ATTACHMENT A

A RESOLUTION ACCEPTING THE REPORT FROM OWASA ON PROPOSED INCREASED WATER AND SEWER RATES
Resolution No. 184/2006-07

WHEREAS, the OWASA Board of Directors is considering raising water and sewer rates for all customers in addition to changing the rate structure; and

WHEREAS, OWASA officials wish Town officials to have the opportunity to comment on and ask questions about these changes; and

WHEREAS, OWASA officials have presented this report and answered these questions.

NOW THEREFORE BE IT RESOLVED BY THE BOARD OF ALDERMEN OF THE TOWN OF CARRBORO:

Section 1. The Carrboro Board of Aldermen does hereby accept this report from OWASA.

Section 2. This resolution shall become effective upon adoption.

ATTACHMENT B

ORANGE WATER & SEWER AUTHORITY

Quality Service Since 1977

May 8, 2007

Moses Carey Jr., Chair
Orange County Board of Commissioners
P.O. Box 8181
Hillsborough, NC 27278

Mark Chilton, Mayor
Town of Carrboro
301 West Main Street
Carrboro, NC 27510

Kevin Foy, Mayor
Town of Chapel Hill
405 Martin Luther King Jr. Boulevard
Chapel Hill, NC 27514

SUBJECT: Proposed Water and Sewer Rate Changes and Increases; Presentations to the Orange County Board of Commissioners and Carrboro Board of Alderman on May 15, 2007 and to the Chapel Hill Town Council on May 21, 2007

Dear Chair Carey, Mayor Chilton and Mayor Foy:

Thank you for giving us the opportunity to make presentations to each of the local governing Boards regarding our water and sewer rate proposals.

As a follow-up to the information we provided to you on April 2, 2007 and as background information for our upcoming presentations, I would like to focus in this letter on two questions.

1. ***How much revenue does OWASA need to continue the high quality of water and sewer service that our customers expect, and for what purposes?***

We will not adopt a budget for Fiscal Year 2007-08 until June. However, our Preliminary Budget identifies expenditure totals of $46.6 million, of which $28.4 million will be funded from operating revenues, compared to $27.0 million in the current budget. Proposed expenditures for the next year are:

$18.4 million	for capital improvements
18.5 million	for operations and maintenance and capital equipment
9.7 million	for debt service
$46.6 million	

As shown, our projected capital improvement costs and debt service for capital projects total $28.1 million or 60% of our budget.

For several years, because OWASA recognizes the need to properly fund the renovation and replacement of aging and inadequate facilities, the capital program costs have comprised the majority of our annual budgets. The true cost of water and wastewater services includes the essential cost of renewing and updating utility assets to protect their value, functionalities and sustainability.

Much of our infrastructure is several decades old. To ensure reliable and high quality water and sewer service to all our customers, it is essential to continue our ongoing program of system rehabilitation and replacement. Without it, we will face more service interruptions, more leaks, greater expenses, and declining quality of service.

As a matter of basic fairness to our present customers, we need to spread the cost of capital improvements over many years so that future customers who will benefit from these long-lived assets bear part of the cost. Like cities and counties, we therefore finance a significant portion of our capital program with long-term bonds.

Our customers' demand for water declined significantly after the drought of 2001-02, and use has not returned to pre-drought long-term projections. The associated resulting decline in revenue has detrimentally affected OWASA's fiscal performance. We now need to take action to restore our debt service coverage ratio that has declined from the historic 2.0 level to 1.5 during Fiscal Year 2005-06; not only to sustain our favorable bond rating but, more importantly, as a measure of fiscal prudence.

Our rates and fees must also ensure adequate funding for our operation and maintenance needs. Increasingly stringent treatment standards, escalating energy and material costs, and other factors are all contributing to upward pressure on our rates and fees.

Although the combined increase in monthly water and sewer rates is proposed to be 9.5%, we want to emphasize that the proposed water rate increase is limited to 6.25%, similar to adjustments in recent years; and the proposed monthly sewer rate increase is 13.75%. The latter reflects costs including debt service for the 50^{+} million Mason Farm Wastewater Treatment Plant (WWTP) improvements (now nearing completion) to improve the reliability and performance of our treatment processes and to eliminate odor. The WWTP upgrade also makes possible the reclaimed water project with the University, without which future water needs would require major investment.

2. How should OWASA raise funds to meet the community's water and wastewater needs?

OWASA's rates and fees are founded on three primary principles.

First, in accord with our 1976 Agreements of Sale and Purchase with the Towns of Chapel Hill and Carrboro and the University, we base our rates, fees and charges on cost-of-service principles. Underlying this policy and contractual requirements is the basic concept that the people who benefit from a service should pay for its cost.

Second, growth should pay for growth. The proposed increases in our water and sewer service availability fees are based on this concept as well as the corollary cost-of-service ratemaking requirement. We recognize that the increases in the sewer availability fees are significant, and we emphasize that these fees properly reflect the 50^{+} million of improvements at the WWTP and other sewer system improvements.

Third, our rates and fees should encourage conservation. Conservation can significantly reduce long-term OWASA system costs to our customers by avoiding or deferring the need to develop an additional water source such as Jordan Lake. The estimated capital cost of obtaining water from Jordan Lake is about $40 million. Conservation is why we implemented seasonal water rates for all customers in May, 2002. The increasing block rates proposed for individually-metered single-family residential customers will strengthen our pricing signal, especially for non-essential water uses. Increasing block rates will also help offset rate increases and eliminate the seasonal penalty for small volume users.

Please see the attached examples of water and sewer bills with increasing block rates and with the current seasonal rates.

The seasonal rate structure is proposed to continue for other customers because the increasing block rate structure would not fit or be fair to the variety of commercial, institutional and master-metered multi-family customers who generally do not have irrigation needs. Seasonal rates have also proven to be an effective pricing strategy for reducing peak water demand by non-residential customers.

While education and information are an important part of our overall conservation program, an appropriate rate structure is essential to achieve our conservation goals. Increasing block rates for residential customers have proven successful in many other communities and are common where water is scarce.

The block rate structure would also more equitably allocate a greater share of water system costs to high-volume residential customers whose demand creates the need for higher system capacity. At the same time, water-wise customers will typically experience lower bill increases than the combined 9.5% rate increase because they will benefit from the lower block rates applicable to consumption under 6,000 gallons per month.

Conclusion

We look forward to meeting with you later this month and the opportunity to receive your feedback and respond to your questions.

Please feel free at any time to contact me (918-3651 or patandmac@earthlink.net) or Ed Kerwin, our Executive Director, (537-4211 or ekerwin@owasa.org) with questions or comments.

Sincerely,

Michael A. (Mac) Clarke, Chair
OWASA Board of Directors

Enclosures: 1. Additional information about the proposed increasing block rates for individually-metered residential customers including examples of residential OWASA bills at proposed and current rates.
2. Additional information about proposed service availability fees.

c: OWASA Board of Directors
Ms. Laura Blackmon, Orange County Manager
Mr. Roger Stancil, Chapel Hill Town Manager
Mr. Steve Stewart, Carrboro Town Manager
Ms. Carolyn Elfland, Associate Vice Chancellor for Campus Services
Ed Kerwin, OWASA Executive Director

Attachment #1

PROPOSED INCREASING BLOCK WATER RATES FOR INDIVIDUALLY-METERED RESIDENTIAL CUSTOMERS

Increasing block water rates are proposed for customers in individually-metered residences including traditional single-family homes and some townhouses, condominiums, and apartments. Several thousand customers in multi-family developments receive service through a "master meter" rather than individual meters and increasing block rates would not apply to them.

With increasing block rates, which would apply year-round, the charge per thousand gallons of water use would rise as a customer's water use rises. The proposed increasing block water rates are:

Level of water use per month	Charge for volume of water use
first 2,000 gallons of water use	$2.46 per 1,000 gallons
3,000 to 5,000 gallons	$4.09 per 1,000 gallons
6,000* to 10,000 gallons	$5.53 per 1,000 gallons
11,000 to 15,000 gallons	$7.46 per 1,000 gallons
16,000 gallons or more	$13.05 per 1,000 gallons

* The average single-family residential household in our community uses slightly less than 6,000 gallons of water per month.

For a typical customer using 6,000 gallons of water per month:

- ✓ The proposed charge for the first 2,000 gallons would be $4.92 (2,000 gallons times $2.46 per 1,000 gallons).
- ✓ The proposed charge for the third, fourth and fifth thousand gallons would total $12.27 (3,000 gallons times $4.09 per 1,000 gallons.
- ✓ The proposed charge for the sixth thousand gallons would be $5.53 for a total charge of $22.72 ($4.92 + $12.27 + $5.53) for water volume only.

Our bills also include fixed monthly water and sewer service charges based on meter size, and a uniform charge per 1,000 gallons of sewer service, and we calculate our bills from meter readings rounded down to the nearest 1,000 gallons.

Increasing block rates would mean that residential customers who use large amounts of water would pay a greater share of the system capacity costs for water supply and treatment facilities needed to meet their higher water demand. Many high volume residential water users would have higher bills with block rates. If the effect of the proposed 9.5% rate increase is not considered, the proposed residential block rate structure would mean lower bills for customers who use small amounts of water each month.

EXAMPLES OF RESIDENTIAL WATER AND SEWER BILLS WITH CURRENT AND PROPOSED RATES

Example 1: A typical household in a single-family residence using 6,000 gallons of water per month throughout the year.

At current rates, the monthly water and sewer bill averages **$63.56.** (With seasonal water conservation rates, our bills vary by time of year.)

With the proposed block rates and 9.5% rate increase, the monthly bill would be **$67.00.**

Increase: 5.4%

Example 2: A household using 8,000 gallons per month from October through April and 20,000 gallons per month from May through September.

At current rates, our monthly bills over a full year average **$124.70**. (With seasonal water conservation rates, our bills vary by time of year.)

With the proposed rate changes including the sewer billing cap, the bills would be $86.38 from October through April and $229.11 from May through September, or an average of **$145.85.**

Increase: 16.9%

Example 3: A household using 3,000 gallons of water per month throughout the year.

At current rates, the monthly water and sewer bill averages **$40.61.** (With seasonal water conservation rates, our bills vary by time of year.)

With the proposed block rates and 9.5% rate increase, the monthly bill would be **$40.81.**

Increase: 0.5%

Example 4: A household using 2,000 gallons of water per month throughout the year.

At current rates, the monthly water and sewer bill averages **$32.97.** (With seasonal water conservation rates, our bills vary by time of year.)

With the proposed block rates and 9.5% rate increase, the monthly bill would be **$32.56.**

***Decrease:* 1.1%**

Example 5: A household using 10,000 gallons of water per month throughout the year.

At current rates, the monthly water and sewer bill averages **$94.15.** (With seasonal water conservation rates, our bills vary by time of year.)

With the proposed block rates and 9.5% rate increase, the monthly bill would be **$105.76.**

Increase: 12.3%

Attachment #2

Orange Water and Sewer Authority
Proposed Service Availability Fees

OWASA's Service Availability Fees are established to recover the proportionate share of the capital costs OWASA incurs to provide the "backbone" water supply, treatment and distribution facilities, and wastewater collection, treatment and disposal facilities necessary to meet a new customer's capacity requirements. The Service Availability Fees were last updated in 2001, with annual adjustments made thereafter at the same percentage as annual water and sewer rate increases. Since the 2001 study was completed, significant capital improvements have been made. The scope of the 2007 Rate Study included an update of both the water and sewer Service Availability Fees to ensure that the fees recover the full cost of service and that growth pays for growth.

The prior update used the System Buy-In methodology to calculate the Service Availability Fees. The System Buy-In method excludes all debt funded capital from the service availability calculation and therefore understates the true cost of the assets that will serve new customers. After evaluation of OWASA's current system and Capital Improvements Plan it was determined that a Plant-in-Service methodology for determining water and sewer availability fees would be most appropriate for OWASA.

The Plant-in-Service method utilizes a cost basis comprised of the Reconstruction Cost New Less Depreciation (RCNLD) value of the existing system assets as well as the cost of the five-year CIP (in current year dollars). This cost basis is then divided by the total system capacity upon completion of the projects included in the five-year CIP to determine a unit cost of the system. Finally, a credit is deducted from the unit cost of the system to reflect the present value payments of the principal portion of future debt service payments new connections will make once they connect to the system via monthly user fees in order to avoid a double recovery of capital costs.

This methodology is considered the fairest methodology of the alternative methodologies considered because it provides for a reasonable method to include all eligible assets in the service availability fee calculation while avoiding double counting the asset value of original projects and their replacement by including all assets, even rehabilitation and replacement assets, and depreciating all assets.

Orange Water and Sewer Authority
Schedule of Current and Proposed Service Availability Fees
Proposed to be Effective October 1, 2007

Water Service Availability Fees

5/8" Meter, Single-family Residential:	Existing	{ **Proposed** }
<1300 square feet	$960.00	**$1,052.00**
1300-1700 square feet	$1,173.00	**$1,284.00**
1701-2400 square feet	$1,484.00	**$1,625.00**
2401-3100 square feet	$2,539.00	**$2,778.00**
3101-3800 square feet	$3,450.00	**$3,777.00**
>3800 square feet	$5,794.00	**$6,341.00**
5/8" Meter, Residential, Irrigation-Only	$2,812.00	**$3,078.00**
5/8" Meter, Multi-family Residential	$1,034.00	**$1,133.00**
5/8" Meter, Nonresidential *	$2,812.00	**$3,078.00**
1" Meter, Nonresidential *	$7,030.00	**$7,694.00**
1-1/2" Meter, Nonresidential *	$14,060.00	**$15,388.00**
2" Meter, Nonresidential *	$22,496.00	**$24,621.00**
3" Meter, Nonresidential *	$44,992.00	**$49,243.00**
4" Meter, Nonresidential *	$70,300.00	**$76,942.00**
6" Meter, Nonresidential *	$140,600.00	**$153,884.00**
8" Meter, Nonresidential *	$224,960.00	**$246,214.00**

* Same fee for Nonresidential, Irrigation-Only accounts

Sewer Service Availability Fees *

5/8" Meter, Single-family Residential	Existing	{ **Proposed**}
<1300 square feet	$1,685.00	**$2,441.00**
1301-1700 square feet	$2,034.00	**$2,949.00**
1701-2400 square feet	$2,071.00	**$3,001.00**
2401-3100 square feet	$2,538.00	**$3,677.00**
3101-3800 square feet	$2,743.00	**$3,973.00**
>3800 square feet	$3,114.00	**$4,514.00**
5/8" Meter, Multi-family Residential	$1,825.00	**$2,645.00**
5/8" Meter, Nonresidential	$3,623.00	**$5,250.00**
1" Meter, Nonresidential	$9,057.00	**$13,125.00**
1-1/2" Meter, Nonresidential	$18,115.00	**$26,250.00**
2" Meter, Nonresidential	$28,984.00	**$41,999.00**
3" Meter, Nonresidential	$57,968.00	**$83,999.00**
4" Meter, Nonresidential	$90,575.00	**$131,248.00**
6" Meter, Nonresidential	$181,150.00	**$262,497.00**
8" Meter, Nonresidential	$289,840.00	**$419,995.00**

* In addition to the sewer availability fee, an excess sewer capacity fee of four percent (4%) of the applicable sewer service availability fee will be charged to recover the costs of excess sewer capacity installed in an area covered by an agreement for credit payments to the constructing developer. This fee applies to residential and nonresidential customers.

B-10

Making Your Infrastructure Program Affordable: Service Availability Fees Based On Finished Area of New Homes

Edward A. Holland, Planning Director

Ed Kerwin, Executive Director

Orange Water And Sewer Authority
Carrboro/Chapel Hill, NC

ABSTRACT

This paper describes the development of a tiered system of water and sewer service availability fees based on the finished area of single family homes.

Orange Water and Sewer Authority (OWASA) customer data exhibit a consistent pattern of increased average and seasonal water use with increasing home size, as indicated by building permit and utility billing records. Customers with more modest homes generally use less total water and exert a lower summer demand than those with larger homes.

OWASA's service availability fees – utility capital recovery charges (or impact fees) assessed to new development – were traditionally based on meter capacity factors, and all single family homes were charged the same one-time fee when connecting to the water or sewer system, regardless of home size or expected water use patterns. Data developed for this analysis provided a valid utility basis for establishing availability fees that are more responsive to the actual patterns of water and sewer use that characterize different subsets of residential customers.

A new tiered approach adopted by OWASA's Board of Directors established five separate size classes for new single family homes. Availability fees for homes in the smallest size class (less than 1700 square feet) are now 38 percent lower than under the previous rate structure, while new fees for the largest homes (greater than 3800 square feet) are 70 percent higher than previously. The analysis of water use patterns also provided a basis for revising service availability fees for multi-family residences (apartments, townhouses, and condominiums with individually metered units), which use an average of 35 percent less water than single family detached homes.

The tiered approach represents a more precise cost-of-service focus than uniform availability fees, because it considers the actual demand patterns of different residential user groups, rather than treating all residential customers in the same way. Another benefit has been the reduction of fees charged for smaller homes, thus lowering one of the economic barriers to more affordable housing in OWASA's service area.

BACKGROUND

Orange Water and Sewer Authority (OWASA) provides utility service to approximately 65,000

people in the Towns of Carrboro and Chapel Hill and to the University of North Carolina at Chapel Hill, which represents nearly 30 percent of OWASA's 8 million gallon average day demand. The rest of the customer base is primarily residential and retail/commercial, representing approximately 55 and 15 percent of total demand, respectively.

Capital improvements are managed through a 15-year Capital Improvements Plan (CIP), which is updated annually. Anticipated project costs are programmed for the upcoming five years through a Capital Improvements Budget (CIB), with capital expenditures typically ranging from $7 million to $10 million per year. OWASA recovers a portion of these costs through service availability fees. These one-time, upfront charges for new customer connections help finance "backbone" projects that support major water and wastewater treatment facilities and their supporting infrastructure.

OWASA's availability fees are based on the System Buy-In approach, under which new customers connecting to the system "buy in" to the existing capacity that has already been provided and financed by existing customers. Thus, after buying in, new customers receive service in an equity position comparable to that of existing customers. Availability charges based on this method recognize the current value of existing backbone facilities, which is determined by a variety of factors, including original construction cost, depreciation, renovations, upgrades, and capacity expansions.

In general, the System Buy-In method is most appropriate for utilities such as OWASA that are experiencing only moderate growth, and desire to have new and old customers share equally in costs of the entire system. Other methods, such as Marginal/ Incremental pricing, are sometimes used by utilities experiencing significant customer growth and capital expansion, but seeking to minimize the rate impacts of system growth and investment on existing customers.

LOCAL HOUSING FACTORS AND WATER USE

In December 1997 OWASA staff conducted a reconnaissance level survey of water consumption and housing parameters among 165 single family detached homes. This preliminary analysis, which was based on 36 consecutive months of customer billing data, indicated a strong relationship between water consumption, lot size, and tax value. Based on these findings, staff developed additional data to support possible changes to the service availability fees.

Because availability fees are applied primarily to new construction, information was collected on all new homes built in the OWASA service area during calendar year 1994, and then linked to the subsequent billing records for each of the corresponding customer accounts. Primary information sources included local building permits and tax files. After deleting incomplete or unmatched records, the resulting data set included 305 valid entries containing consistent information on lot size, finished area, number of bedrooms, bathrooms, and 31 months of water consumption from June 1995 through December 1997. Finished area, as recorded in local building permits, represents total heated floor space.

As with the preliminary findings for existing homes, data for the new homes displayed positive

correlations between water use and tax value (r = 0.571), finished area (r = 0.485), and lot size (r = 0.267). Although the correlation was somewhat stronger between water use and tax value than between water use and finished area, subsequent fee structure analyses were based on finished area, because this parameter was thought to represent a more defensible utility-based indicator of water consumption than tax value. The general findings of the analyses are presented in Exhibit 1 and discussed below.

GENERAL METHOD FOR CALCULATING AVAILABILITY FEES

Tiered availability fees were calculated with the same factors used in a recently completed OWASA rate study to adjust water and sewer use estimates for lost water, infiltration and inflow, and maximum day demands (1). The general form of the calculation is expressed in Equations 1 and 2:

Water = [Average Use] x [Loss Factor] x [Peak Factor] x [Unit Value] **(eq. 1)**

Sewer = [Average Use] x [Sewer Use Factor] x [I/I Factor] x [Combined Use and I/I Peak Factor] x [Unit Value] **(eq. 2)**

Adjustment factors for water and sewer use and capacity unit values are presented in Exhibit 2. The sources and derivations of these factors are described in Exhibits 3 and 4.

The OWASA staff analysis separated customer accounts into three user classes: (1) single family detached homes; (2) multi-family individually metered apartments, townhouses, condominiums; and (3) a combined non-residential customer class that included master-metered apartment complexes plus all other commercial and institutional (University) accounts. The use of these three classes is justified by their distinctive consumption patterns summarized in Exhibit 3.

OWASA's former rate structure treated all single family residential accounts as one customer class and based availability fees on an average water consumption of 208 gallons per day (gpd) for all 5/8-inch meter accounts, which typically represent single family residences and small businesses. By contrast, the present analysis separated consumption records for all 5/8-inch accounts into the three classes described above and found the daily averages for the 24 months of FY 1996-97 to be 193 gpd, 127 gpd, and 322 gpd, respectively, for single family detached, multi-family individually metered, and non-residential 5/8-inch meter accounts (see Exhibit 3).

These consumption rates, along with the modified adjustment factors, are the basis for the tiered availability fees that were subsequently adopted as shown in Exhibit 5.

Average Water Use

Water consumption data for the calculation of availability fees is described below and in Exhibits 1 through 3. Data reported for all classes represents the same time base of two

OWASA fiscal years, FY 96-97 (July 1, 1995 through June 30, 1997).

Single Family Detached - Average water use for each of the five size groups (finished area) of the single family detached class were derived from the FY 96-97 water use data presented in Exhibit 1. These groupings were selected to optimize several considerations. Each class spans an equal size range of 700 square feet. The upper and lower-most size classes (less than 1701 and greater than 3800 square feet) represent substantial differences in size and value, yet contain sufficient sample data to support a credible statistical pattern. Finally, the size class with the largest number of new homes (2401 to 3100 square feet) represents the midrange of both the finished area and water use variables; i.e., the mean values of this range are nearly identical to the average values of the entire sample set.

Multi-Family Individually Metered - Average water use (127 gpd) for this class was obtained from OWASA customer billing records, as described in notes to Exhibit 3.

Non-Residential 5/8-Inch Meter Accounts - Actual account data for this class were not analyzed for FY 96-97. The reported annual (322 gpd) and winter (302 gpd) averages were obtained by adjusting the observed annual and winter FY 95 non-residential 5/8-inch account averages (334 gpd and 313 gpd, respectively) in proportion to the reduction from 200 gpd to 193 observed in annual use for the single family residential class between the FY 95 and the FY 96-97 sampling periods. *Examples: Annual average = 334 gpd x 193/200 = 322 gpd. Winter average = 313 gpd x 193/200 = 302 gpd.*

The resulting availability fees calculated for non-residential 5/8-inch accounts are the basis for all other non-residential fees, which were scaled up by meter capacity ratios, as in the previous rate structure, and as recommended by in the recent OWASA rate study[1].

Water Loss and Peaking Factors

The need for backbone water system capacity is a function of short term (peak) customer demands and longer term demands represented by losses from the system. The loss factor of 1.08 applied to the average day demands of all user classes reflects OWASA's actual unaccounted-for loss of eight percent of total finished water production.

The recent rate study report applied one-day peaking factors of 2.0, 1.4, and 1.5, to the average day demands of single family detached, multi-family individually metered, and non-residential 5/8-inch accounts, respectively, in its analysis of backbone capacity needs[1]. OWASA's present analysis incorporated modifications to the single family peaking factor in order to reflect actual summertime differences observed among the size classes, as described below.

Single Family Detached - Peaking factors highlighted with gray shading in Column 7 of Exhibit 3 were derived by normalizing the average summer demands of each finished area size class to the summer average (248 gpd) of the entire single family detached class as a whole, to which the recent rate study had assigned a peaking factor of 2.0. For example, the peaking factor of 1.3 applied to the <1701 square foot subclass was obtained by multiplying

2.0 (the average peaking factor for the class) by 160/248 (average summer demand of the <1701 square foot subclass divided by average summer demand for the entire class): *1.3 = 160/248 x 2.0*.

Multi-Family Individually Metered and Non-Residential 5/8-Inch Meter Accounts - The peaking factors of 1.4 and 1.5 used for these customer classes are the same as those used in the recent rate study report[1].

Sewer Use Factors

Sewer system availability fees are based on adjusted water use. The rate study report applied a sewer use factor of 0.875 to all customer classes, which is consistent with OWASA's historic estimate that 87.5 percent of billed water returns to the sewer system as wastewater.

In developing the tiered availability fees, OWASA staff applied different sewer factors to each customer class to better reflect actual differences in seasonal use observed for each group. Sewer use was estimated as the ratio of average winter to average annual water consumption for each class, reflecting the assumption that most winter use occurs indoors and is returned to the sewer system as wastewater, while a substantial portion of summer demand is for outdoor use on lawns and gardens. The inverse relationship between the sewer use factor and peak water demand is apparent in Exhibit 2 and in comparisons among columns 7, 10, and 12 of Exhibit 3.

Infiltration/Inflow, Combined Sewer Use & I/I Factors

Additional adjustment factors were employed in calculating sewer availability fees to account for periodic high flows related to customer peaks, as well as the unwanted entry of stormwater (infiltration and inflow) into the collection system. As noted, these are the same factors used in the recent rate study report (see Exhibits 2 and 4).

Unit Capacity Factors

The total value of water and sewer backbone assets was determined by adding the value of recently completed major capital improvements and projects that were either underway or programmed for completion within the next two years, to the total value of water and sewer assets reported at the end of FY 96. These "reproduction cost less depreciation" (RCLD) values had been compiled for the recent rate study report[1]. Additional information is presented in Exhibit 4.

IMPLEMENTATION OF NEW FEE STRUCTURE

Tiered service availability fees, as outlined in Exhibit 5, were implemented in October 1998 after the proposal had been discussed in several public meetings and news articles. Customer response was generally positive, due to the understandable logic and perceived fairness of the approach. Local housing advocates praised the new fee structure for its benefits to housing affordability. Administration of the tiered fees has required no internal changes at OWASA

other than the submittal of a building permit application or floor plans for new home construction.

SUMMARY AND CONCLUSIONS

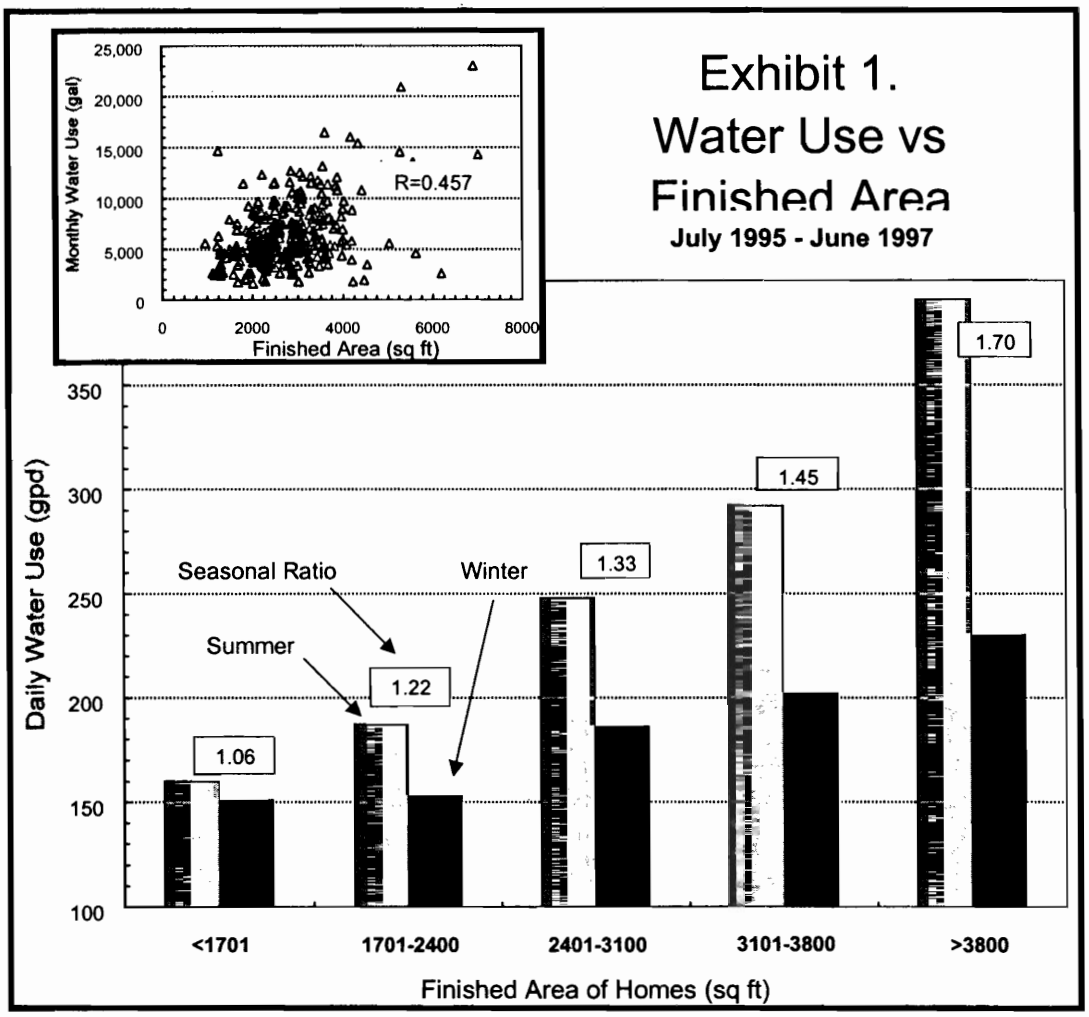
OWASA customer billing data, in conjunction with information derived through local building permits and tax records, demonstrated a consistent pattern of increased average and seasonal water use with increasing home size. Customers with more modest homes generally use less total water and exert a lower summer demand than those with larger homes. These findings provided a valid utility basis for a tiered system of one-time service availability fees based on the finished area of new homes connecting to the public water and sewer system. The new fee structure has been straightforward to administer, well received by the public, and is credited with lowering one of the economic barriers to more affordable housing in the OWASA service area.

ACKNOWLEDGEMENTS

The authors wish to thank Mr. Michael Mussman and Mr. William Stannard of Black & Veatch, LLP and Mr. George Raftelis of Raftelis Financial Consultants, PA for their technical support and guidance during the development of OWASA's tiered availability fees.

REFERENCES

1. *Final Report, Water and Sewer Rates for the Orange Water and Sewer Authority*, Black & Veatch, LLP, January 1998.



Finished Area (square feet)	Sample Size (# accts)	Pct Homes	24-Month Mean (gpd)	Pct 24-Month Demand	Summer Mean (gpd)	Pct Summer Demand	Winter Mean (gpd)	Pct Winter Demand	Seasonal Ratio
<1701	28	9%	155	7%	160	6%	151	8%	1.06
1701-2400	81	27%	170	21%	187	20%	153	22%	1.22
2401-3100	104	34%	218	35%	248	34%	186	35%	1.33
3101-3800	59	19%	247	22%	292	23%	202	21%	1.45
>3800	33	11%	311	16%	391	17%	230	14%	1.70
Overall:	305	100%	215	100%	248	100%	182	100%	1.36
Mean Finished Area:	2,820 sq ft								

Data Set: 305 homes built in Carrboro/Chapel Hill during 1994, from building permit and tax records.
Water Use: 24 Months, July 1995 - June 1997, from OWASA customer records.
Summer: May - October; Winter: November - April.

Exhibit 2. Standard and Derived Usage and Unit Value Factors

Customer Class		Water			Sewer			
	Area (sq ft)	Loss Factor	Peak Factor	Unit Value ($/gpd)	Sewer Factor	I/I Factor	Combined Use & I/I Factor	Unit Value ($/gpd)
↑	<1701	1.08	1.3	$3.38	0.97	1.20	1.75	$4.06
	1701-2400	1.08	1.5	$3.38	0.90	1.20	1.75	$4.06
Single Family Detached	2401-3100	1.08	2.0	$3.38	0.86	1.20	1.75	$4.06
	3101-3800	1.08	2.4	$3.38	0.82	1.20	1.75	$4.06
↓	>3800	1.08	3.2	$3.38	0.74	1.20	1.75	$4.06
Multi-Family Individually Metered		1.08	1.4	$3.38	0.98	1.30	1.75	$4.06
Non-Residential 5/8"		1.08	1.5	$3.38	0.95	1.05	1.75	$4.06

Notes: *The derivation of unit values is presented in Exhibit 4.*

Shaded peak and sewer use factors are derived from data presented in Exhibits 1 and 3. All other factors are as presented in Reference 1.

Exhibit 3. Average Water Use In Gallons Per Day, Peak and Sewer Use Factors for 5/8" Meter Accounts

Fiscal Years 1995 and 1996-97 *

Customer Class	(1) Sample FY95	(2) Size FY96-97	(3) Annual Avg FY95	(4) Annual Avg FY96-97	(5) Summer Avg FY95	(6) Summer Avg FY96-97	(7) Peak Factor	(8) Winter Avg FY95	(9) Winter Avg FY96-97	(10) Sewer Factor	(11) Seasonal Ratio FY95	(12) Seasonal Ratio FY96-97
All Single Family Detached:	9,808	10,372	200	193	221	212	N/D	178	174	0.90	1.24	1.22
New Homes Built in CY 1994												
<1701	N/D	28	N/D	155	N/D	160	1.3	N/D	151	0.97	N/D	1.06
1701-2400	N/D	81	N/D	170	N/D	187	1.5	N/D	153	0.90	N/D	1.22
2401-3100	N/D	104	N/D	218	N/D	248	2.0 (a)	N/D	186	0.86	N/D	1.33
3101-3800	N/D	59	N/D	247	N/D	292	2.4	N/D	202	0.82	N/D	1.45
>3800	N/D	33	N/D	311	N/D	391	3.2	N/D	230	0.74	N/D	1.70
Total New Homes:	N/D	305	N/D	215	N/D	248	2.0 (a)	N/D	182	0.85	N/D	1.36
Multi-Family Individually Metered:	3,113	3,142	126	127	127	129	1.4 (a)	125	125	0.98	1.02	1.03
Non-Residential 5/8" Accounts:	575	N/D	334	322 (b)	354	N/D	1.5 (a)	313	302 (b)	0.94	1.13	N/D

Notes:

* *FY 95 annual average computed for 12 months of July, 1994 through June, 1995.*
Summer: July-October, 1994 and May-June, 1995; Winter: November-December, 1994 and January-April, 1995.

FY 96-97 annual average computed for 24 months of July, 1995 through June, 1997.
Summer: July-October, 1995; May-October, 1996; and May-June, 1997.
Winter: November-December, 1995; January-April, 1996; November-December, 1996; and January-April, 1997.

(a) *Standard peaking factors from Reference 1.*

(b) *Non-residential 5/8" account data were not analyzed for FY 96-97. The 322 gpd annual (column 4) and 302 gpd winter (column 9) averages reported for this class were derived by adjusting (reducing) the observed FY 95 5/8" non-residential averages of 334 (column 3) and 313 gpd (column 8) proportionally to the reduction from 200 gpd to 193 gpd observed for the single family residential class between the FY 95 and FY 96-97 sampling periods (columns 3 and 4). Annual Avg = 334 gpd x 193/200 = 322 gpd. Winter Avg = 313 gpd x 193/200 = 302 gpd.*

Shaded Peak Factors (column 7): *Derived by normalizing the average summer demands of each single family subclass to the summer average (248 gpd) for the entire SFD group (column 6), to which Black & Veatch assigned a peak factor of 2.0.*
Example: Peak Factor for the <1701 sq ft subclass =160 gpd/248 gpd x 2.0 = 1.3

Shaded Sewer Factors (column 10): *Derived by dividing average winter use (column 9) by average annual use (column).*

Exhibit 4. Calculation of Unit Capacity Values for Water and Sewer Backbone Facilities

	Notes	Water	Sewer
RCLD value as of 6/30/96:	(a)	$58,645,000	$36,675,000
Plus CWIP & CIB from 7/1/96 through 6/30/00:	(b)	$11,176,000	$27,191,000
Less credit for existing debt as of 6/30/00:	(c)	($19,185,000)	($5,100,000)
Less credit for projected new debt:	(c)	$0	($10,000,000)
Projected asset value as of 6/30/00:	(d)	$50,636,000	$48,766,000
System capacity as of 6/30/00 (mgd):	(e)	15	12
Unit capacity value ($/gpd):	(f)	$3.38	$4.06

Notes:

(a) RCLD (Reproduction Cost Less Depreciation) is the asset value of backbone facilities. RCLD values at the end of FY 96 were compiled in OWASA's 1998 rate study report[1].

(b) Includes all backbone-related construction work in progress (CWIP) not booked as assets in (a), plus backbone-related improvements programmed from FY 97 through FY 2000 in OWASA's Capital Improvements Budget (CIB). Values have not been depreciated.

(c) Represents outstanding debt principle for backbone water and sewer facilities. Debt service costs are recovered through regular monthly service and/or commodity charges and are credited against availability fee calculations to avoid double-charging new customers who pay service availabilit fees. Existing debt as of June 30, 2000 is outstanding from OWASA's 1993 bond sale. Projected new debt respresents $10 million of anticipated bond sales to finance major improvements underway at the wastewater plant.

(d) Total asset value as of June 30. 2000 is calculated as (a) + (b) + (c).

(e) Represents maximum sustainable daily flow permitted through the water plant and maximum monthly flow permitted through the wastewater plant upon completion of all improvements.

(f) Unit capacity value is derived by dividing (d) by (e).

Exhibit 5. Comparison of Uniform and Tiered Service Availability Fees

Orange Water and Sewer Authority, October 1998

Customer Class	Meter Size	Finished Area	Avg Use (gpd)	WATER Uniform	WATER Tiered	WATER Change	SEWER Uniform	SEWER Tiered	SEWER Change	COMBINED Uniform	COMBINED Tiered	COMBINED Change
↑	5/8"	<1701	155	$1,928	$731	-62%	$1,323	$1,284	-3%	$3,251	$2,015	-38%
	5/8"	1701-2400	170	$1,928	$940	-51%	$1,323	$1,306	-1%	$3,251	$2,246	-31%
Single Family Detached	5/8"	2401-3100	218	$1,928	$1,591	-17%	$1,323	$1,589	20%	$3,251	$3,180	-2%
↓	5/8"	3101-3800	247	$1,928	$2,119	10%	$1,323	$1,719	30%	$3,251	$3,838	18%
	5/8"	>3800	311	$1,928	$3,577	86%	$1,323	$1,962	48%	$3,251	$5,539	70%
Multi-Family Individ Metered	5/8"		127	$1,928	$649	-66%	$1,323	$1,155	-13%	$3,251	$1,804	-45%
		Meter Ratio										
↑	5/8"	1	322	$1,928	$1,763	-9%	$1,323	$2,258	71%	$3,251	$4,021	24%
	1"	3	*	$4,820	$4,408	-9%	$3,308	$5,645	71%	$8,128	$10,053	24%
	1.5"	5	*	$9,640	$8,816	-9%	$6,615	$11,290	71%	$16,255	$20,106	24%
Non-Residential	2"	8	*	$15,424	$14,105	-9%	$10,584	$18,065	71%	$26,008	$32,170	24%
	3"	16	*	$30,848	$28,210	-9%	$21,168	$36,129	71%	$52,016	$64,339	24%
	4"	25	*	$48,200	$44,079	-9%	$33,075	$56,452	71%	$81,275	$100,530	24%
	6"	50	*	$96,400	$88,157	-9%	$66,150	$112,903	71%	$162,550	$201,061	24%
↓	8"	80	*	$154,240	$141,051	-9%	$105,840	$180,645	71%	$260,080	$321,697	24%

Water Availability Fees = [avg use] x [loss factor] x [peak factor] x [unit value]

Sewer Availability Fees = [avg use] x [sewer use factor] x [I/I factor] x [combined use & I/I peak factor] x [unit value]

All adjustment factors are presented in Exhibit 2.

* *Non-residential fees are based on meter capacity multiples of the average daily use (322 gpd) of non-residential 5/8-inch meter accounts.*

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