

# **WATER CONSERVATION & PEAK DEMAND MANAGEMENT PLAN**

Adopted April, 2000

## **EXECUTIVE SUMMARY**

### **Purpose and Scope of Plan**

The purpose of the Water Conservation and Peak Demand Management Plan (“Conservation Plan”) is to assist the Town of Cary (“Town”) in identifying and developing cost effective water conservation and demand management alternatives, general and site specific conservation programs, and other water efficiency measures.

One focus of the Town’s Conservation Plan is to address peak summer usage levels and, in particular, what can be done to reduce this use over the short-term until the Cary/Apex Water Treatment Plant (“C/AWTP”) expansion is on-line. Currently, the Town experiences strong demand peaks during the summer due to demand for irrigation and other elective uses. This peak seasonal demand is driven by a large proportion of residential customers, an affluent customer base, and high community standards for the appearance of commercial properties. The primary objective of the short-term demand management measures is to address these summer peaks. In addition to the short-term focus on peak demand management, the Conservation Plan addresses long-term conservation measures designed to achieve a level of total water savings at least a ten-year planning horizon. Benefits from water savings during this longer-term planning horizon include savings associated from the deferral of capital projects that would otherwise have been necessary in the absence of conservation.

### **Service Area & Water Use Characteristics**

The Town owns 77% of the C/AWTP and produces water for the Town’s approximately 30,000 retail customers, the Town of Morrisville (“Morrisville”), the Raleigh Durham Airport Authority (“RDU”), the Wake County portion of Research Triangle Park (“RTP”). The C/AWTP also serves the retail and wholesale customers of the Town of Apex (“Apex”), which owns the remaining portion (23%) of the treatment plant.

Water use patterns for the Town were evaluated in terms of six general categories or customer groups. Table ES-1 below, presents a summary of these characteristics of each of these six retail customer groups for 1998, the most recent calendar year for which data was available at the time of the analysis of operating characteristics. The characteristics include the number of accounts in each group, the gallons per day per account (“gpda”) for each group, the percentage of each customer group’s consumption as it relates to total Cary retail consumption, and the percentage of each customer group’s consumption attributable to indoor and outdoor uses.

**Table ES-1**

**Summary of Customer Group Consumption Characteristics for 1998**

<b>Customer Group</b>	<b>Accounts</b>	<b>GPD/ Account</b>	<b>Percentage of Total Retail</b>	<b>Indoor Use as % of Class</b>	<b>Outdoor Use as a % of Class</b>
Single-family (RSF)	27,409	197.1	63.1%	82.1%	17.9%
Multi-family (RMF)	548	1,843.6	11.8%	92.9%	7.1%
Institutional	74	1,272.7	1.1%	64.8%	35.2%
Commercial	1,462	1,200.6	20.5%	84.4%	15.6%
Industrial	14	8,562.0	1.4%	70.4%	29.6%
Irrigation	123	1,461.8	2.1%	38.7%	61.3%

As the table illustrates, the majority of retail water sales in the Town goes to Residential Single-family (“RSF”), Commercial, and Residential Multi-family (“RMF”). The combined sales of the three remaining customer groups amounts to less than 5% of the total retail water sales. Therefore, the Town’s historical water use patterns suggest that the RSF, Commercial, and RMF customer groups provide the greatest potential for long-term water savings achieved through conservation measures and efforts.

**Existing and Projected Water Demand and Supply**

Since the C/AWTP was constructed in 1993, population growth in Cary and the surrounding area has increased peak seasonal water demand to levels that exceed the Town’s existing capacity to produce and distribute water. In order to meet this level of demand, the Town is planning to expand the C/AWTP in order to provide a capacity of 40.0 MGD by fiscal year (“FY”) 2002. The Town will continue to own 77% or approximately 30.8 MGD of the plant’s expanded capacity. In the meantime, peak demand is met by purchasing finished water from the City of Raleigh (“Raleigh”) and the City of Durham (“Durham”).

Based on forecasted changes in the demographics of the Town, the average daily retail water demand is projected to increase from 8.6 MGD in 1998, the base year used for this study, to 26.7 MGD in 2028. This represents over a 300% increase in demand over the 30-year forecast period. In addition to the current plant expansion to 40.0 MGD, two subsequent expansions of 16.0 MGD are scheduled to occur during the planning horizon in order to meet the anticipated in growth in demand. These expansions are necessary in order to meet expected increases in peak day demand, which are projected to increase from 9.1 to 28.3 over the 30-year forecast period.

**Current Water Conservation Programs**

The Town began to address water conservation in late 1996 after hiring a water conservation specialist and subsequently adopted a formal Water Conservation and Demand Management Policy in March 1997. The Town’s ongoing water conservation efforts are focused on both supply side conservation, to augment and preserve existing and future water supplies, and demand side conservation, to reduce demand and promote the efficient use of water.

To address the peak seasonal demand from a supply side perspective, the Town is committed to the construction of a Reclaimed Water System to provide non-potable reclaimed water for irrigation systems within its local retail service area. Initially, the reclaimed water distribution system will be limited to selected areas within reasonably close proximity to the Town’s two

wastewater treatment plants. The first two projects are scheduled to be completed by the spring of 2001, and the use of reclaimed water is projected to reduce potable water demand for irrigation purposes by approximately 0.176 MGD beginning in the summer of 2002.

The Town already has in place a Water Conservation program focused on demand side conservation to encourage long-term conservation and wise water use. Demand side conservation activities already implemented by the Town to address the “long-term” conservation of water by its retail water customers include:

- A *Public Education Program* that incorporates a “Block Leader Program” and a summer “Beat the Peak Program” to convey to the public an understanding of why water conservation is important;
- A *Toilet Flapper Rebate Program* to provide customers with the incentive to replace existing flappers with early closure models;
- A *Water Waste Ordinance* that prohibits wasteful outdoor watering that falls directly onto impervious surfaces;
- A *Rain Sensor Ordinance* that requires all existing and new customers with irrigation systems to install a rain sensor that measures rainfall and overrides the irrigation cycle of the system; and
- A *Conservation Rate Structure* designed to encourage more efficient use of water resources by charging higher unit rates to residential customers as their level of consumption increases.

The Town has also been proactive in addressing its peak demand management issues by implementing various water use restrictions that may be imposed during those periods that constitute a water emergency. These peak demand management restrictions include:

- Odd-Even Day Outdoor Watering;
- Total Ban on Turf Watering; and
- Odd-Even Day Turf Watering.

### **Assessment of Water Conservation Potential**

The vast majority of retail water sales (97.5%) in the Town is attributable to four of the six customer groups: RSF (63.1%); Commercial (20.5%); RMF (11.8%); and Irrigation (2.1%). Therefore, these four customer groups provide the greatest potential to achieve long-term average day water savings through conservation measures and efforts. However, achieving long-term average water savings will be more difficult in a newly developed community, such as Cary, where a large proportion of homes are relatively new. A large proportion of structures in Cary were built after the adoption of revised plumbing codes in 1992, thereby eliminating many opportunities to achieve conservation that might be available in other communities. In fact, the analysis of water usage patterns indicates that residential indoor usage measured on a per account basis already demonstrated acceptable water use efficiency.

From the perspective of deferring proposed water capital improvement projects (additional

expansions to the C/AWTP), the objective is to reduce summer peak day water use because water treatment plants are sized, and expansions are timed, based upon peak day demand. Outdoor water use by the four groups identified above represents over 95% of the total retail outdoor water use. As a result, there appears to be potential for significant conservation in each of these customer groups related to outdoor or landscape water use.

## **Conservation Plan and Implementation Recommendations**

In March 1999, the Town distributed a Request for Proposals (“RFP”) to conduct a Water Conservation and Peak Demand Management Plan. The project team, which includes Raftelis Financial Consulting, (“RFC”) in association with Maddaus Water Management (“MWM”) and the Weber Group (“WG”), was selected based on its response to the RFP. The following is a summary of the findings of the study and recommendations for a comprehensive cost-effective water conservation plan.

### *Benefit Cost Analysis and Recommendations*

Over 130 potential conservation measures were considered. After a screening process, water savings were estimated and costs were developed for 15 conservation measures or programs. Benefits and costs were compared in a formal present worth analysis and conclusions were drawn about which programs produce cost-effective water savings for the Town. Cost categories include labor (by Town staff or outside contractors to administer and perform any required fieldwork), expenses, incentives, and one-time setup costs. Benefits from conservation include:

- Current savings in operations and maintenance (“O&M”); and
- Savings from the deferral and/or elimination of capital projects that would have been necessary in the absence of conservation.

Capital savings were estimated by comparing existing treatment capacity with the capacity that would be required through the year 2028. Water demand projections were adjusted for expected demand reductions from long-term implementation of existing plumbing code requirements for water conserving toilets, urinals, faucets, and showerheads. The need for additional plant capacity was estimated, excluding the initial 40.0 MGD expansion already underway, assuming that treatment capacity would be added in 16.0 MGD increments over the 30-year forecast period. Of the 16.0 MGD increments of expansion Cary would receive 12.3 MGD, representing its 77% ownership stake in the plant.

### *The Recommended Plan*

Based on the results of the benefit-cost analysis, a recommended plan was developed using the following criteria:

- Benefit-cost ratio greater than 1.0 (i.e., the program must save more than it costs);
- Reasonable cost (i.e., affordable);
- Significant water savings; and
- Acceptable non-quantifiable impacts.

The recommended plan includes seven programs targeted mainly at residential (RSF and RMF), commercial, and irrigation accounts. A list of the programs, water savings, and total costs (over the first five years) of each program included in the recommended plan are shown in Table ES-2.

**Table ES-2  
Recommended Plan**

Program Element	Water Savings in 2009 MGD	Unit Cost of Water Saved, \$/MGD	First Five Years of Costs	Utility Benefit-Cost Ratio
Residential Water Audits	.053	\$546.85	\$71,300	1.1
New Home Points Program	.491	36.46	100,000	16.2
Public Education	.300	400.59	314,300	1.5
Flapper Rebate	.005	828.04	11,800	1.0
Water Reclamation Facility (Water Reuse)	.270	0.00	1 <sup>(1)</sup>	N/A
Landscape Water Budgets	.013	754.33	64,200	.9
Landscape/Irrigation Codes	.019	276.07	128,400	2.6
Increasing Block Rate Structure	.143	49.40	54,000	14.3
Combined Results <sup>(2)</sup>	1.169	137.5	\$655,500	4.4

<sup>(1)</sup> The decision to construct a Water Reclamation Facility was made independent of this study. Although the water savings and benefits of the facility are included in the Conservation Plan, the capital costs associated with this project have not been factored into the benefit-cost analysis, as the costs will be incurred regardless of this analysis. In order to include the Facility as a measure in the DSS Model, a \$1 cost had to be included. For more information regarding this issue, please see the discussion included on page 5 of Chapter 7.

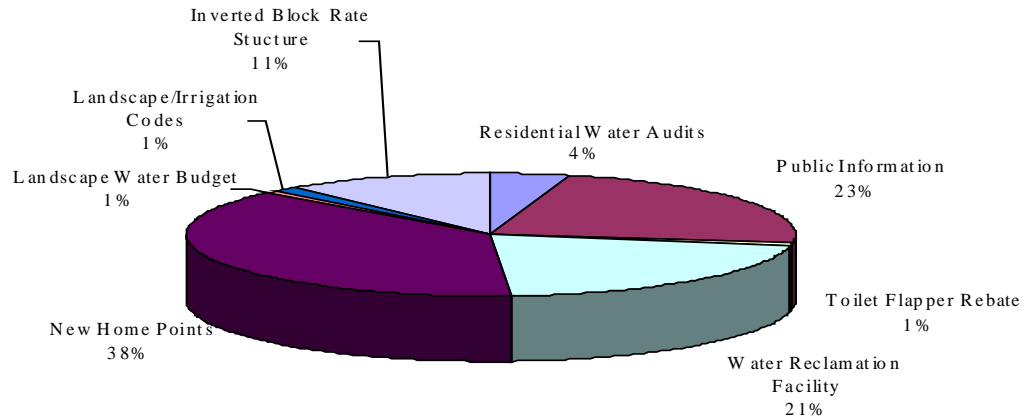
<sup>(2)</sup> For more information on the relationship between the water savings estimated for each stand-alone measure and the combined results of incorporating the water savings associated with the stand-alone measures into an alternative program, see the discussion on page 6 of Chapter 7.

The plan assumes the programs will be implemented in FY 2001. Water savings in retail water production expected from the recommended plan by the end of the forecast period in 2028 total 4.6 MGD. This represents a reduction in retail water production of approximately 16.3%. It should be noted that the water savings estimated for the Recommended Plan does not equal the total water savings associated with the sum of each plan elements due to the “shared water savings” produced by those conservation measures that focus on similar end uses.

For information purposes, Figure ES-1 provides a distribution of the water savings associated with each individual plan element, as a percentage of the sum of the savings for all of the individual plan elements over the entire planning horizon.

Figure ES-1

**Distribution of Water Savings by Programmatic Element**



*Benefits of the Recommended Plan*

Benefits of the plan include the deferral of considerable capital expenditures and the operating costs associated with them (Phase I and II of expanding the C/AWTP) and save money by reducing the annual system operating costs. Even with projected water savings from enforcement of plumbing code provisions, the Town’s share of the total C/AWTP capacity projected to be needed by 2028 in the absence of the Conservation Plan is approximately 55.4 MGD. This represents an increase of 4.5 times the current Town share (11.6 MGD) of the existing 15.0 MGD capacity. Although both expansions of the C/AWTP to provide the Town with additional capacity will still be required by 2028, the Recommended Plan is projected to provide water savings that will allow these expansions to be delayed. By extending the timing of the capital cost associated with these expansions, the present worth of these expansions are reduced. The projected delay for the first phase represents approximately a 4.5-year delay from 2009 to 2013. The projected delay for the second expansion phase represents approximately a 5.8-year delay from 2018 to 2024.

*Implementation Considerations*

The recommended water conservation plan represents a significant commitment and effort by the Town over the next ten years to implement proposed water efficiency programs. In addition to the programs included in the recommended plan, the Town will continuously monitor and evaluate its overall water conservation effort in relation to its water supply and water and wastewater facility capacity needs. As the need for major capital investments draw near, the

Town may consider expanding current programs and/or implementing additional water conservation measures. More aggressive water conservation measures may be implemented throughout the service area or targeted to specific sub-areas in order to delay planned capital improvements. Proper timing of future investments by the Town for water conservation is essential to maximizing the benefits of such programs to the utility and its ratepayers.

It is important that the Town proceed in a planned and careful manner, ramping up the program as new staff is hired and becomes capable of conducting programs and administering contracts. Staffing is discussed in the next section. Not all new programs need start in the first year; and expansion of the programs should be paced with the growing capabilities of the new staff and increases in budgets. The programs can be ramped up over a 3-year period so that at the end of the third year all programs are up and running. (This also coincides with the need to focus most of the effort and attention over the next two summers on short-term measures and water use restrictions that may be discontinued once the plant expansion is completed.)

The conservation programs that will be implemented should be monitored to ensure that they are generating the level of savings that is required to meet long-range demand and strategic supply objectives. In addition, the findings of this monitoring will provide the cost effectiveness information required for Town management to make future adjustments and modifications to the Conservation Plan to provide the most efficient long-term allocation of conservation resources.

