	0-2	1
Second Tier		4-6	3-5	2-4
Third Tier		6-12	5-9	4-6
Final Tier		<12	<9	<6
<b>Multi Family - 1,000 gallons</b>				
Basic Tier		0-2	1	1
Second Tier		3-4	2-3	2
Third Tier		5-6	4-5	3
Final Tier		<6	<5	<3

### 3.5 Commercial Blocks

When developing conservation rates for commercial customers, it became apparent that the same definitions could not be used that are used for residential. Without going into an economic or political debate, it was determined that commercial use is either basic discretionary (someone had to make a decision to go into business) or controllable. Although meter size is used to assess the minimum monthly charge for commercial customers, actual use per meter size varies to a much greater extent than it varies for residential use. For that reason, controllable was defined as use which exceeded basic

needs. For rate setting purposes basic use is considered to be 75% percent of the prior year's actual average consumption. This average consumption is calculated for each customer annually.

Additional parity with residential customers was achieved through the use of an initial rate for commercial use which falls about midway between the second and third tier residential rate and represents the average calculated volume charge. The controllable rate is the same as the fourth tier residential rate.

<b>WWS Retail Rate Study Report 2010</b>			
<b>Commercial Volume Charges</b>			
Average Retail Volume			\$3.30
Tier 1	100%	3.30	
Tier 2	195%	6.43	

During declared water emergencies blocks for Commercial, Municipal, Institutional, Hotels, Motels, and Recreational Vehicle Customers are also adjusted as follows:

<b>Retail Rate Study Report 2010 Commercial Rate Tiers</b>	<b>Standard</b>	<b>Drought</b>	<b>Extreme Drought</b>
<b>Commercial - All meter sizes</b>			
<b>per AAC (Annual Average Consumption) - 1,000 gallons</b>			
First Tier	0-75%	0-60%	0-45%
Second Tier	<75%	<60%	<45%

### 3.6 Irrigation Rates

We encourage limiting potable water use for irrigation purposes. If customers do choose to use potable water for this purpose, they are charged at the highest block rates established for residential use.

<b>WWS Retail Rate Study Report 2010</b>		
<b>Irrigations Volume Charges</b>		
Average Retail Volume		\$3.30
Tier 1	100%	4.13
Tier 2	195%	6.43

Blocks are established for each meter size and adjusted during water emergencies as follows:

<b>Retail Rate Study Report 2010</b>			<b>Standard</b>	<b>Drought</b>	<b>Extreme Drought</b>
<b>Irrigation Rate Tiers</b>					
<b>Irrigation - Per meter size, 1,000 gallons</b>					
<b>5/8 inch</b>	First Tier		0-8	0-4	0-2
	Second Tier		<8	<4	<2
<b>1 inch</b>	First Tier		0-22	0-11	0-5
	Second Tier		<22	<11	<5
<b>1 1/2 inch</b>	First Tier		0-55	0-27	0-14
	Second Tier		<55	<27	<14
<b>2 inch and over</b>	First Tier		0-142	0-71	0-35
	Second Tier		<142	<71	<35

### 3.7 Adequacy of Rates

Once the calculations of proposed retail water and sewer rates are complete a test is performed to determine if the rates will produce the desired revenues. Given the large volume of gallons sold and the rounding of the calculations to the nearest penny, there is the potential for the recommended rates to over or under recover significant amounts of revenue. These over and under recoveries may be mitigated through minor adjustment to the costs allocated to the commodity or volume charge from the capacity or minimum monthly charge.

To test the adequacy of the rates calculated as previously described, we have run a rate model that applies the recommended rates to the billing for the 12 months ended June 30, 2010. This computation determined that revenues would equal an amount which exceeds the revenue requirements by approximately \$2.3 million. Given the declines in customer demand experienced since the implementation of water restrictions in 2007 we believe the recommended rates provide a reasonable contingency to assure sufficient revenue is generated to meet revenue requirements for 2011.

<b>WWS Retail Rate Study Report 2010</b>					
<b>Water &amp; Sewer Revenue Sufficiency</b>	Minimum	Volume	Total	Requirement	Over (Under)
<b>Water</b>					
Retail	\$12,079,382	\$22,305,370	\$34,384,752	\$35,048,598	\$ (663,846)
Resale	1,974,957	3,785,428	5,760,385	5,642,734	117,651
Private Fire Protection	666,730	3,838	670,568		670,568
<b>Sewer</b>	16,180,388	16,818,584	32,998,972	30,750,290	2,248,682
<b>Customer Charge</b>	2,842,000		2,842,000	2,836,794	5,206
			76,656,677	74,278,416	2,378,261

## **Chapter 4 – Capital Recovery Charges**

### **4.1 Utility System Investment**

It is the nature of a utility that the greatest investment necessary to sustain the business is its investment in utility treatment, transmission, distribution, and collection plant. The high cost of both water and wastewater treatment facilities require huge expenditures to provide capacity for future customers. Unlike other more traditional businesses which may acquire inventory incrementally to meet demand, this inventory in plant must be purchased in large quantities and held sometimes for years before it may be sold to new customers.

Because of these high costs, it is normal for utilities to finance plant expansions. This means that the cost of carrying this inventory also includes financing costs. Further, since servicing this debt requires repayment usually from the date of borrowing, it becomes necessary for current customers to pay to build and maintain the plant for future customers. A Capital Recovery Charge (CRC) is intended as a system buy in to recover the costs incurred by existing customers to fund new connections. It is expected to bring parity to the various customers regardless of when they became system users. And finally, it is structured to assure customers do not pay more than their fair share of financing costs.

### **4.2 Impact Fees**

Impact fees have been defined in the Florida Administrative Code, as charges that a customer must pay for the privilege of connecting to a system. As contemplated by the code, these charges may or may not bare any relationship to the costs associated with the provision of service. Many challenges in the courts over the authority of utilities, especially utilities owned by government entities have more narrowly defined what impact fees are and how they may be calculated. Additionally, funds received through

the imposition of impact fees are restricted by both State Statute and bond covenants so that they may only be used to pay utility expansion costs.

In 1993, the Board of County Commissioners adopted the comprehensive neighborhood approach to improve areas to encourage annexation by adjacent cities. At the time there was concern over the cost of these projects to the residents. When sanitary sewers are installed in existing communities, residents must pay to physically connect to the system, close their septic tank and, if appropriate, pay an impact fee. Such costs could run over \$5,000 per household. In an attempt to mitigate these costs, the Board pursued a way to at least forego the collection of the sewer CRC.

Since State Statute and Bond Covenants restricted the Boards power to waive fees, they adopted a rate that made the first Equivalent Residential Unit of the Sewer CRC available to each customer at no charge. This approach does not change the way the sewer charge is calculated. It does however reduce the revenue generated from collection of the sewer CRC. As a result other rates must be increased or more bonds must be sold to replace this revenue.

### **4.3 Water Consumption Analysis**

The average monthly consumption does not always reflect the demands placed upon the water or sewer system by a typical single family residence. This may occur because the average can be affected by very high demands relating to just a few customers. To assure the numbers used are as representative as possible, an analysis of the consumption per household was performed using fiscal year ended June 30, 2010 data.

During fiscal year 2007, a long term drought began in South Florida which included the areas served by WWS. To mitigate the impact of the drought, the SFWMD instituted water restrictions on South Florida utilities. As the drought continued, restrictions were increased to level 3, a level which called for reductions in water use by 45% of pre drought use. Although restrictions were later reduced to level 2 (30% targeted

reductions), the communities of Broward County began to recognize that permanent reductions were in the best interest of South Florida. Consequently both the County and the SFWMD adopted regulations which included permanent restrictions on the use of potable water in South Florida including the areas served by WWS.

Prior to the drought, consumption per Equivalent Residential Unit (ERU) was defined as the maximum day system demands on a typical residential unit estimated at 300 gallons per day (gpd) for water and 200 gpd for wastewater. Plant capacity necessary to accommodate these demands is 350 gpd and 250 gpd for water and wastewater, respectively. Currently, ERU's have been reduced to 274 gpd for water and 209 gpd for wastewater (Engineering Support Study, [Appendix D](#)).

#### **4.4 Equivalent Residential Unit**

The imposition of a charge for system capacity requires the definition of a unit to measure that capacity. For simplicity's sake, all customer needs are measured in terms of an ERU. An ERU is defined as the normal daily system demand of a single-family residential unit as measured at the customer's meter. Since water treatment plants are designed to meet peak demands, the customer's average must be converted to plant capacity using the peaking factor which is 1.3 times the average day demand.

The water ERU is calculated as follows:

$$\begin{aligned} \text{One ERU} &= \text{Average billed water} \times 133\% \text{ peaking factor} \\ &= 5,520 \text{ gallons}/30\text{days or gallons per day} \times 133\% \\ &= 244 \text{ gallons per day} \end{aligned}$$

System water losses average in the neighborhood of 12 percent per year. Allowing for these losses, plant capacity of 274 gallons per day is needed in order to provide 244 gallons per day to a single family residence under peak conditions.

Since water returned to the sewer system is not metered, the amount returned for treatment and disposal as wastewater must be estimated. The amount of wastewater returned exceeds the amount of billed water to water and sewer customers by 13%.

Therefore, the sewer ERU is calculated as follows:

One ERU = 184 gallons per day x 113.6%  
= 209 gallons per day

#### **4.5 Calculation of Capital Recovery Charge**

For the purpose of determining the present value of the plant facilities, Water and Wastewater Engineering Division developed valuations (Engineering Support Study – Appendix D) for the water and sewer facilities based on current engineering estimates of the average cost to install water mains, gravity sewer mains, sewer force mains, and wastewater transmission mains. Water treatment plant costs were estimated based upon the estimated cost to build new facilities to treat water from the Floridan Aquifer. Land costs were based upon the 2008 appraised values per the Broward County Property Appraiser. The Wastewater Treatment plant costs were estimated based upon the costs of the recent plant expansion that provided an additional 20 mgd of capacity to the North Regional Wastewater System. The valuation for the North Regional Wastewater System is further allocated to represent the Broward County retail portion of these facilities.

The present values of the water and sewer facilities are then compared to the available plant capacities to determine the value per ERU net of related depreciation. The retail share of debt service, expressed as the average annual principal and interest, is also determined per ERU of plant capacity. Based upon the relationship between the current terms of bonded debt to the date of calculation, a credit representing the appropriate present value of annual principle which will be paid by customers joining the system during the rate year is calculated. In a similar calculation, the present value of interest payments new customers will not pay is also determined. The resultant Capital Recovery Charge per ERU is the present value of facilities less the present value of principle which will be paid plus the present value of the interest previously paid.

<b>Capital Recovery Charge</b>	<b>Water</b>	<b>Sewer</b>
<b>Total Cost Recovery</b>		
Treatment Plant Value (\$1,000)	\$45,000	\$62,000
Total Plant Capacity (mgd)	6	20
	@ 274	@ 209
Capacity ERU's	gpd 21,898	gpd 95,694
Value per ERU - Plant	\$2,055	\$648
Value per ERU - Land	\$26	\$336
Value per ERU - Storage	406	
Value per ERU - Transmission	375	1,151
Value per ERU	\$2,862	\$2,135
Less depreciation	236	219
	\$2,626	\$1,916
<b>Adjustment for Debt Service</b>		
ERUs Added per year	1,460	1,424
Years of Debt Service	25	29
ERUs Online at Buildout (2025)	21,898	21,357
Annual Principal (thousands)	\$1,944	\$2,309
Annual Principal per ERU	\$89	\$24
Years New ERUs will pay Principal	25	23
Present Value Annual Principal per ERU	\$1,191	\$555
Annual Interest (thousands)	\$1,679	\$1,994
Annual Interest per ERU	\$77	\$93
Years New ERU will not pay Interest	0	6
Present Value Interest not Paid	\$0	\$601
<b>Adjusted Value of ERUs</b>	<b>\$1,440</b>	<b>\$1,960</b>

Although customers in District 3 receive water and wastewater service on a wholesale basis from the City of Hollywood, they are assessed the same Capital Recovery Charge as has been calculated for the provision of service from customers in District 1 and 2. Any differences between these charges, what is paid to the City for their capacity charge and what might be calculated specifically for the South Regional System are either charged or credited to the annual revenue requirement for the development of monthly service charges.

To compare our proposed charges with other utilities, a survey was performed. Charges for all utilities in Broward County as well as representative utilities throughout the Tri-County area were obtained.

## COMPARATIVE SURVEY CAPITAL RECOVERY CHARGES

UTILITY	WATER	SEWER	COMBINED
Margate	\$ 0	\$ 0	\$ 0
Hillsboro Beach	\$ 0	\$ 0	\$ 0
Oakland Park	\$ 0	\$ 0	\$ 0
Royal Utilities	\$ 0	\$ 0	\$ 0
Davie	\$ 1,197	\$ 8	\$ 1,205
Coral Springs	\$ 760	\$ 540	\$ 1,300
Parkland Utilities	\$ 250	\$ 1,200	\$ 1,450
Pompano Beach	\$ 985	\$ 545	\$ 1,530
Dania Beach	\$ 1,557	\$ 725	\$ 2,282
North Lauderdale	\$ -	\$ -	\$ 2,300
Coral Springs Improv District	\$ -	\$ 600	\$ 2,675
Lauderhill	\$ 1,629	\$ 1,190	\$ 2,819
Plantation	\$ 1,585	\$ 1,260	\$ 2,845
Sunrise	\$ 1,500	\$ 1,350	\$ 2,850
Hallandale	\$ 1,318	\$ 1,672	\$ 2,990
North Springs Improv District	\$ -	\$ -	\$ 3,025
Deerfield Beach	\$ 2,500	\$ 560	\$ 3,060
Hollywood	\$ 1,130	\$ 2,130	\$ 3,260
Broward County Current	\$ 1,185	\$ 2,140	\$ 3,325
Broward County Proposed	\$ 1,440	\$ 1,960	\$ 3,400
Cooper City	\$ 1,316	\$ 2,201	\$ 3,517
Tamarac	\$ 1,700	\$ 2,200	\$ 3,900
Palm Beach County	\$ -	\$ -	\$ 4,000
Pembroke Pines East	\$ 2,187	\$ 2,043	\$ 4,230
Coconut Creek	\$ -	\$ -	\$ 4,257
Pembroke Pines West	\$ 2,187	\$ 2,609	\$ 4,795
Coconut Creek	\$ -		\$ 5,321
Miramar	\$ 2,750	\$ 2,760	\$ 5,510
Miami-Dade County	\$ 1,800	\$ 5,000	\$ 6,800
Wilton Manors	\$ -	\$ 2,075	
Fort Lauderdale	\$ -	\$ 1,000	
Pembroke Park	\$ -	\$ 667	

## Chapter 5 – Recommendations

### 5.1 Charges for Services

As a result of the analysis performed, the following rates should be charged for services rendered effective October 1, 2010:

#### Rates

<b>Customer Charge - per bill</b>	\$4.06
-----------------------------------	--------

#### Residential Rates

Minimum Monthly Charge	Water	Sewer
<b>Single Family - per meter</b>		
5/8 inch	\$10.14	\$17.44
1 inch	\$25.92	\$63.09
1 1/2 inch	\$70.63	\$125.91
<b>Multi Family - Per Unit</b>		
Multi/Mobile	\$6.57	\$12.21

#### Volume Charges - per 1,000 gallons

Basic Tier	\$1.32	
Second Tier	\$2.31	
Third Tier	\$4.79	
Final Tier	\$6.43	
Single Family - 1,000 to 15,000 gallons per month		\$3.13
Multi Family - 1,000 to 8,000 gallons per month		\$3.13

#### Commercial Rates

Minimum Monthly Charge	Water	Sewer
<b>Per Meter</b>		
5/8 inch	\$15.83	\$18.10
1 inch	\$32.81	\$63.09
1 1/2 inch	\$70.63	\$125.91

**Rates - continued**

2 inch	\$156.14	\$369.21
3 inch	\$496.00	\$852.83
4 inch	\$1,907.96	\$1,630.88
6 inch	\$7,234.50	\$13,333.15
8 inch	\$10,259.22	\$17,039.10
<b>Per Unit:</b>		
Recreational Vehicles	\$5.09	\$10.16
Hotels/Motels	\$5.60	\$11.09

**Volume Charges - per 1,000 gallons**

First Tier	\$3.30	\$3.13
Second Tier	\$6.43	\$3.13

**Sale for Resale****Minimum Monthly Charge****Per Meter**

	Water
4 inch	\$1,907.96
6 inch	\$7,234.50
8 inch	\$10,259.22
10 inch or greater	\$43,339.33

**Volume Charges - per 1,000 gallons, all gallons**

Treatment	\$2.12
Transmission	\$0.07

**Irrigation Rates****Minimum Monthly Charge****Per Meter:**

	Water
5/8 inch	\$13.59
1 inch	\$26.33
1 1/2 inch	\$62.75
2 inch	\$140.39
3 inch	\$431.22
4 inch	\$1,907.96

**Volume Charges - per 1,000 gallons**

First Tier	\$4.79
Second Tier	\$6.43

**Rates - continued**

<b>Private Fire Protection</b>	Water
<b>Minimum Monthly Charge per service</b>	\$114.00
<b>Volume Charges - per 1,000 gallons, all gallons</b>	\$4.79

Alternative blocks should be instituted whenever the SFWMD mandates additional water restrictions in the event of future droughts. The tiered rates should be applied to the following consumption blocks:

<b>Residential Tiers</b>		<b>Standard</b>	<b>Drought</b>	<b>Extreme Drought</b>
<b>Residential - All meter sizes</b>				
<b>Single family - 1,000 gallons</b>				
	Basic Tier	0-3	0-2	1
	Second Tier	4-6	3-5	2-4
	Third Tier	6-12	5-9	4-6
	Final Tier	<12	<9	<6
<b>Multi Family - 1,000 gallons</b>				
	Basic Tier	0-2	1	1
	Second Tier	3-4	2-3	2
	Third Tier	5-6	4-5	3
	Final Tier	<6	<5	<3

<b>Commercial Tiers</b>		<b>Standard</b>	<b>Drought</b>	<b>Extreme Drought</b>
<b>Commercial - All meter sizes</b>				
<b>per AAC (Annual Average Consumption) - 1,000 gallons</b>				
	First Tier	0-75%	0-60%	0-45%
	Second Tier	<75%	<60%	<45%

<b>Irrigation Tiers</b>		<b>Standard</b>	<b>Drought</b>	<b>Extreme Drought</b>
<b>Irrigation - Per meter size, 1,000 gallons</b>				
<b>5/8 inch</b>	First Tier	0-8	0-4	0-2
	Second Tier	<8	<4	<2

<b>Irrigation Tiers – continued</b>					
<b>1 inch</b>	First Tier		0-22	0-11	0-5
	Second Tier		<22	<11	<5
<b>1 1/2 inch</b>	First Tier		0-55	0-27	0-14
	Second Tier		<55	<27	<14
<b>2 and over</b>	First Tier		0-142	0-71	0-35
	Second Tier		<142	<71	<35

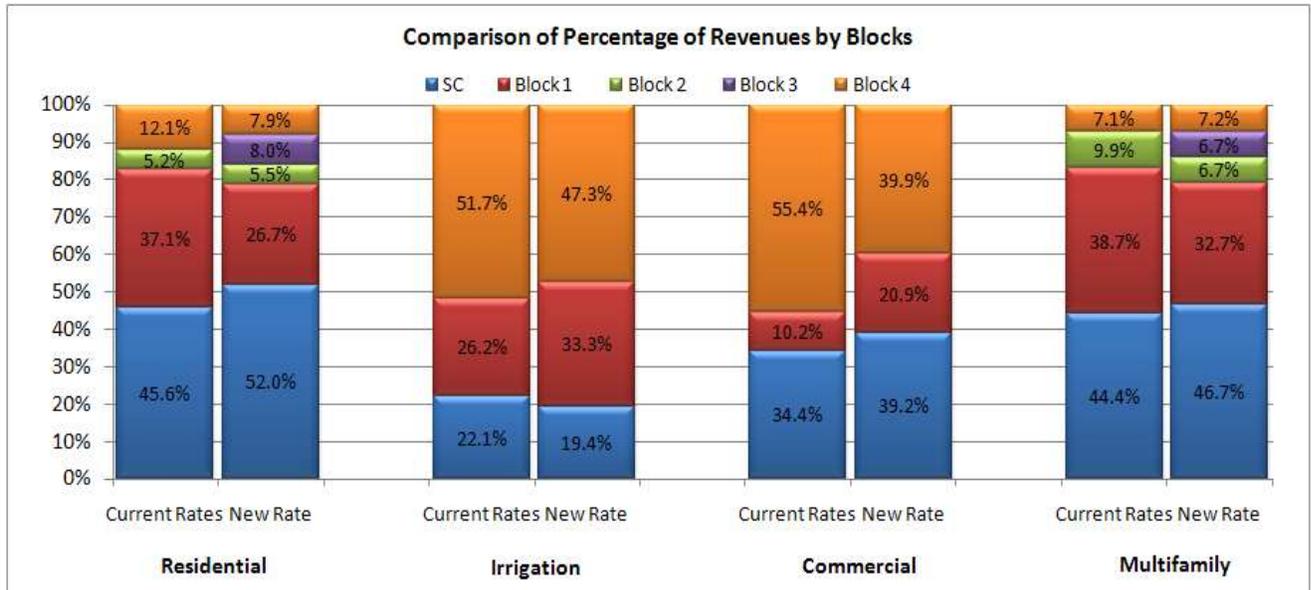
## 5.2 Rate Impacts

The implementation of these rates will have the following impacts on customers based upon average or normal consumptions per meter size:

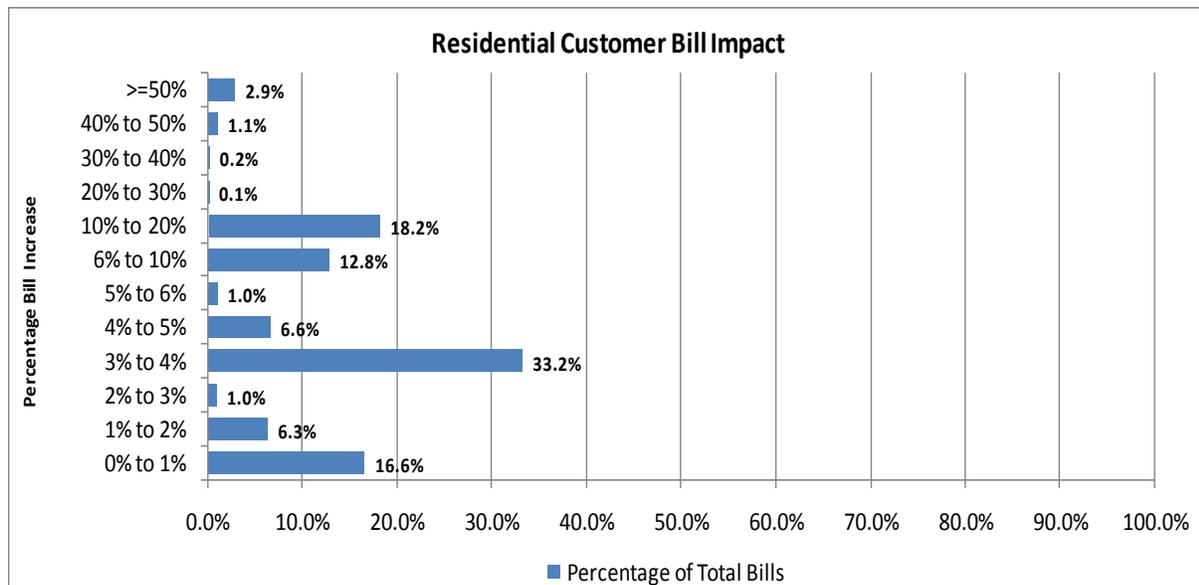
<b>Rate Impacts</b>	1,000 gals	Cust Chg	<b>Proposed charge</b>				<b>Current charge</b>	<b>% Inc</b>
			Min Charge	Water Volume	Sewer Volume	Total		
<b>Water Sewer Customers</b>								
Residential 5/8 inch	3	\$4.06	\$27.58	\$3.96	\$9.39	\$44.99	\$43.56	3.27%
Residential 5/8 inch	5	4.06	27.58	8.58	15.65	55.87	54.22	3.03%
Residential 5/8 inch	10	4.06	27.58	30.05	31.30	92.99	89.87	3.47%
Residential 5/8 inch	20	4.06	27.58	91.07	46.95	169.66	155.27	9.26%
Commercial 5/8 inch	9	\$4.06	\$33.93	\$35.96	\$28.17	\$102.12	\$94.18	8.43%
Commercial 1 inch	16	4.06	95.90	65.32	50.08	215.36	204.60	5.26%
Commercial 1.5 inch	26	4.06	196.54	104.58	81.38	386.56	369.70	4.56%
Commercial 2 inch	77	4.06	525.35	313.57	241.01	1,083.99	1,032.80	4.96%
<b>Water only</b>								
Irrigation 5/8 inch	15	\$4.06	\$13.59	\$83.33		\$100.98	\$77.24	30.73%
Irrigation 1 inch	26	4.06	26.33	124.54		154.93	128.61	20.46%
Irrigation 1.5 inch	69	4.06	62.75	338.71		405.52	329.72	22.99%
Irrigation 2 inch	154	4.06	140.39	737.66		882.10	708.25	24.55%
Resale	48014	\$4.06	\$43,339.33	\$105,150.66		\$148,494.05	\$135,318.06	9.74%

These rate increases will shift the rate impacts for residential customers by both increasing the amounts recovered through the minimum monthly service charge, thereby nominally reducing risk associated with declining consumption patterns while

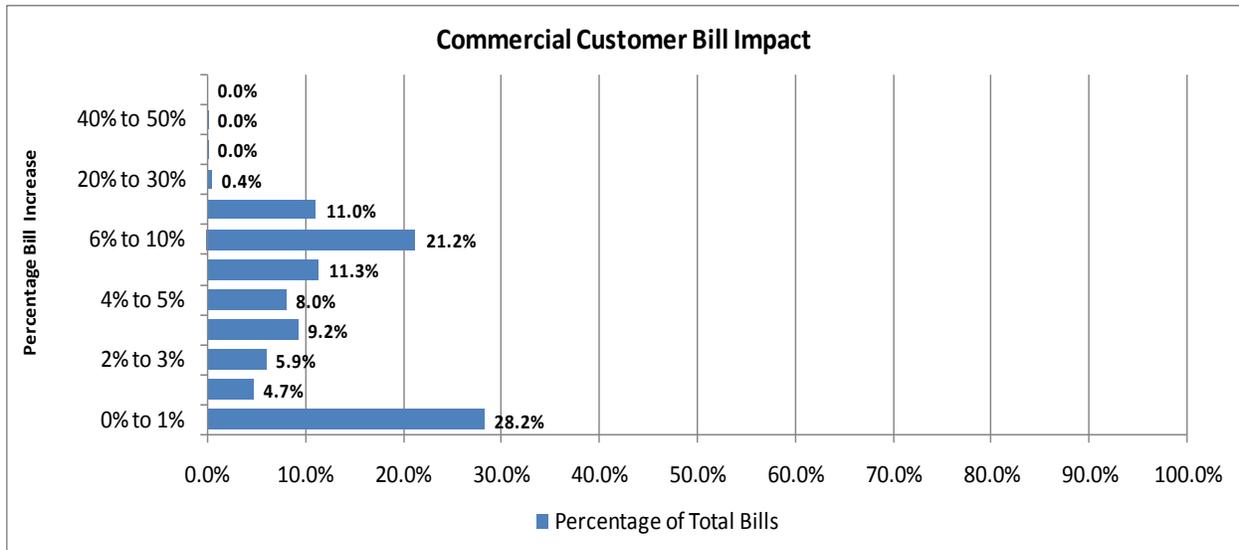
substantially increasing rates for customers using water used for irrigation purposes. The following chart compares the percentage of revenue by customer class generated by each rate component:



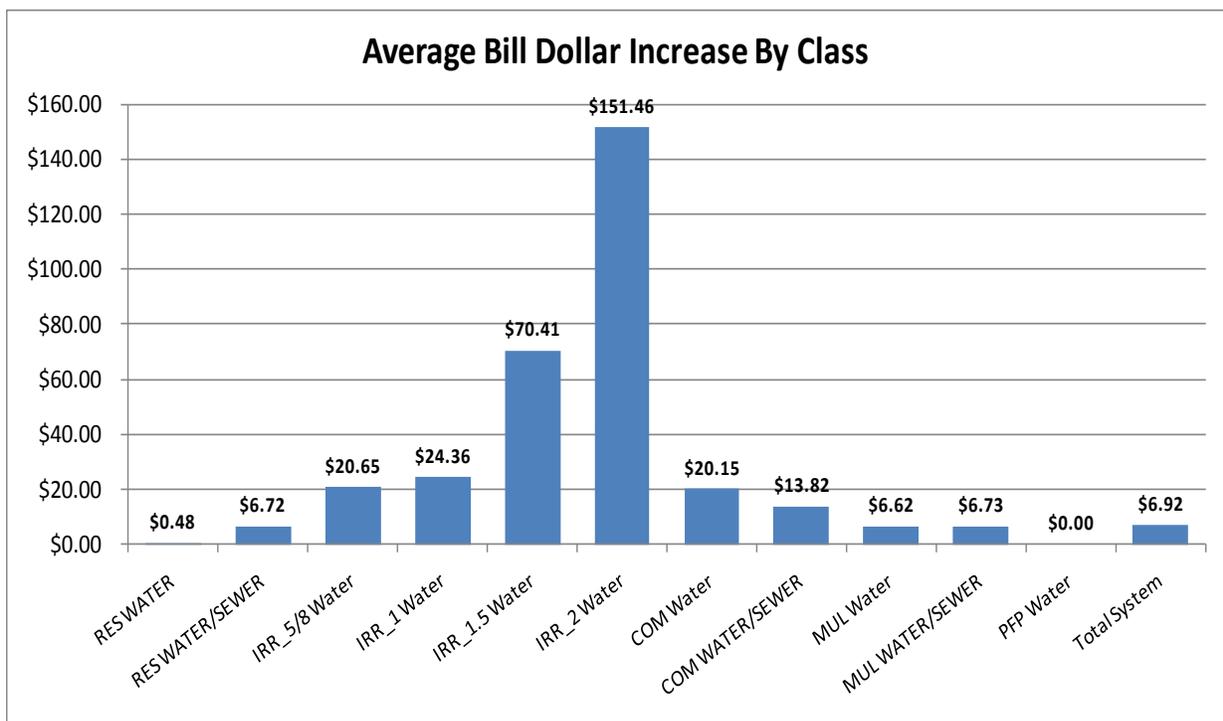
For residential customers using both water and sewer, over 60 percent will see rate increases of less than five (5) percent with most seeing increases between three and four percent:



More than half of commercial customers of water and sewer services will also experience rate impact of five (5) percent or less:



The average dollar impact by customer class is presented below with the largest increases to be experienced by large users of water for irrigation purposes:



### **5.3 Future Rate Adjustments**

The current rate increases were significantly impacted by changes in consumption patterns over the past several years. Because of the impacts of changes on certain individual bills the percentage of costs recovered through the monthly service charge was reduced on the water bill from 40% per the last comprehensive rate study to 35%. The reduction on the sewer bill was even greater and dropped from 60% to 50%. The fact that all rate adjustments over the past ten years were applied as across the board percentage increases also exacerbated this shift.

Although shifting more of the revenue recovery to volume charges supports conservation pricing, it increases risks associated with reduced customer demands. This risk is demonstrated by 2010 revenue that is not expected to realize the approved rate increase of 5.1% due to reduced customer demand. Over the next several years, steps should be taken to increase the percentage of revenue recovered through monthly service charges to 40 and 60 percent for water and sewer respectively.

In order to assure that the monthly service charge is appropriately allocated to the various customer classes, including sale for resale, calculations based upon equivalent residential units should be performed annually. The practice of applying percentage rate increases across the board should be discontinued.

# APPENDICES

## Appendix A 5 Year Retail Capital Improvement Program

	2011	2012	2013	2014	2015
<b>Sewer</b>					
Engineering Services Sewer Portion Combined Projects	13,269,310	333,330	333,330	9,824,610	333,330
Twin Lakes South NIP	-	745,160	-	-	-
Generic Lift Station Rehab	100,000	750,000	750,000	2,000,000	2,000,000
Rehab of Lift Station 310	212,770	-	-	-	-
Rehab Lift Stations 28D and 29A	10,000	-	-	-	-
Rehab Lift Stations 28 and 24E21	10,000	-	-	-	-
Generic Lift Station Site Acq	-	100,000	-	100,000	100,000
Inflow/Infiltration Reduction	1,900,000	1,900,000	1,900,000	1,900,000	1,900,000
Retail Sewer	15,502,080	3,828,490	2,983,330	13,824,610	4,333,330
<b>Water</b>					
Engineering Services Water Portion Combined Projects	2,407,270	2,174,600	2,174,420	1,679,250	2,372,500
SW 25th Terr Improvements	40,600	-	-	-	-
Water Conservation Plan	200,000	200,000	-	-	-
UAZ 103 Pipe Replacement	-	47,000	-	-	-
UAZ 310 Pipe Replacement	-	-	-	-	10,129,290
Generic Developer Oversizing	300,000	300,000	300,000	300,000	300,000
1B2 Water Main Improvements	340,000	2,172,000	-	-	-
Retail Master Plan Update	1,000,000	-	-	-	-
UAZ 245 Watermains	300,000	-	-	-	-
General Rehab of Process Equip	300,000	300,000	300,000	300,000	-
WTP 2A Treatment Expansion	-	500,000	-	-	5,800,000
Security System Improvements	555,990	-	-	-	-
3A Potable Water Storage	-	2,799,960	-	-	-
D 2 Raw Water Wells	1,420,000	-	-	-	-
WTP 1A Treatment	1,800,000	-	1,566,810	39,050,000	-

Appendix A - continued

1A2 Storage Tank	3,060,000	-	-	-	-
Admin Center HVAC	500,000				
D 2 Water Storage Tank	-	-	3,562,000	-	-
1B1 Storage Tank	-	-	4,649,000	-	-
Storage Tank Repairs	-	2,200,000	-	-	-
Energy Projects	350,000	1,000,000	-	-	-
High Service Pumps District 3A	-	-	-	-	500,000
Repair D 2 Water Storage Tank	-	-	-	-	140,000
Retail Water	19,208,510	11,860,230	12,718,900	46,241,550	19,408,460
<b>Total</b>	<b>34,710,590</b>	<b>15,688,720</b>	<b>15,702,230</b>	<b>60,066,160</b>	<b>23,741,790</b>

## Appendix B

Year	Debt Service Schedule Series 2003			Debt Service Schedule Series 2003B		
	Principal	Interest	Total	Principal	Interest	Total
2011	\$935,000.00	\$4,933,263.76	\$5,868,263.76	\$7,455,000.00	\$2,515,002.50	\$9,970,003
2012	980,000.00	4,886,513.76	5,866,513.76	7,690,000.00	2,282,815.00	9,972,815
2013	1,010,000.00	4,852,213.76	5,862,213.76	7,940,000.00	2,034,525.00	9,974,525
2014	1,050,000.00	4,814,843.76	5,864,843.76	8,185,000.00	1,786,400.00	9,971,400
2015	1,090,000.00	4,775,468.76	5,865,468.76	8,595,000.00	1,377,150.00	9,972,150
2016	1,125,000.00	4,731,868.76	5,856,868.76	9,030,000.00	947,400.00	9,977,400
2017	1,175,000.00	4,686,868.76	5,861,868.76	9,480,000.00	495,900.00	9,975,900
2018	7,550,000.00	4,638,693.76	12,188,693.76	3,510,000.00	140,400.00	3,650,400
2019	11,955,000.00	4,261,193.76	16,216,193.76			0
2020	12,550,000.00	3,663,443.76	16,213,443.76			0
2021	7,775,000.00	3,035,943.76	10,810,943.76			0
2022	8,165,000.00	2,647,193.76	10,812,193.76			0
2023	8,575,000.00	2,238,943.76	10,813,943.76			0
2024	9,000,000.00	1,810,193.76	10,810,193.76			0
2025	9,450,000.00	1,360,193.76	10,810,193.76			0
2026	9,880,000.00	934,943.76	10,814,943.76			0
2027	10,335,000.00	477,993.76	10,812,993.76			0
2028			0			0
2029			0			0
2030			0			0
2031			0			0
2032			0			0
2033			0			0
2034			0			0

## Appendix B – continued

Year	Debt Service Schedule Series 2005A			Debt Service Schedule Series 2009A		
	Principal	Interest	Total	Principal	Interest	Total
2011		\$3,837,000	\$3,837,000	\$1,720,000	\$8,603,808	\$10,323,808
2012		3,837,000	3,837,000	1,770,000	8,552,208	10,322,208
2013		3,837,000	3,837,000	1,825,000	8,499,108	10,324,108
2014		3,837,000	3,837,000	1,865,000	8,460,783	10,325,783
2015		3,837,000	3,837,000	1,905,000	8,416,023	10,321,023
2016		3,837,000	3,837,000	1,960,000	8,368,398	10,328,398
2017		3,837,000	3,837,000	2,010,000	8,314,498	10,324,498
2018		3,837,000	3,837,000	2,070,000	8,254,198	10,324,198
2019		3,837,000	3,837,000	1,775,000	8,171,398	9,946,398
2020		3,837,000	3,837,000	1,845,000	8,100,398	9,945,398
2021	\$3,390,000	3,837,000	7,227,000	3,935,000	8,026,598	11,961,598
2022	3,560,000	3,667,500	7,227,500	4,110,000	7,846,198	11,956,198
2023	3,735,000	3,489,500	7,224,500	4,315,000	7,641,710	11,956,710
2024	3,930,000	3,302,750	7,232,750	4,525,000	7,428,985	11,953,985
2025	4,125,000	3,106,250	7,231,250	4,750,000	7,205,660	11,955,660
2026	4,325,000	2,900,000	7,225,000	4,990,000	6,968,585	11,958,585
2027	4,545,000	2,683,750	7,228,750	5,235,000	6,719,085	11,954,085
2028	15,585,000	2,456,500	18,041,500	5,500,000	6,457,335	11,957,335
2029	16,365,000	1,677,250	18,042,250	5,780,000	6,175,460	11,955,460
2030	17,180,000	859,000	18,039,000	6,085,000	5,875,665	11,960,665
2031				24,440,000	5,555,943	29,995,943
2032				25,725,000	4,271,785	29,996,785
2033				27,075,000	2,920,108	29,995,108
2034				28,500,000	1,497,495	29,997,495

## Appendix B – continued

### Combined Debt Service Schedule

Year	Total	Retail Water/Sewer	Retail Share of Regional	Total Retail
2011	\$29,999,074	\$15,568,245	\$3,440,607	\$19,008,852
2012	29,998,537	15,567,642	3,440,595	19,008,237
2013	29,997,847	15,568,596	3,440,177	19,008,773
2014	29,999,027	15,569,341	3,440,315	19,009,656
2015	29,995,642	15,566,369	3,440,204	19,006,573
2016	29,999,667	15,571,378	3,439,916	19,011,294
2017	29,999,267	15,569,236	3,440,355	19,009,591
2018	30,000,292	14,910,828	3,662,998	18,573,825
2019	29,999,592	14,346,719	3,836,037	18,182,755
2020	29,995,842	14,345,419	3,835,436	18,180,856
2021	29,999,542	17,983,635	2,946,995	20,930,630
2022	29,995,892	17,980,606	2,946,840	20,927,447
2023	29,995,154	17,978,346	2,947,213	20,925,559
2024	29,996,929	17,983,866	2,946,295	20,930,161
2025	29,997,104	17,983,545	2,946,417	20,929,962
2026	29,998,529	17,980,381	2,947,542	20,927,923
2027	29,995,829	17,980,543	2,946,839	20,927,382
2028	29,998,835	26,453,485	873,940	27,327,426
2029	29,997,710	26,452,916	873,803	27,326,719
2030	29,999,665	26,453,328	874,184	27,327,512
2031	29,995,943	21,102,146	2,192,350	23,294,496
2032	29,996,785	21,102,738	2,192,412	23,295,150
2033	29,995,108	21,101,558	2,192,289	23,293,848
2034	29,997,495	21,103,238	2,192,464	23,295,701

## Appendix B – continued

DEBT SERVICE:	Principal	Interest	Total	Retail %	Retail	Water	Sewer
EXISTING:							
Series 2003	\$935,000	\$4,933,260	5,868,260	21.66%	1,271,065	772,045	499,020
Series 2003B	\$7,455,000	\$2,515,000	9,970,000	32.07%	3,197,379	1,918,427	1,278,952
Series 2005A	\$0	\$3,837,000	\$3,837,000	100.00%	3,837,000	1,471,873	2,365,127
Series 2009A	\$1,720,000	\$8,603,810	\$10,323,810	70.35%	7,262,800	4,430,308	2,832,492
Regional Share					3,440,600		3,440,600
	<u>\$10,110,000</u>	<u>\$19,889,070</u>	<u>\$29,999,070</u>		19,008,844	8,592,653	10,416,191
		COVERAGE	<u>120.00%</u>			<u>120.00%</u>	<u>120.00%</u>
			<u>35,998,884</u>			<u>10,311,190</u>	<u>12,499,430</u>

## 2012 thru 2015 RETAIL REVENUE FORECAST

### Appendix C

	Year 2012			Year 2013		
	TOTAL	WATER	SEWER	TOTAL	WATER	SEWER
<b>Debt Service</b>						
Existing	\$22,810,620	\$10,311,190	\$12,499,430	\$22,810,620	\$10,311,190	\$12,499,430
Proposed	0	0	0	5,777,966	2,419,454	3,358,513
<b>Total Debt Service</b>	<b>\$22,810,620</b>	<b>\$10,311,190</b>	<b>\$12,499,430</b>	<b>\$28,588,586</b>	<b>\$12,730,644</b>	<b>\$15,857,943</b>
<b>Operating Appropriations</b>	<b>\$48,983,654</b>	<b>\$30,258,759</b>	<b>\$18,724,895</b>	<b>\$49,963,327</b>	<b>\$30,863,934</b>	<b>\$19,099,393</b>
Cash Financed Capital Projects	10,736,950	6,691,700	4,045,250	8,097,220	5,897,130	2,200,090
Reserve Fund Contributions						
Operating/Retail	160,077	98,885	61,192	163,279	100,863	62,416
Less Other Revenue	-7,524,672	-4,375,290	-3,149,382	-7,556,166	-4,375,290	-3,180,876
Revenue Required From Rates	\$75,166,629	\$42,985,244	\$32,181,385	\$79,256,246	\$45,217,281	\$34,038,966
Revenue Generated by Proposed Rates	\$71,749,123	\$40,691,330	\$31,057,793	\$75,488,443	\$42,985,244	\$32,503,199
Net (Surplus) Shortfall	\$3,417,506	\$2,293,914	\$1,123,592	\$3,767,803	\$2,232,037	\$1,535,767
<b>% Revenue Increase Required</b>	<b>4.76%</b>	<b>5.64%</b>	<b>3.62%</b>	<b>4.99%</b>	<b>5.19%</b>	<b>4.72%</b>

Appendix C – continued

**2012 thru 2015 RETAIL REVENUE FORECAST**

	Year 2014			Year 2015		
	TOTAL	WATER	SEWER	TOTAL	WATER	SEWER
<b>Debt Service</b>						
Existing	\$22,810,620	\$10,311,190	\$12,499,430	\$22,810,620	\$10,311,190	\$12,499,430
Proposed	11,555,943	4,838,908	6,717,035	11,555,943	4,838,908	6,717,035
<b>Total Debt Service</b>	<b>\$34,366,563</b>	<b>\$15,150,098</b>	<b>\$19,216,465</b>	<b>\$34,366,563</b>	<b>\$15,150,098</b>	<b>\$19,216,465</b>
<b>Operating Appropriations</b>	\$50,962,593	\$31,481,213	\$19,481,381	\$51,981,845	\$32,110,837	\$19,871,008
Cash Financed Capital Projects	5,818,400	4,816,540	1,001,860	9,494,030	6,683,450	2,810,580
Reserve Fund Contributions						
Operating/Retail	166,544	102,880	63,665	169,875	104,937	64,938
Less Other Revenue	-7,587,975	-4,375,290	-3,212,685	-7,620,101	-4,375,290	-3,244,811
Revenue Required From Rates	\$83,726,126	\$47,175,440	\$36,550,686	\$88,392,212	\$49,674,032	\$38,718,180
Revenue Generated by Proposed Rates	\$79,596,636	\$45,217,281	\$34,379,355	\$84,091,633	\$47,175,440	\$36,916,193
Net (Surplus) Shortfall	\$4,129,490	\$1,958,160	\$2,171,330	\$4,300,579	\$2,498,592	\$1,801,987
<b>% Revenue Increase Required</b>	<b>5.19%</b>	<b>4.33%</b>	<b>6.32%</b>	<b>5.11%</b>	<b>5.30%</b>	<b>4.88%</b>

## Appendix D

# **Engineering Support For 2010 Rate Study**

Prepared By  
Steven W. Uhrick, P.E.

## CONTENTS

1. PURPOSE
2. SUMMARY
3. EQUIVALENT RESIDENTIAL UNIT
  - 3.1 Water ERU
  - 3.2 Wastewater ERU
4. POTABLE WATER COST OF FACILITIES
  - 4.1 Fire Protection Goal
  - 4.2 Source of Supply and Treatment Cost per ERU
  - 4.3 Finished Water Storage Cost per ERU
  - 4.4 Transmission Piping Cost per ERU
5. WASTEWATER COST OF FACILITIES
  - 5.1 Treatment and Effluent Disposal Cost per ERU
  - 5.2 Transmission Piping Cost per ERU
6. ANALYSIS OF CUSTOMER POTABLE WATER USAGE BY METER SIZE

### EXHIBITS

- A A-12 from 2009 WWS Annual Report
- B Table 3-10 from Draft Alternative Water Supply Study
- C Table 3-13 from Draft Alternative Water Supply Study
- D Tables 3-14, 2-15 and 3-16 from Draft Alternative Water Supply Study

## 1. PURPOSE

The purpose of this document is to provide engineering and cost of facilities information and analysis in support of Water and Wastewater Services (WWS) 2010 retail rate study.

## 2. SUMMARY

This study determined that 1 Equivalent Residential Unit (ERU):

- Equals 185 gallons per day (GPD) average day demand measured at the customer's potable water meter
- Requires 274 GPD maximum day demand of potable water treatment plant capacity.
- Requires 209 GPD averaged day demand of wastewater treatment plant capacity.

All computations and values are calculated based upon total costs and result in averages for the entire WWS service area. Computations performed on a district or sub district basis may vary substantially from district to district.

This study determined that the per ERU cost of potable water facilities eligible for capital recovery is:

Source of supply and treatment	\$2,054
Finished water storage	406
Water transmission piping	<u>375</u>
TOTAL	\$2,835

This study determined that the per ERU cost of wastewater facilities eligible for capital recovery is:

Treatment and effluent disposal	\$ 648
Wastewater transmission piping	<u>1,151</u>
TOTAL	\$1,799

### 3. EQUIVALENT RESIDENTIAL UNIT

WWS defines an ERU as a typical single family residence with a 5/8 inch water meter.

A study was conducted by WWS staff utilizing information retrieved from the customer information database (Energy) covering April, 2009 to March, 2010.

1. Only customers who's "Group" was equal to "Residential Single Family" were included in the analysis.
2. Only customers who's "Meter Size" was equal to 5/8 inch were included in the analysis.
3. Only customers who's "Service" was equal to "Retail Water" or "Retail Water Sewer" were included in the analysis.
4. Only customers that had a usage value for each of the twelve months were included in the analysis.

The results of these three steps were 30,061 customers remaining.

From there, "GPD" was calculated which was the sum of the 12 months of usages (which are in 1000 gallons per month) times 1000 divided by 365, and the data was sorted by GPD into ascending order. The top 5% of the remaining customers (by GPD) were checked for apparent data anomalies and those customers were removed from the analysis, which totaled 67.

29,924 customers remained in the analysis whose average usage ranged from 33 GPD to 2433 GPD. Extreme low values (the lowest 10%) and extreme high values (the highest 10%) were not considered in the determination of "typical" single family residence usage. This left 24,004 "typical" single family residences whose average usage was 185 GPD.

Therefore, 185 GPD is the value for average potable water usage for 1 ERU measured at the water meter.

#### 3.1 WATER ERU

As described above, 185 GPD is the value for average potable water usage for 1 ERU measured at the water meter. However, due to water system uses and losses, potable water facilities must produce more than 185 GPD to deliver 185 GPD to the customer's meter. Per Exhibit A (2009 WWS Annual Report), system uses and losses were 11% of billed water (1,001,128,000 gallons divided by 9,001,256,000 gallons). Therefore the water treatment plant would have to produce 206 GPD to deliver 185 GPD to the customer's meter.

Source of supply and treatment plants are rated on maximum day demand. Exhibit B (draft Alternative Water Supply Study) established the following maximum day to average day factors:

District 1	1.28
District 2	1.30
District 3A	1.37
District 3BC	1.46

1.33 will be used in this Study as a system wide maximum day to average day factor. Therefore, an ERU of source of supply and treatment plant capacity equals 274 GPD (206 GPD times 1.33).

### 3.2 WASTEWATER ERU

As described above, 185 GPD is the value for average potable water usage for 1 ERU measured at the water meter. Unlike potable water usage, wastewater usage is not metered at the customer's point of service, so the wastewater usage for 1 ERU must be estimated. Wastewater usage at the customer's point of service equals potable water usage less potable water for outside uses that are not connected to the sanitary sewer system. Wastewater flow through the sewer piping systems and at the treatment plant equals usage at the customer's point of service plus infiltration/ inflow.

WWS, like most water utility organizations, does not know what percentage of potable water is not returned to the sanitary sewer system. However, WWS does know billed water to sewer customers and total wastewater (including infiltration and inflow) delivered for treatment. Exhibit A (2009 WWS Annual Report) records these values as 5,438,694,000 gallons and 6,134,780,000 gallons, respectfully, which means that 13% more wastewater is delivered for treatment than billed for as potable water.

Therefore, a wastewater ERU can be estimated at 185 GPD, which is billed potable water for 1 ERU time 1.13, or 209 GPD.

## 4. POTABLE WATER COST OF FACILITIES

### 4.1 FIRE PROTECTION GOAL

WWS has established a fire protection goal of 3500 GPM (gallons per minute) for duration of 3 hours, which is a volume of 630,000 gallons.

### 4.2 SOURCE OF SUPPLY AND TREATMENT COST PER ERU

Potable water source of supply and treatment facilities are sized to meet maximum day demands and to replenish fire protection volume. Section 3.1 estimated the maximum day factor at 1.33 and the maximum day demand of 1 ERU at 274 GPD.

WWS currently owns and operates two water treatment plants, known as 1A and 2A. Each treatment plant has its own source of supply which is wells that obtain water from the Biscayne aquifer.

Per Exhibit C (draft Alternative Water Supply Plan), the Water Management District has placed a long term average day limitation of withdrawal from the Biscayne aquifer at 9.20 MGD (million gallons per day) for the 1A plant and 16.91 MGD for the 2A plant, for a total of 26.11 MGD average daily flow or 34.73 MGD maximum day flow. Both plants have physical capacity in excess of the limitation.

Per Exhibit D (draft Alternative Water Supply Plan), the 2010 maximum day demand potential plus fire protection replenishment value is 12.73 MGD for the 1A treatment plant and 21.01 for the 2A treatment plant. The total is 33.74 MGD.

$$34.73 \text{ MGD capacity} - 33.74 \text{ MGD demand} = 0.99 \text{ MGD available capacity}$$

Since 0.99 MGD is less than 3% of the total capacity and WWS is not sure if recent reductions in demand will remain over an extended period of time, the remaining 0.99 MGD of capacity in existing facilities is deemed not significant for the purposes of the rate study.

Future capacity will come from the Floridian aquifer, which is significantly more costly construct and treat than the Biscayne aquifer water currently being used by the existing treatment plants. WWS has hired MWH Americas Inc. (consulting engineers) to design a 6 MGD Floridian aquifer treatment plant for the District 1 service area. MWH's budgetary estimate for the project is \$45 million dollars which includes construction of Floridian wells. WWS expects that the District 2 Floridian aquifer treatment plant cost will be similar.

$$6,000,000 \text{ GPD divided by } 274 \text{ GPD/ERU} = 21,898 \text{ ERU}$$

The source of supply and treatment cost per ERU is:

$$\$45,000,000 \text{ divided by } 21,898 \text{ ERU} = \$2,054 \text{ per ERU}$$

#### 4.3 FINISHED WATER STORAGE COST PER ERU

WWS has three potable water storage projects in its proposed 2011 capital improvements program. Each project consists of constructing a 2 million gallon ground storage tank and associated pumping station. The average estimated cost of these three projects is \$5,056,000.

Finished water tanks are sized to store 40% of the maximum day demand plus the fire protection volume. Therefore a 2,000,000 gallon storage tank has 630,000 gallon for fire protection and 1,370,000 gallon for maximum day demand.

$$\begin{aligned} 274 \text{ gallons per ERU times } 40\% &= 110 \text{ gallons per ERU for storage} \\ 1,370,000 \text{ gallons divided by } 110 \text{ gallons per ERU} &= 12,455 \text{ ERU} \end{aligned}$$

Therefore, a 2 million gallon finished water storage tank provides service to 12,455 ERU, and the finished water storage tank cost per ERU is:

$$\$5,056,000 \text{ divided by } 12,455 \text{ ERU} = \$406 \text{ per ERU}$$

#### 4.4 TRANSMISSION PIPING COST PER ERU

The WWS potable water distribution and transmission system currently consists of almost 700 miles of pipe of the following lengths of pipe by diameter:

Diameter (inches)	Length (feet)
< 6	440,734
6	1,104,561
8	1,404,692
10	116,693
12	387,588
14	823
16	124,597
18	10,633
20	50,276
24	30,916
30	11,755
> 30	7,254
Total	3,690,522

Because of the nature of potable water distribution and transmission systems it is not possible to precisely calculate the capacity of the system. However, in the professional opinion of the author, who has considerable experience with the capabilities of the WWS systems, the systems generally have enough capacity to handle anticipated growth through the year 2025. According to Exhibit D (draft Alternative Water Supply Plan), the year 2025 average day flow is anticipated to be 41.63 MGD, including Coconut Creek.

$$41,630,000 \text{ GPD divided by } 206 \text{ GPD per ERU} = 202,087 \text{ ERU}$$

WWS considers pipes 16 inches and larger to be transmission pipes. Most new piping smaller than 16 inch is constructed via developers who then donate the asset to WWS for continued maintenance. Therefore, only transmission piping costs will be included in the computation and are based on pipes 16 inches and larger. The current installed cost per foot used in the computation includes construction, engineering and permitting costs as well as valves, hydrants and other appurtenances, pavement and surface restoration and an estimating contingency of 15%.

Diameter (inches)	Length (feet)	Cost Per Foot	Cost
16	124,597	\$230	\$28,657,310
18	10,633	\$300	\$3,189,900
20	50,276	\$367	\$18,451,292
24	30,916	\$450	\$13,912,200
30	11,755	\$550	\$6,465,250
> 30	7,254	\$700	\$5,077,800
Total	--	--	\$75,753,752

The distribution and transmission piping cost per ERU is:

$$\$75,753,752 \text{ divided by } 202,087 \text{ ERU} = \$375 \text{ per ERU}$$

## 5. WASTEWATER COST OF FACILITIES

### 5.1 TREATMENT AND EFFLUENT DISPOSAL COST PER ERU

Wastewater treatment plants are rated on an average day basis. Section 3.2 established the average day value of a wastewater ERU at 209 GPD as measured at the treatment plant.

WWS recently completed an approximate \$90 million dollar improvement program for the North Regional Wastewater Treatment Plant in which approximately \$62 million was for a 20 MGD capacity increase.

$$20,000,000 \text{ GPD divided by } 209 \text{ GPD per ERU} = 95,694 \text{ ERU}$$

The wastewater treatment and effluent disposal cost per ERU is:

$$\$62,000,000 \text{ divided by } 95,694 \text{ ERU} = \$648 \text{ per ERU}$$

### 5.2 TRANSMISSION PIPING COST PER ERU

The WWS wastewater and transmission system currently consists of over 390 miles of gravity pipe of the following lengths of pipe by diameter:

Diameter (inches)	Length (feet)
8	1,927,716
10	93,788
12	29,902
14	100
15	9,163
16	2,061
18	5,796
20	28
21	1,043
24	223
Total	2,069,820

and over 100 miles of force main of the following lengths of pipe by diameter:

Diameter (inches)	Length (feet)
< 6	40,854
6	165,643
8	138,294
10	57,312
12	80,607
14	10,243
16	12,834
18	7,761
20	12,389
24	5,881
Total	531,818

and 227 pump stations.

Because of the nature of wastewater collection and transmission systems it is not possible to precisely calculate the capacity of the system. However, in the professional opinion of the author, who has considerable experience with the capabilities of the WWS systems, an acceptable indicator is pump station run time, which averaged 55% of capacity. Per Exhibit A (2009 WWS Annual Report), the 2009 total wastewater flow to treatment was 6,314,780,000 gallons which equals 17,300,767 GPD.

$$17,300,767 \text{ GPD divided by } 55\% = 31,455,940 \text{ GPD}$$

Therefore, the estimated capacity of the wastewater transmission system in ERU is:

$$31,455,940 \text{ GPD divided by } 209 \text{ GPD per ERU} = 150,507 \text{ ERU}$$

WWS considers gravity piping larger than 12 inches and force main piping larger than 6 inches to be transmission system piping. Only transmission piping costs and pump station will be included in the cost per ERU computation. The current installed cost per foot of piping used in the computation includes construction, engineering and permitting costs as well as valves and other appurtenances, pavement and surface restoration and an estimating contingency of 15%.

Diameter (inches)	Length (feet)	Cost Per Foot	Cost
14 Gravity	100	\$380	\$38,000
15 Gravity	9,163	\$400	\$3,665,200
16 Gravity	2,061	\$420	\$865,620
18 Gravity	5,796	\$480	\$2,782,080
20 Gravity	28	\$530	\$14,840

21 Gravity	1,043	\$560	\$584,080
24 Gravity	223	\$640	\$142,720
8 Force Main	138,294	\$170	\$23,509,980
10 Force Main	57,312	\$180	\$10,316,160
12 Force Main	80,607	\$190	\$15,315,330
14 Force Main	10,243	\$200	\$2,048,600
16 Force Main	12,834	\$210	\$2,695,140
18 Force Main	7,761	\$280	\$2,173,080
20 Force Main	12,389	\$340	\$4,212,260
24 Force Main	5881	\$450	\$2,646,450
Total	--	--	\$71,009,540

The current installed cost per pump station used in the computation includes construction, engineering and permitting costs and an estimating contingency of 15%, and assumes one out of every two pump stations requires an emergency power generator.

227 pump stations times \$450,000 per station = \$102,150,000  
resulting in a total transmission cost of \$173,159,540.

The wastewater transmission cost per ERU is:

\$165,067,000 divided by 150,507 ERU = \$1,151 per ERU

## 5. ANALYSIS OF CUSTOMER POTABLE WATER USAGE BY METER SIZE

Customer usage was analyzed by meter size and group to assist in determining the minimum monthly charge. The results are shown on the next two tables.

A subsequent analysis was done on 36,588 meters to determine reasonable usage ranges for different size meters. The analysis indicates that about 3% of the meters should be upsized one meter size and about 6% of the meters should be down sized one meter size.

### Analysis By Meter Size

Meter Size	Group	Total Data Points	Range Count	Range Average GPD	Range % of Average		Range Usage in 1000 GAL/MONTH	
					Low	High	Low	High
5/8	Single Family Residential	29818	23972	185	44	191	2	11
5/8	Multi Family Residential	680	546	467	39	386	6	55
5/8	Commercial	1138	916	289	23	331	2	29
5/8	Irrigation	123	97	496	30	424	5	64
1	Single Family Residential	1676	1344	473	31	213	4	31
1	Multi Family Residential	501	402	617	48	205	9	39
1	Commercial	682	546	523	19	320	3	51
1	Irrigation	106	84	857	28	270	7	70
1.5	Single Family Residential	98	78	1021	40	229	13	71
1.5	Multi Family Residential	177	141	1382	40	323	17	136
1.5	Commercial	489	392	872	19	310	5	82
1.5	Irrigation	87	69	2291	19	243	13	169
2	Single Family Residential	2	2	342	87	112	9	12
2	Multi Family Residential	484	387	2941	34	289	30	258
2	Commercial	419	335	2566	11	396	9	309
2	Irrigation	55	43	5125	22	238	34	371
2	Reclaimed Water	9	7	7704	28	209	65	490
3	Multi Family Residential	9	7	21928	33	212	218	1415
3	Commercial	20	16	9054	16	229	43	130
4	Multi Family Residential	6	4	26343	32	179	257	1435
4	Commercial	12	8	17314	5	590	26	3107
4	Irrigation	1	1	26712	100	100	812	812
6	Multi Family Residential	2	2	13815	61	139	257	583
6	Commercial	3	3	132059	34	161	1349	6485
10	Sale For Resale	3	3	1578544	94	106	44954	51015

### Analysis By Group

Meter Size	Group	Total Data Points	Range Count	Range Average GPD	Range % of Average		Range Usage in 1000 GAL/MONTH	
					Low	High	Low	High
5/8	Single Family Residential	29818	23972	185	44	191	2	11
1	Single Family Residential	1676	1344	473	31	213	4	31
1.5	Single Family Residential	98	78	1021	40	229	13	71
2	Single Family Residential	2	2	342	87	112	9	12
5/8	Multi Family Residential	680	546	467	39	386	6	55
1	Multi Family Residential	501	402	617	48	205	9	39
1.5	Multi Family Residential	177	141	1382	40	323	17	136
2	Multi Family Residential	484	387	2941	34	289	30	258
3	Multi Family Residential	9	7	21928	33	212	218	1415
4	Multi Family Residential	6	4	26343	32	179	257	1435
6	Multi Family Residential	2	2	13815	61	139	257	583
5/8	Commercial	1138	916	289	23	331	2	29
1	Commercial	682	546	523	19	320	3	51
1.5	Commercial	489	392	872	19	310	5	82
2	Commercial	419	335	2566	11	396	9	309
3	Commercial	20	16	9054	16	229	43	130
4	Commercial	12	8	17314	5	590	26	3107
6	Commercial	3	3	132059	34	161	1349	6485
5/8	Irrigation	123	97	496	30	424	5	64
1	Irrigation	106	84	857	28	270	7	70
1.5	Irrigation	87	69	2291	19	243	13	169
2	Irrigation	55	43	5125	22	238	34	371
4	Irrigation	1	1	26712	100	100	812	812
2	Reclaimed Water	9	7	7704	28	209	65	490
10	Sale For Resale	3	3	1578544	94	106	44954	51015

**EXHIBIT A**  
(from 2009 WWS Annual Report)

A-12 Water and Wastewater Retail Statistics (1,000's gallons) As of September 30,2009				
<b>Water</b>	<b>Produced</b>	<b>Purchased</b>	<b>Billed</b>	<b>System Uses &amp; Losses</b>
District 1	2,834,660	211,139	2,637,891	407,908
District 2	4,570,638	0	2,476,322	-
District 2 - Resale	0	0	1,826,265	268,051
District 3A	0	1,098,181	945,354	152,827
District 3BC	0	1,287,766	1,115,424	172,342
<b>Total</b>	<b>7,405,298</b>	<b>2,597,086</b>	<b>9,001,256</b>	<b>1,001,128</b>
<b>Wastewater</b>	<b>Billed *</b>	<b>Wastewater Transmission to Plant</b>		
District 1	2,176,572	2,429,229		
District 2	2,279,155	2,543,721		
District 3A	639,637	869,965		
District 3BC	343,330	291,865		
<b>Total</b>	<b>5,438,694</b>	<b>6,134,780</b>		
* Based upon water billed to wastewater customers. Residential billing capped at 15,000 gallons.				
Source: Broward County Water and Wastewater Services				

**EXHIBIT B**  
(from Draft Alternative Water Supply Study)

**Table 3-10:  
Maximum past ten-year historical demand peaking factors by service area**

Service Area	Maximum past ten-year historical			
	Maximum-day demand peaking factor		Maximum-month peaking factor	
	10-Year 100 <sup>th</sup> Percentile	10-Year 75 <sup>th</sup> Percentile	10-Year 100 <sup>th</sup> Percentile	10-Year 75 <sup>th</sup> Percentile
District 1	1.38 (April 2006)	1.28	1.16 (April 1999)	1.14
District 2	1.44 (May 2008)	1.30	1.20 (July 1999)	1.17
District 3A	1.43 (April 2002)	1.37	1.20 (November 2001)	1.13
District 3B/C	1.48 (March 2007)	1.46	1.19 (September 1999)	1.12

**EXHIBIT C**  
(from Draft Alternative Water Supply Study)

Table 3-13 Biscayne Raw Water Allocation By Wellfield Serving Districts 1 and 2

(1) Raw water allocation by wellfield serving Districts 1 and 2	(2) (3) (4) (5) (6) (7) (8) Biscayne Aquifer							
	Raw Water Allocation		Peaking Factor		Finished water production allowed by the Biscayne water allocation			
	ADF (mgd)	Peak Flow (mgd)	MMF/ADF	MDF/ADF	ADF (mgd) <sup>1,2</sup>	MMF (mgd)	MDF (mgd)	
<b>District 1 Wellfield</b>								
Past allocation (Dec 2001)	9.79	12.43	Maximum day	1.14	1.27	9.59	10.98	12.18
New temporary allocation (through April 1, 2013)	10.67	11.64	Maximum month	1.09	1.19	10.46	11.41	12.44
New permanent allocation (through April 10, 2028)	9.20	9.95	Maximum month	1.08	1.17	9.02	9.75	10.55
<b>Broward County 2A/North Regional Wellfields</b>								
<i>Past allocation</i>								
<i>Including Deerfield Beach</i>	18.11	23.00	Maximum day	1.14	1.27	17.57	20.10	22.31
<i>Net allocation for WTP 2A</i>	17.52	22.17	Maximum day	1.14	1.27	16.99	19.44	21.50
<i>New temporary allocation (through April 1, 2013)</i>								
<i>Including Deerfield Beach</i>	19.95	21.70	Maximum month	1.09	1.20	19.35	21.05	23.22
<i>Net allocation for WTP 2A</i>	19.36	20.95	Maximum month	1.09	1.19	18.78	20.47	22.42
<i>New permanent allocation (through April 10, 2028)</i>								
<i>Including Deerfield Beach</i>	17.50	19.24	Maximum month	1.10	1.21	16.98	18.67	20.54
<i>Net allocation for WTP 2A</i>	16.91	18.49	Maximum month	1.10	1.20	16.40	18.04	19.73

1. District 1 WTP treatment efficiency 98%, District 2 WTP treatment efficiency 97%  
2. BCWWS is contracted to provide 0.59 mgd annual average daily flow and a peak daily flow of 0.83 mgd.

## EXHIBIT D

(from Draft Alternative Water Supply Study)

**Table 3-14 District 1 Water Demand Forecasts**

(1) Year	(2) District 1 (excluding Broadview Park)					(3) Broadview Park <sup>1</sup>					(4) District 1 (including Broadview Park)								
	Population	Average-day water demand (mgd)			Population	Average-day water demand (mgd)			Population <sup>1</sup>	Average-day water demand (mgd)			Maximum-month water demand (mgd)			Maximum-day water demand including 0.63 mgd fire flow (mgd)			
		Low per capita 131 gpcd	Medium per capita 140 gpcd	High per capita 143 gpcd		Low per capita 86 gpcd	Medium per capita 88 gpcd	High per capita 92 gpcd		Low per capita	Medium per capita	High per capita	Low per capita 1.14 PF	Medium per capita 1.14 PF	High per capita 1.16 PF	Low per capita 1.26 PF	Medium per capita 1.28 PF	High per capita 1.36 PF	
2008	66,108	8.66	9.26	9.45	6,935	0.60	0.61	0.64	66,108	8.66	9.26	9.45	9.87	10.55	10.97	11.71	12.48	13.68	
2009	66,526	8.71	9.31	9.51	7,012	0.60	0.62	0.65	66,526	8.71	9.31	9.51	9.93	10.62	11.04	11.79	12.55	13.76	
2010	67,504	8.84	9.45	9.65	7,044	0.61	0.62	0.65	67,504	8.84	9.45	9.65	10.08	10.77	11.20	11.95	12.73	13.95	
2015	73,292	9.60	10.26	10.48	7,265	0.62	0.64	0.67	80,557	10.23	10.90	11.15	11.66	12.43	12.93	13.72	14.58	16.02	
2020	80,494	10.54	11.27	11.51	7,563	0.65	0.67	0.70	88,057	11.20	11.93	12.21	12.76	13.61	14.16	14.96	15.91	17.47	
2025	86,776	11.37	12.15	12.41	7,921	0.68	0.70	0.73	94,697	12.05	12.85	13.14	13.74	14.64	15.24	16.05	17.07	18.76	
2030	92,064	12.06	12.89	13.17	8,319	0.72	0.73	0.77	100,383	12.78	13.62	13.93	14.56	15.53	16.16	16.98	18.06	19.85	
2035	95,291	12.48	13.34	13.63	8,610	0.74	0.76	0.79	103,901	13.22	14.10	14.42	15.07	16.07	16.73	17.56	18.68	20.53	

1. Broadview Park connects to District 1 finished-water supply in 2015.

**Table 3-15 District 2 Water Demand Forecasts**

(1) Year	(2) District 2 (excluding Coconut Creek)					(3) Coconut Creek <sup>1</sup>					(4) District 2 (including Coconut Creek)								
	Population	Average-day water demand (mgd)			Population	Average-day water demand (mgd)			Population <sup>1</sup>	Average-day water demand (mgd)			Maximum-month water demand (mgd)			Maximum-day water demand including 0.63 mgd fire flow (mgd)			
		Low per capita 163 gpcd	Medium per capita 178 gpcd	High per capita 183 gpcd		Low per capita 111 gpcd	Medium per capita 119 gpcd	High per capita 121 gpcd		Low per capita	Medium per capita	High per capita	Low per capita 1.17 PF	Medium per capita 1.17 PF	High per capita 1.20 PF	Low per capita 1.30 PF	Medium per capita 1.30 PF	High per capita 1.44 PF	
2008	54,612	8.90	9.72	9.99	49,681	5.51	5.91	6.01	104,293	14.42	15.63	16.01	16.87	18.29	19.21	19.37	20.95	23.68	
2009	54,747	8.92	9.74	10.02	49,439	5.49	5.88	5.98	104,186	14.41	15.63	16.00	16.86	18.29	19.20	19.36	20.95	23.67	
2010	54,937	8.95	9.78	10.05	49,542	5.50	5.90	5.99	104,479	14.45	15.67	16.05	16.91	18.34	19.26	19.42	21.01	23.74	
2015	57,714	9.41	10.27	10.56	53,152	5.90	6.33	6.43	110,866	15.31	16.60	16.99	17.91	19.42	20.39	20.53	22.21	25.10	
2020	61,072	9.95	10.87	11.18	57,693	6.40	6.87	6.98	118,765	16.36	17.74	18.16	19.14	20.75	21.79	21.90	23.69	26.78	
2025	64,597	10.53	11.50	11.82	61,127	6.79	7.27	7.40	125,724	17.31	18.77	19.22	20.26	21.96	23.06	23.14	25.03	28.30	
2030	67,974	11.08	12.10	12.44	63,380	7.04	7.54	7.67	131,354	18.11	19.64	20.11	21.19	22.98	24.13	24.18	26.16	29.59	
2035	70,559	11.50	12.56	12.91	64,268	7.14	7.65	7.78	134,847	18.64	20.21	20.69	21.81	23.65	24.83	24.86	26.90	30.43	

1. Currently, Coconut Creek is supplied by three BCWWS Interconnects.

**Table 3-16 District 3 Water Demand Forecasts**

(1) Year	(2) District 3A					(3) District 3B/C					(4) District 3A and 3B/C								
	Population		Average-day water demand (mgd)			Population	Average-day water demand (mgd)			Population	Average-day water demand (mgd)			Maximum-month water demand (mgd)			Maximum-day water demand including 0.63 mgd fire flow (mgd)		
	Retail service area	Annual Enplanements	Low band/ enplanement 204 gpcd 21 gpcd	Medium band/ enplanement 217 gpcd 24 gpcd	High band/ enplanement 239 gpcd 27 gpcd		Low band 112 gpcd	Medium band 122 gpcd	High band 125 gpcd		Low band	Medium band	High band	Low band 1.13 PF 1.12 PF	Medium band 1.13 PF 1.12 PF	High band 1.20 PF 1.19 PF	Low band 1.37 PF 1.46 PF	Medium band 1.37 PF 1.46 PF	High band 1.43 PF 1.48 PF
2008	12,782	11,133,857	3.25	3.51	3.88	31,631	3.54	3.86	3.95	44,413	6.75	7.36	7.83	7.64	8.28	9.36	10.25	11.07	12.03
2009	12,824	10,573,767	3.22	3.48	3.85	31,702	3.55	3.87	3.96	44,526	6.78	7.35	7.81	7.62	8.26	9.33	10.23	11.04	12.00
2010	12,964	10,919,738	3.27	3.53	3.90	32,068	3.59	3.91	4.01	45,022	6.86	7.44	7.91	7.72	8.37	9.45	10.35	11.18	12.14
2015	14,118	12,838,453	3.62	3.91	4.32	34,952	3.92	4.27	4.37	49,080	7.53	8.17	8.69	8.47	9.19	10.39	11.30	12.21	13.28
2020	15,714	15,119,250	4.08	4.40	4.87	38,672	4.33	4.72	4.83	54,386	8.41	9.12	9.71	9.46	10.26	11.60	12.54	13.55	14.75
2025	17,036	17,511,594	4.48	4.85	5.37	42,301	4.74	5.16	5.29	59,337	9.22	10.01	10.65	10.37	11.26	12.73	13.69	14.81	16.13
2030	18,113	19,903,938	4.84	5.24	5.80	45,807	5.13	5.59	5.73	63,920	9.97	10.83	11.53	11.22	12.18	13.78	14.75	15.97	17.40
2035	18,966	22,296,282	5.15	5.58	6.18	48,159	5.39	5.88	6.02	67,125	10.55	11.46	12.20	11.86	12.89	14.58	15.56	16.85	18.38

1. District 3A serves FLL Airport while District 3B/C serves a Coca-Cola Bottling Plant