

***COLLABORATIVE REPORT
WATER CONSERVATION STRATEGIES FOR
JOINT CONSIDERATION BY CARRBORO, CHAPEL HILL,
ORANGE COUNTY AND OWASA***

**INITIAL REPORT ON OPTIONS EVALUATED BY
INTERLOCAL STAFF WORKGROUP**

STAFF WORKGROUP COMPRISED OF REPRESENTATIVES FROM:

**Town of Carrboro Planning Department
Town of Chapel Hill Planning Department
Town of Chapel Hill Inspections Department
Town of Chapel Hill Public Works Department
Orange County Planning Department
Orange Water and Sewer Authority**

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EXECUTIVE SUMMARY

Draft Report on Collaborative Water Conservation Strategies For Joint Consideration By Carrboro, Chapel Hill and Orange County

This report presents information and recommendations on water conservation strategies the Town of Carrboro, Town of Chapel Hill, Orange County, and the Orange Water and Sewer Authority (OWASA) can consider to increase water use efficiency within the OWASA service area. It is provided in response to the local elected boards' request for follow-up information and recommendations regarding strategies they can consider to complement long-term conservation efforts of OWASA.

In October 2005, the Town of Chapel Hill Town Council requested that OWASA provide information about the effects of potential increases in development density within the currently defined urban service area on OWASA's ability to meet water and wastewater service demands. In February 2006, OWASA made presentations and provided a discussion paper to each of the local elected boards about the potential effects of increased development density on future water and sewer capacity, stating that "OWASA can meet the utility needs of increased development density within the currently defined urban services area of Carrboro and Chapel Hill, but meeting those needs while maintaining the level of service expected by OWASA's customers will require additional collaboration among OWASA, local governments, and the development community."

One of the main themes presented was the following:

"Highly efficient water conservation technologies are readily available that can support increased development density with little or no net increase in water service demands. Many of these advanced efficiency measures can be implemented through existing legal authority and local review and approval procedures that are already in place, but some may require ordinance changes or new enabling legislation. OWASA is ready and willing to provide technical assistance to Carrboro, Chapel Hill, and Orange County if they choose to move in this direction, and we will consider adopting water use efficiency standards for new development that will be served by OWASA."

Each of the three local governing boards subsequently requested their staffs work with OWASA staff to develop more specific information about practices, requirements, and/or technologies that might be applied to this goal. In response, OWASA staff convened an initial planning meeting with staff from the three local jurisdictions on August 28, 2006 to begin this work. This interlocal staff level workgroup continued to meet regularly over the following nine months to discuss and evaluate the various water conservation measures, programs and strategies that might be most appropriate for local government consideration. This report represents the work to date on that effort.

Increased efficiency will be essential if OWASA is to achieve the *Goal and Objectives for OWASA's Long-Term Water Conservation and Demand Management Program* adopted by the OWASA Board of Directors in April 2005. Those goals and objectives were developed to ensure that OWASA meets the needs of its current and future customers in a manner consistent with the principles of sustainability. OWASA's primary water conservation goal is:

“To develop, fund and implement a cost-effective water conservation and demand management program that will meet our community's long-term water supply needs (through 2050) by making the best use of our local water resources and eliminating the need for costly new water supply sources and facilities.”

The extreme drought of 2001-2002 and the ongoing exceptional drought of 2007 have heightened concerns about the need for conservation of the Carrboro-Chapel Hill community's essential drinking water supplies. It is hoped that this increased awareness will result in joint action by the governing boards to pursue and provide financial and staff resources needed to implement those strategies that are determined to be the most effective for the community.

Implementation of any of the collaborative strategies presented in the report would complement and determine the scope of other water conservation measures undertaken by OWASA, such as comprehensive education and outreach efforts, technical assistance such as water audits for high-volume users, conservation pricing methods, and potential financial incentives (such as rebates, credits and no-interest loans) for customers to install permanent conservation measures.

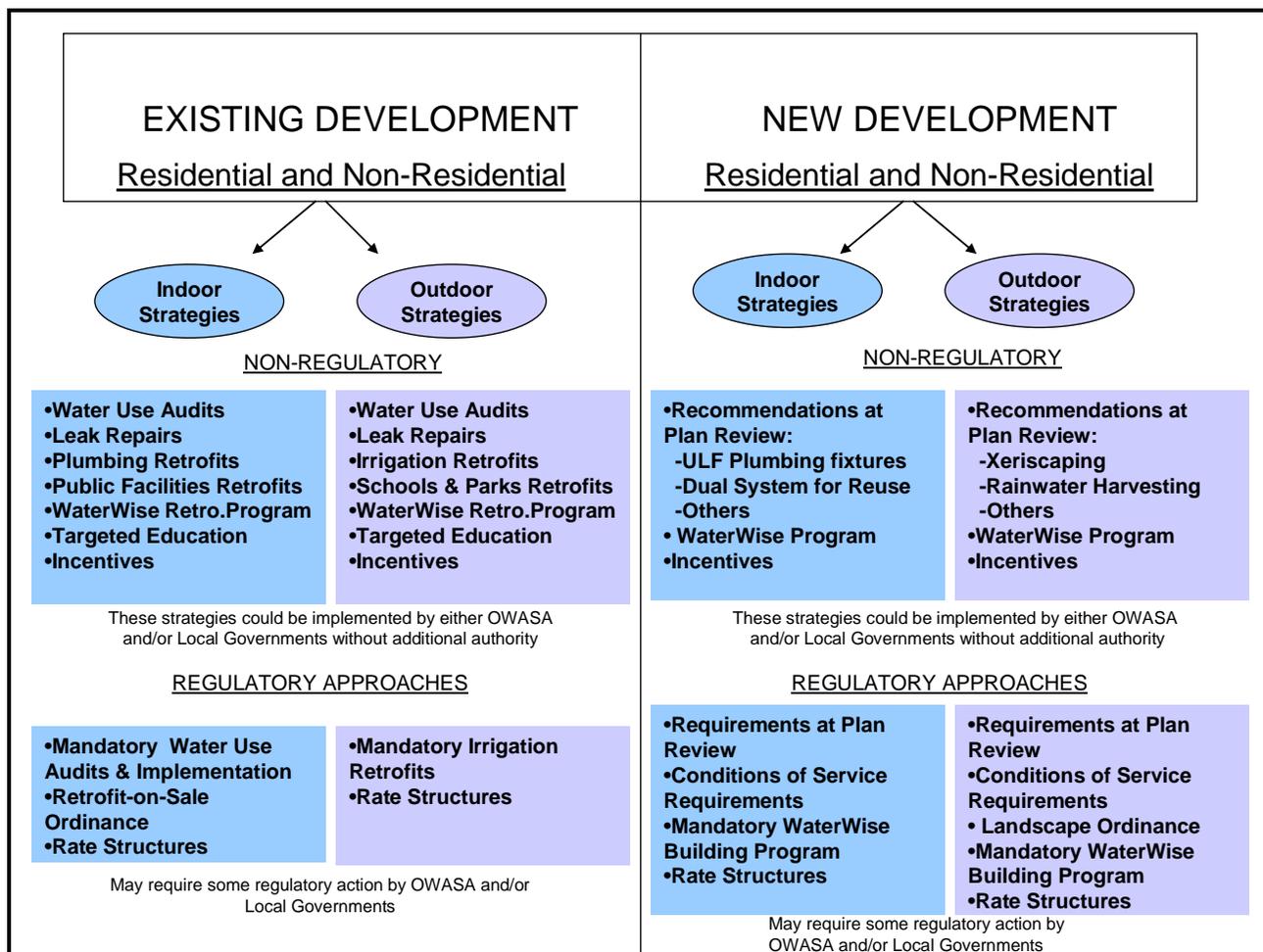
The extent to which financial incentives will be needed will depend on several factors, such as:

- ✓ the extent to which regulatory requirements are used to increase water use efficiency;
- ✓ customers' response to education and awareness efforts;
- ✓ the cost of water and sewer services and the resulting payback that customers can expect from their conservation investments; and
- ✓ the capacity to fund and implement such incentives.

The local governments and OWASA will need to determine which regulatory measures should be the direct responsibility of the Towns and the County, and which would be appropriate for OWASA. Regardless of the approach, it is likely that special enabling legislation will be needed to implement some of the regulatory measures presented in this report.

Figure 1 summarizes the various strategies and opportunities for addressing water efficiency in existing and new development. These measures could be implemented by the local governments and/or OWASA.

Figure 1.



Recommendations

Based upon the proposed *Goals* and *Guiding Principles*, the interlocal staff workgroup recommends that the local governing boards and OWASA consider the following:

- ✓ Undertaking pilot demonstration water use efficiency projects at public facilities. The results and feedback of these pilot projects could provide important lessons and more accurate information regarding expectations, financial and staff resource needs, and effectiveness of the various measures or programs.

Examples of such projects might initially include:

- Collaboration between OWASA and the Chapel Hill Public Housing Authority (CHPHA) to facilitate the retrofit of about 350 public housing units with water efficient fixtures (such as was done by the City of Houston). OWASA staff has made initial inquiries regarding the possibility of obtaining high efficiency toilets (1.28 gallons per flush) at a

discounted cost for this potential demonstration project. This project would not only save water – it would reduce the water and sewer costs for the CHPHA and occupants of the public housing units that are customers of OWASA.

- OWASA Board of Directors should consider an Availability Fee Water Conservation Credit program for new development where a builder/developer could voluntarily certify that the building or development meets certain prescribed water efficiency standards in exchange for a reduced availability fee and/or expedited review and permit process.
 - Local Governments should lead by example by initiating water use audits, leak repairs and retrofits at key existing public facilities. For new public buildings, local governments should plan, design, and build public facilities to achieve the greatest and most cost-effective water efficiency practical.
 - The University should continue its progressive approach to water use efficiency as demonstrated by its Carolina North design principles.
- ✓ Selecting which of the non-regulatory and regulatory strategies are considered acceptable and direct staff to develop specific implementation proposals, including a schedule and assessment of financial and staff resources needed to implement the strategy.
- ✓ Determining the need for and benefits of pursuing specific enabling legislation directly related to the implementation of selected water conservation strategies that are presented in this report, and that may be needed to achieve our community's long-term water conservation and demand management goal and objectives.

PART I

PURPOSE AND SCOPE OF THIS REPORT

Purpose

This report presents information and recommendations on a variety of potential water conservation partnership strategies that the governing boards of the Town of Carrboro, Town of Chapel Hill, Orange County, and the Orange Water and Sewer Authority (OWASA) can consider to increase water use efficiency within the OWASA service area. It is provided in response to the local elected boards' request for follow-up information and recommendations regarding strategies they can consider to complement long-term conservation efforts of OWASA.

In October 2005, the Town of Chapel Hill Town Council requested that OWASA provide information about the effects of potential increases in development density within the currently defined urban service area on OWASA's ability to meet the water and wastewater service demands. In February 2006, OWASA made presentations and provided a discussion paper to each of the local elected boards about the potential effects of increased development density on future water and sewer capacity, stating that "OWASA can meet the utility needs of increased development density within the currently defined urban services area of Carrboro and Chapel Hill, but meeting those needs while maintaining the level of service expected by OWASA's customers will require additional collaboration among OWASA, local governments, and the development community."

One of the main themes presented was the following:

"Highly efficient water conservation technologies are readily available that can support increased development density with little or no net increase in water service demands. Many of these advanced efficiency measures can be implemented through existing legal authority and local review and approval procedures that are already in place, but some may require ordinance changes or new enabling legislation. OWASA is ready and willing to provide technical assistance to Carrboro, Chapel Hill, and Orange County if they choose to move in this direction, and we will consider adopting water use efficiency standards for new development that will be served by OWASA."

Each of the three local governing boards subsequently requested their staffs work with OWASA staff to develop more specific information about practices, requirements, and/or technologies that might be applied to this goal. In response, OWASA staff convened an initial planning meeting with staff from the three local jurisdictions on August 28, 2006 to begin this work. This interlocal staff level workgroup continued to meet regularly over the next nine months discussing and evaluating the various water conservation measures, programs and strategies that might be most appropriate for local government consideration. This report represents the work to date on that effort.

Increased efficiency will be essential if OWASA is to achieve the *Goal and Objectives for OWASA's Long-Term Water Conservation and Demand Management Program* adopted by the OWASA Board of Directors in April 2005. That document is included as Appendix A.

That goal was developed as a way of ensuring that OWASA meets the needs of its current and future customers in a manner consistent with the principles of sustainability. A key focus is “eliminating the need for costly new water supply sources and facilities.”

The extreme drought of 2001-2002 and the ongoing exceptional drought of 2007 have heightened concerns about the need for conservation of the Carrboro-Chapel Hill community's essential drinking water supplies. It is hoped that this increased awareness will result in full consideration of the options presented in this report, and joint action by the governing boards to pursue and provide financial and staff resources needed to implement those strategies that are considered to be the most effective for the community.

Implementation of any of the collaborative strategies presented in this report would complement and influence the scope of other water conservation measures undertaken by OWASA, such as comprehensive education and outreach efforts, technical assistance such as water audits for high-volume users, conservation pricing methods, and potential financial incentives (such as rebates, credits and no-interest loans) for customers to install permanent conservation measures.

Scope

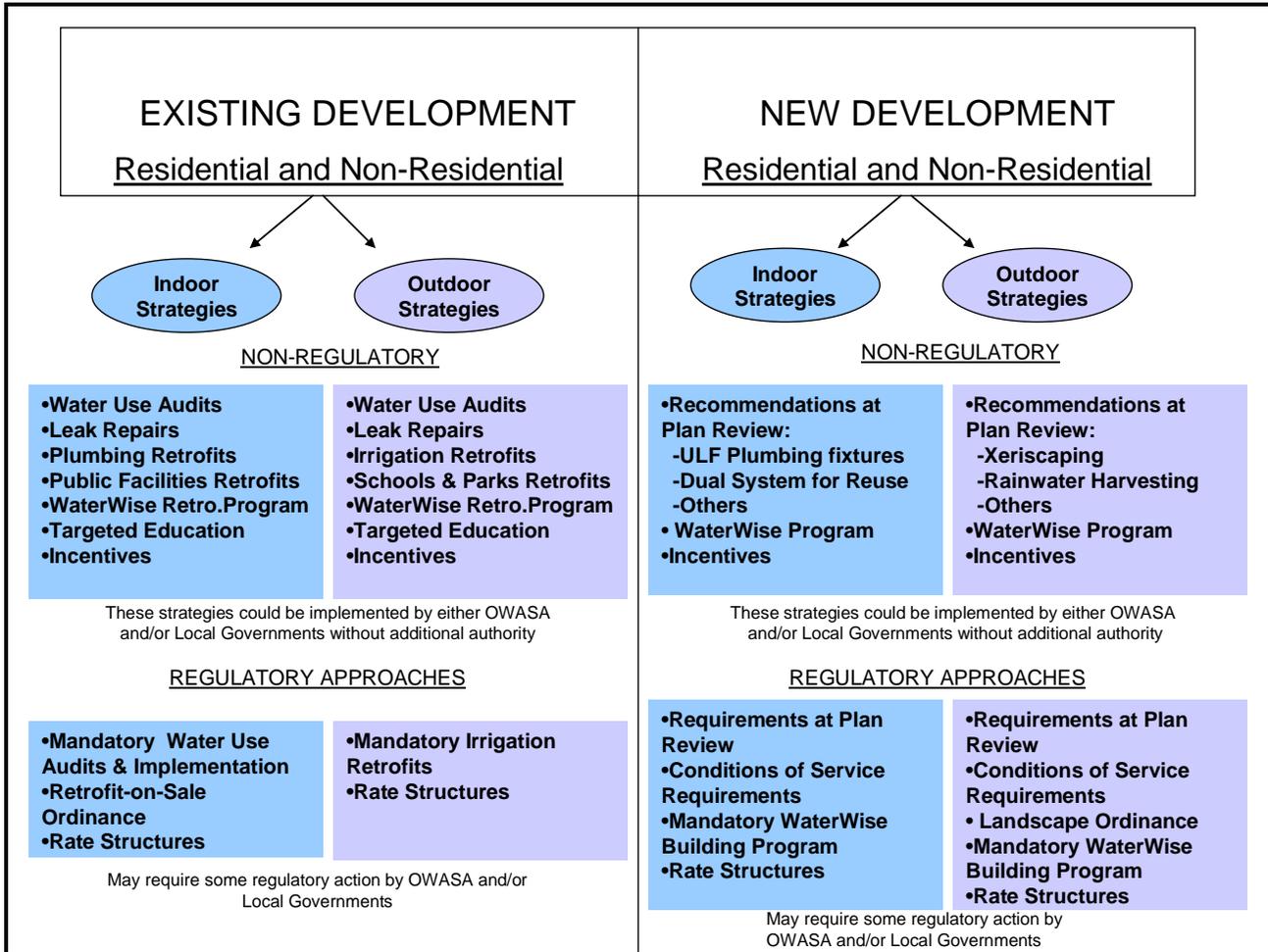
Part II of this report presents an overview of long-term demand and supply projections, the need for conservation, and OWASA's formally adopted water conservation goal and objectives. OWASA's ongoing water conservation efforts are summarized, and there is a brief review of specific technological/mechanical practices that can be implemented to reduce indoor and outdoor water use in new and existing development. A brief discussion on the importance of establishing effective partnerships with public and private parties is also provided.

This background information provides the local governing boards and the public with an understanding of the essential role that conservation will play in meeting our community's long-term water needs in a sustainable manner.

Part III describes the goals and guiding principles which the interlocal staff workgroup recommends be used to frame the discussion and evaluation of potential strategies that local governments can jointly consider to increase water use efficiency within the community. It also provides information on several non-regulatory and regulatory strategies to promote conservation in existing and new development.

Figure 1 summarizes the various strategies and opportunities for addressing water efficiency in existing and new development. Note that these measures could be implemented by either the local governments and/or by OWASA.

Figure 1.



Part IV presents the interlocal staff workgroup’s initial recommendations regarding potential partnership strategies. If regulatory strategies are considered appropriate and necessary to achieve the community’s conservation goals, it will be essential for the local governments to simultaneously adopt uniform regulatory provisions to ensure consistent and equitable treatment of OWASA’s existing and future customers. The generally uniform local water conservation ordinances serve as a model for joint local action to promote water conservation.

The local governments and OWASA will need to determine the extent to which any desired regulatory measures should be the direct responsibility of the Towns and the County, and which would be appropriate for OWASA to have the direct authority and responsibility to adopt and implement.

Regardless of the approach, it is likely that special enabling legislation will be needed to implement at least some of the regulatory measures presented in this report. Part IV includes a preliminary draft legislative proposal relating to the clear establishment of local government and OWASA authority to implement the different conservation strategies discussed in this report.

PART II

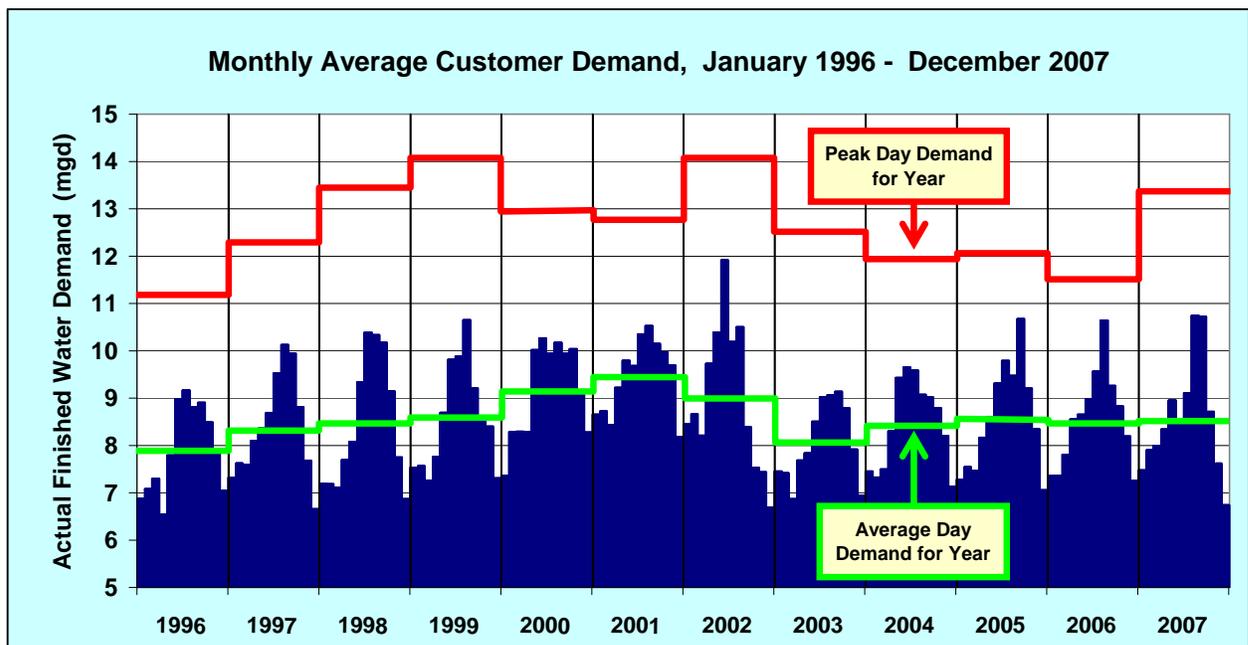
LOCAL WATER CONSERVATION NEEDS AND EFFORTS

(Note: Much of the information in this section is taken directly or adapted from an October 19, 2007 memorandum titled “Annual Review and Update of Strategic Trends and Master Plan Issues.”)

Water Demands in the OWASA Service Area

From the 1970s until the 2001-2002 drought of record, annual water demands in the OWASA service area grew at a remarkably uniform rate of increase of about 0.2 million gallons per day (mgd) per year. That steady rate of growth up until 2001 is illustrated in Figure 2. Since then, average-day and peak-day water demands have remained below 2001-2002 demand levels.

Figure 2.



Based on community trends observed since the mid-1970s and on information provided by Carrboro, Chapel Hill, Orange County, and the University of North Carolina at Chapel Hill (the University, or UNC), OWASA’s 2001 *Comprehensive Water and Sewer Master Plan* anticipated an approximate doubling of water and sewer demands by 2050. Shortly after the Master Plan was completed, the University announced plans for accelerated and more intense development of the central campus than previously anticipated in OWASA’s Master Plan. The revised UNC growth plans resulted in revised projections of future water and wastewater service needs that were intermediate between the “expected” and “high growth” projections of OWASA’s 2001 Master Plan.

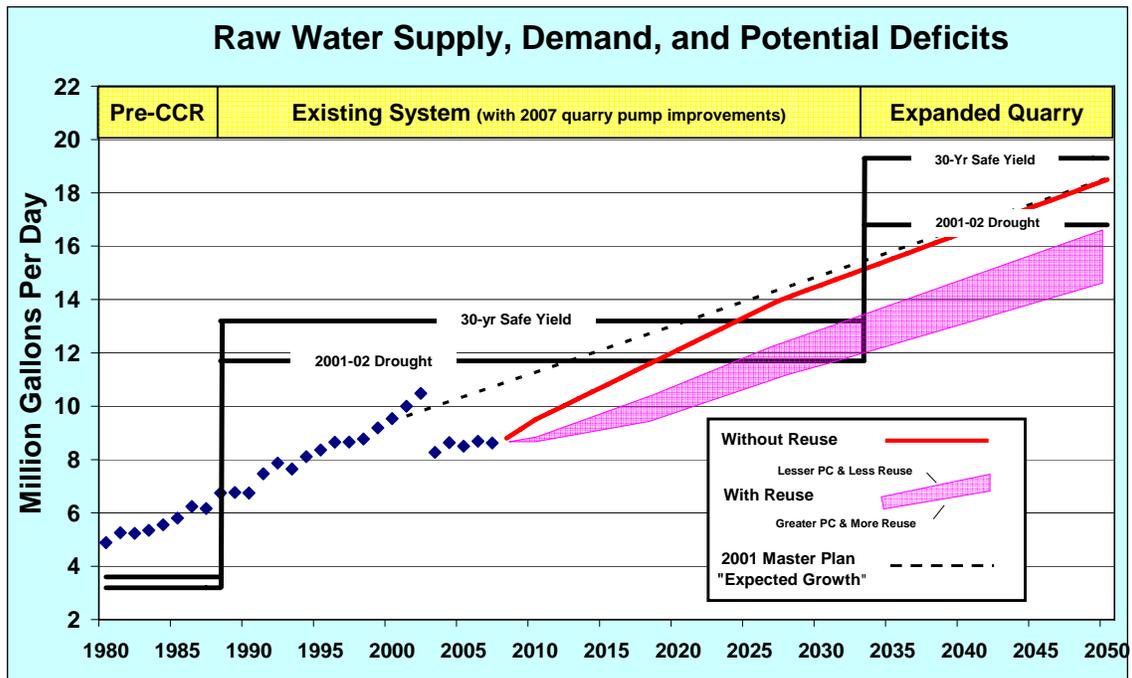
Demands for UNC's Carolina North development were included in OWASA's 2001 Master Plan projections, and a "placeholder" demand of 1.6 mgd for Carolina North continues to be reflected in our current demand projections, which represents the best information available at this time. OWASA's demand projections will be updated when the University submits the Carolina North development plans for local approval.

The Master Plan projected an ultimate (2050) raw water demand of 18.5 mgd, as shown on Figure 3. The additional main campus University growth noted above represented a potential 3.3 mgd increase in demand not anticipated in the Master Plan, which would have corresponded to a total system demand of 21.8 mgd in 2050. This was close to the "high growth" demand scenario in OWASA's original Master Plan.

Since 2001, OWASA revised its long-term demand projections to account for: (a) the implementation of a new process water recycling system at the drinking water plant which has reduced raw water withdrawals by about six percent; (b) planned start-up of the new reclaimed water system which will initially serve the University's main campus; and (c) conservation savings that are expected from use of more water-efficient fixtures in new development and in renovations of existing buildings, *assuming no major conservation policy or program changes*.

As shown in Figure 3, these collective measures are expected to reduce previously projected 2050 raw water needs to an ultimate demand in the range of 14.5 and 16.5 mgd, depending on eventual levels of reclaimed water use, passive conservation, and Carolina North demands. *This estimate is 10 to 20 percent lower than the original Master Plan "expected growth" demand projection.*

Figure 3.



OWASA's detailed hydrologic model indicates that with optimized operation, our community's raw water supply reservoirs (including the recently completed Stone Quarry pumping improvements) can provide 13.6 mgd under estimated 30-year drought conditions, but only about 11.7 mgd assuming the drought conditions experienced in 2001-2002.

When the expanded Stone Quarry Reservoir comes on-line in the early to mid-2030s, our total storage capacity will increase by at least 2.2 *billion* gallons. At that time, our supply reservoirs will be able to provide about 19.3 mgd assuming the 30-year drought, and about 16.8 mgd assuming the 2001-2002 drought conditions. That capacity exceeds the demand projection for 2050.

The Need for Increased Conservation

Although our community's long-term water supply capacity is projected to be adequate to meet projected demands at 2050, we will face a much greater risk to droughts and potential shortfalls in the interim period between now and the time the expanded Stone Quarry Reservoir is available. As shown in Figure 3, water demands will approach the existing system's safe yield (assuming 2001-2002 drought conditions) in the early to mid-2020s, and could exceed the safe yield of our reservoirs by more than 1.5 mgd before the expanded Stone Quarry Reservoir comes online.

To offset the increased risk and ensure that this projected 1.5 mgd shortfall in supply is addressed, OWASA will need to increase available supply and/or decrease projected demands. The OWASA Board of Directors has concluded that the best way to address this shortfall is to increase water conservation and the use of reclaimed water. This is reflected in the *Goal and Objectives for OWASA's Long-Term Water Conservation and Demand Management Program* adopted by the Board in April 2005. That document is include as Appendix A. The official goal of OWASA is:

“To develop, fund and implement a cost-effective water conservation and demand management program that will meet our community's long-term water supply needs (through 2050) by making the best use of our local water resources and eliminating the need for costly new water supply sources and facilities.”

Conservation and water reuse are keys to sustainable water resource management as they can:

- ✓ reduce the amount of water that needs to be withdrawn, thereby enhancing surface and ground water resources and aquatic habitats;
- ✓ reduce the amount of energy that must be used to withdraw, pump and deliver water to meet the community's water needs, thereby complementing local greenhouse gas emission reduction efforts;
- ✓ defer or eliminate the need to increase water supply and treatment facility capacities and install new pipelines, thereby reducing long-term direct and indirect financial and environmental costs;

- ✓ reduce water and sewer charges and hot water heating costs for customers that implement conservation measures; and
- ✓ complement stormwater management and nonpoint source pollution control efforts.

OWASA's *Conservation Goal and Objectives* document establishes specific demand reduction targets, and guidelines for cost-effectiveness, customer satisfaction, and fiscal impacts that are to be weighed when new conservation and demand management programs are contemplated. The Board intends to revisit the *Water Conservation Goal and Objectives* periodically and will revise them as necessary to reflect changing conditions and new information that becomes available.

The role of an active water conservation program, including the reclaimed water system project, is now a cornerstone of OWASA's long term water supply plans and is a significant strategic change since the *Master Plan* was completed in 2001.

Now that plans and arrangements for the reclaimed water system project have been finalized and construction is imminent, OWASA is shifting its focus to the evaluation, implementation, and funding of cost-effective and practical water conservation measures to increase the long-term reliability of our existing supply.

Approval and implementation of one or more of the interlocal strategies presented in Part III of this report would complement OWASA's future comprehensive long-term water conservation efforts.

OWASA's Existing Water Conservation Program

Traditionally, the water utility industry has viewed water conservation as a short-term strategy for coping with temporary shortages of supply or capacity, rather than as a permanent strategy for reducing system capacity requirements, managing the demand for raw water, and reducing the environmental impacts of water utility operations. For more than two decades, this was also the general view and approach of OWASA.

However, the severe drought of 2001 – 2002 and subsequent re-evaluations of OWASA's future water supply and demand projections resulted in a substantial rethinking of the long-term importance of conservation as a key component of OWASA's sustainable water management strategy.

OWASA has not had a formal comprehensive, long-term plan for water conservation and demand management. Despite not having a formal plan, beginning in 2002 OWASA and its customers have made significant efforts to permanently reduce water demand and increase water use efficiency. The following regulatory, policy, pricing, operational, and educational methods have been used to achieve the conservation results to date:

- ✓ In May 2002, OWASA implemented a *seasonal water conservation rate structure* that has helped to contain increases in peak-day and peak-season demands. Under the seasonal

pricing approach, use during the peak season months (May through September) is billed at a substantial higher rate per 1,000 gallons than use during the off-peak season.

During the recently completed rate study project, OWASA rate consultant concluded that OWASA's conservation pricing approach has clearly been a key factor that has led to reductions in water use by many customers, including the University.

- ✓ In August 2002, after receiving approval from the State, OWASA implemented a ***new system to recycle highly treated spent water plant process wastewater*** back to the Jones Ferry Road Water Treatment Plant rather than discharge that water to a nearby stream. This utility management measure has reduced raw water withdrawals, and associated energy use and costs for raw water pumping, by about six percent.
- ✓ In 2003, Orange County and the Towns of Carrboro and Chapel Hill adopted ***local water conservation ordinances which include year-round conservation standards*** and restriction on water use in various stages of drought or water supply emergencies within the OWASA service area. A copy of the ordinance is included in Appendix B.
- ✓ In 2004, OWASA developed a new ***water supply yield analysis and simulation model*** to better guide our water supply planning and management and drought response efforts.
- ✓ As previously discussed, in April 2005 the OWASA Board of Directors adopted the ***Goal and Objectives for OWASA's Long-Term Water Conservation and Demand Management Program***.
- ✓ In 2006, OWASA and the University of North Carolina entered into a contract to design, construct, operate and finance a ***new reclaimed water system*** that will provide the University with highly treated wastewater to meet certain non-potable water needs on the main campus. The reclaimed water system is expected to begin operation around March 2009. The initial demand is expected to be about 0.57 mgd, which will initially reduce potable water demands by about six percent. At buildout of the main campus, reclaimed water demand may reach about 2 mgd, which would be about 14 percent of the community's water needs.

The University is paying the full cost to build the reclaimed water system (more than \$10 million), excluding the portion that will be paid by Federal and State grants of \$625,000 and \$1.866 million, respectively).

- ✓ OWASA continues to implement ***system-wide operational water conservation efforts*** including installation of water-efficient fixtures in its buildings and facilities, replacement of older water mains prone leaks and breaks, and maintenance and replacement of water meters to ensure accurate measurement and billing of water use by customers.
- ✓ OWASA has an on-going ***public education and outreach program*** aimed at increasing customer awareness of and support for water conservation. Activities include: participating in street fairs, festivals, workshops, etc. sponsored by local governments, community

groups, schools, Chamber of Commerce and the University; conducting targeted workshops in partnership with others, such as the Sustainable Landscaping workshop series and Conservation Retrofit workshops; providing conservation information through customer newsletters, brochures, news releases, OWASA's website, etc.; and providing low-flow showerheads and water-saving early-closing flapper valves for toilets at no cost to customers.

- ✓ In 2007, OWASA revised its Emergency Water Loss Adjustment policy to *eliminate certain adjustments in customer billing charges* due to irrigation system leaks and leaks of visible plumbing fixtures. Irrigation is considered a nonessential use of potable water and visible water leaks should be fixed by customers as soon as possible. Approving reductions in billing charges for such leaks would run counter to OWASA's long-term water conservation goals and objectives.
- ✓ Effective October 1, 2007, OWASA implemented a new *5-tiered increasing block rate structure* for individually-metered residential customers. The new rate structure is designed to encourage greater water conservation by offering a lower water charge per 1,000 gallons for low-volume users, while substantially increasing the water rate for high-volume users.

OWASA believes water pricing is an essential tool for providing incentives for increased water conservation, and will continue to evaluate options for further strengthening conservation pricing signals.

- ✓ The *Joint Local Government Staff Water Conservation Workgroup* (comprised of staff representatives from the planning, public works and inspections departments of Orange County and the Towns of Carrboro and Chapel Hill, and OWASA) began meeting in 2006 to jointly evaluate alternative conservation strategies, technologies and programs and to present recommendations for consideration by the elected local governing boards and the OWASA Board of Directors. This report represents the consensus work of that staff committee.

Conservation Management Practices

Conservation programs usually focus on technological/mechanical measures for reducing water use, as those measures can provide essentially permanent and measurable reductions in water use. Examples of such measures, which OWASA refers to as "Conservation Management Practices (CMPs)", are the installation of water-saving plumbing fixtures, efficient cooling systems, and rainwater harvesting, water recycling, and use of reclaimed water.

Behavioral practices are more difficult to measure, and require ongoing education and awareness efforts. An effective public education and outreach program is essential for a successful long-term conservation program, and will complement and reinforce efforts to get customers to implement technological/mechanical CMPs.

OWASA has compiled information on more than 40 technological/mechanical conservation management practices (CMPs) that can directly result in increased efficiency in indoor and outdoor water use at new and existing facilities and grounds. That information is available in a separate technical report from OWASA.

Figure 4 lists CMPs for the Residential Sector and the Commercial, Institutional, and Industrial Sectors. Figure 5 lists CMPs for the Landscape/Irrigation Sector and for Water and Sewer Utility Management.

Figure 4.

<u>Conservation Management Practices- “CMPs”</u> <u>Initially Considered by OWASA</u>	
<u>Residential Sector</u>	<u>Commercial, Industrial and Institutional Sectors</u>
<ul style="list-style-type: none"> • Install Ultra-Low Flush Toilets • Retrofit older toilets with Displacement Devices; with Early Closure Flappers • Retrofit older toilets with Fill Cycle Regulators; with Dual Flush Valves • Replace older showerheads with Low-Flow Models/Retrofit with Flow-Flow Restrictors • Replace older faucets with Ultra-Low ones • Retrofit older faucets with Low-flow Aerators • Install Water-Saving Dishwashers • Install Water-Saving Washing Machines • Install Leak Detection/Prevention Devices • Repair Leaks • Install Point of Use/Recirculating Hot Water Heaters • Install Water Pressure Reducing Valve • Install Greywater Reuse System 	<ul style="list-style-type: none"> • Install Ultra-Low Flush Toilets • Install Waterless Urinals • Retrofit with Ultra-Low Flush Urinals • Commercial Toilet Valve Retrofit • Replace Urinal Flush Valve • Install Self-Closing/Metering Faucets • Install Water Efficient Laundry Machines • Install Water Efficient Dishwashers • Install Recirculating Car Wash • Increase Cycles of Concentration in Cooling Towers • Install Air-Cooled Chillers • Install Air-Cooled Ice Makers • Install Air-Cooled Drinking Water Fountains • Capture and Reuse Condensate

Figure 5.

<u>Conservation Management Practices, cont.</u> <u>“CMPs”</u>	
<u>Landscape/Irrigation Sector</u>	<u>Water and Sewer Utility Management</u>
<ul style="list-style-type: none">• Install Rain Sensors• Install Soil Moisture Sensors• Install Automatic Irrigation Timers• Design and Install Water Efficient Landscaping/Xeriscaping	<ul style="list-style-type: none">• Water Use Information Analysis & Management• Utility system Leak Detection and Repair• Utility Metering of Water Use and Maintenance of Meters• In-Plant Recycling of Treatment Plant Processing Water• Reclamation and Reuse of Water Plant Process Water• Use of Reclaimed Water from WWTP Operations• Unidirectional Water Main Flushing• Adoption of Water Conservation Ordinance and Rates

Many different strategies can be used to implement CMPs within the OWASA service area. These include:

- ✓ public education and outreach;
- ✓ water use audits and technical assistance;
- ✓ regulatory measures.
- ✓ financial incentives such as rebates, credits, no interest loans and device give-aways.

The extent to which financial incentives will be needed and may be used will depend on several factors, such as: the extent to which regulatory requirements are used to increase water use efficiency; customers’ response to education and awareness efforts; the cost of water and sewer services and the resulting payback that customers can expect from their conservation investments; and the financial capability of OWASA to implement such incentives.

Part III of this report presents information about some specific non-regulatory and regulatory strategies that local governments can jointly consider to help achieve the community’s water conservation goal and objectives.

Effective Partnerships Will be Key to Success of Our Conservation Program

Any successful community-wide effort is based upon collaboration and partnerships. OWASA's recent progress on conservation and water is attributable to the collective efforts of our customers, our local governments, OWASA, the University, and other parties. There is increased opportunity for expanding and building on these partnerships as we move forward with the next phase of our long-term water efficiency and demand management strategy. These potential partnership opportunities include both the public and private sectors.

Public sector partners include, but are not limited to:

- Local Governments
- OWASA
- Chapel Hill-Carrboro City School System
- Chapel Hill Public Housing Authority
- The University of North Carolina at Chapel Hill
- North Carolina Cooperative Extension Service
- State Agencies (DWR, DEQ, PWSS, etc.)
- State Legislative Delegates
- Federal Agencies (EPA, DOE)

Private sector partners include, but are not limited to:

- Property Owners
- Renters/Tenants
- Property Managers
- Home and Building Contractors
- Developers
- Architects and Site Designers
- Landscaping/Irrigation Industry
- Chamber of Commerce
- Hoteliers
- Restaurateurs
- Plumbing Contractors
- Plumbing/Building Suppliers
- Media
- NPOs/Volunteer Organizations

The continued success of our conservation program will depend on the extent to which we can work collaboratively within our community to achieve understanding, awareness, support and strong participation throughout all phases of the program.

The strategies presented in Part III of this report will require strong partnerships between OWASA and the local elected boards and staffs, and will help to shape the form and extent of partnerships with other public and private sector agencies and organizations.

PART III

GOALS, PRINCIPLES AND OPTIONS FOR COLLABORATION ON WATER CONSERVATION STRATEGIES

Recommended Guiding Principles and Criteria

The Staff Workgroup recommends the following general *Goals* for water conservation efforts pursued by the local governments in partnership with OWASA:

- ✓ Conservation strategies pursued jointly by the local governments should ***permanently reduce long term water demands*** by existing and future customers in order to complement OWASA's *Goal and Objectives for OWASA's Long-Term Conservation and Demand Management Program*.
- ✓ Conservation programs should ***ensure the utility service capacity needed*** to support locally desired development densities, including local government proposals for increased development densities in the downtown areas.
- ✓ Conservation programs should ***complement and enhance natural resource protection, greenhouse gas reduction, and sustainability program efforts*** underway in the community.

The Workgroup recommends the following *Guiding Principles* be used to evaluate the alternative conservation strategies identified for interlocal consideration. These principles, which are closely modeled after the OWASA's formally adopted water conservation objectives, are:

- ✓ **Cost-Effective** – Conservation measures should achieve a desired level of demand reduction at a reasonable cost, especially in comparison to the cost of providing an equivalent amount of water supply capacity. Consistent with OWASA's conservation goal and objectives, conservation measures should provide an economic payback to customers within five (5) years based upon cost savings for water, sewer and other utilities. Implementation should be achieved with existing resources and through existing programs to the greatest extent practical.
- ✓ **Acceptable to the Community** – Conservation measures should sustain the level of utility service and “quality of life” that the community expects.
- ✓ **Voluntary versus Mandatory** – Conservation measures should be promoted primarily through public education, economic incentives, and conservation-based rates. If mandatory conservation measures are determined necessary to meet the community's conservation goals, those measures should be applied, to the extent possible, through existing legal and administrative mechanisms that require little or no additional rule-making or legislation at either the state or local level.
- ✓ **Leadership** – The Town of Carrboro, Town of Chapel Hill, Orange County, and OWASA should lead by example in implementing cost-effective water conservation

measures within their own facilities and operational practices to the greatest possible extent.

Potential Conservation Strategies for Consideration By Local Governments

OWASA staff provided the Workgroup an initial listing of several potential non-regulatory and regulatory strategies for joint consideration by the Towns, County and OWASA. Those include:

Non-Regulatory Strategies

- ✓ Water use audits, leak detection and repairs, and cost-effective fixture retrofits at public facilities;
- ✓ Voluntary use of increased water use efficiency measures in new government facilities and in renovations of existing facilities; and
- ✓ Voluntary certification program for water efficiency in new development and renovations.

Regulatory Strategies

- ✓ Requirements for sustainable landscaping;
- ✓ Requirements for plumbing fixture retrofits at time-of-sale of property or change of use;
- ✓ Requirements for increased water efficiency in new development;
- ✓ Requirements for water use audits and leak detection and repairs for water users exceeding some specified threshold of use; and
- ✓ Requirements for extensions of and connections to the planned reclaimed water system.

Some of the above regulatory strategies would require new authority, while it may be possible to implement others through conditions of service and/or existing development review and approval procedures.

Staff recognizes that the Towns, County, and OWASA will need to evaluate the feasibility of these strategies based on factors such as jurisdictional policy objectives and priorities, implementation and/or enforcement costs, community acceptance and public information/education needs, and the legal authority of the local governments and/or OWASA to adopt requirements relating to such measures.

The following section presents a discussion of each strategy, who is using it, how it is implemented, the cost and staffing requirements, and a general indication of the potential water savings.

Non-Regulatory Options

1. Water Use Audits, Leak Detection and Repair, and Fixture Retrofits at Public Properties

What is the Concept? An excellent way for local governments to help conserve water while setting an appropriate public example is to conduct water use audits of their own principal water-using facilities, and to repair leaks and retrofit older plumbing fixtures and irrigation systems with new water-efficient models and practices. Audits help the customer achieve the maximum water savings possible, to find energy and other cost saving opportunities, and to identify the most cost-effective and practical conservation management practices to implement.

Who Is Using This Strategy? Many communities across the country conduct water use audits of their own facilities. Many also offer water audit services for their customers. Some also even mandate audits for certain high volume users.

Many local governments have undertaken plumbing fixture retrofit projects at their own facilities.

The City of Houston, Texas completed a special audit and retrofit program at a public housing development in the city. Tucson, Arizona periodically conducts self-administered water audits of City facilities.

How Is the Strategy Implemented? A water use audit is a service in which a trained conservation professional performs a complete review and inspection of all water fixtures, processes, water leaks, and water use practices on a site and makes site-specific recommendations on actions that can be taken to improve water use efficiency at the property. Some audit programs include the on-site installation of conservation measures at the time of the audit (e.g., faucet aerators, toilet and urinal valve retrofits). Trained staff or a competent contractor would be needed to perform water use audits.

Some communities have established landscape water use audit programs designed to improve irrigation efficiency and watering practices. Trained auditors identify low-cost improvements, such as aligning sprinkler heads, replacing broken heads and repairing leaks, and trimming grass that disrupts spray patterns. The detailed audit includes an evaluation of the precipitation rate, distribution uniformity, grass type, root depth, and soil type.

The auditor prepares a customized report on the findings and recommendations, including projected water savings, and benefit/cost analysis for recommended measures.

Based upon findings of the water audit and/or other evaluations, the customer then considers replacing less efficient plumbing fixtures with water saving devices where feasible and cost-effective. Water leaks should be repaired as quickly as possible.

(In accordance with our local water conservation ordinance, leaks and water waste must be corrected within ten days notice from OWASA.)

Once the recommended measures are implemented the customer's water use is then tracked over time and periodically reviewed to assess the effectiveness of the audit program.

Some communities hire and train individuals from diverse cultural backgrounds to conduct the water audits and implement conservation programs in neighborhoods that would be expected to have below average participation rates.

How Much Water Might the Strategy Help Us Save? Water audits and plumbing fixture retrofit projects have been reported to have a wide range of water savings, depending on the age of the facility and plumbing fixtures, the level of occupancy and activity at the facility, and other factors. Some communities have reported that an average indoor water savings of ten percent appears to be a reasonable expectation for water use audits that include measure(s) installation.

One utility has reported that high volume and/or complex water users can achieve a minimum of 25 percent reduction in water use by implementing the recommendations of a complete audit.

Other communities have reported that irrigation system audits can generally result in water savings of up to 15 percent for business and residential irrigation systems.

The City of Houston achieved a 72 percent savings in water use, and a corresponding 79 percent reduction in monthly water and sewer charges when it audited and retrofitted a low income housing development with water-efficient plumbing fixtures.

The owners and property manager of Cedar Court Condominiums in Carrboro recently completed a very successful water conservation retrofit project that reduced water use, and water and sewer utility charges, by about 35 percent. This was accomplished through leak detection and repairs, installation of ultra low-flush toilets, low flow showerheads and faucets, and installation of water-saving clothes washers in the common laundry. The cost of the retrofits was about \$15,000. The annual savings are estimated to be about \$7,000 which is a payback of 2.1 years and a 48 percent annualized return on the conservation investment.

What are the Program Costs and Staffing Requirements? Two utilities have reported that the cost to conduct water audits for commercial/institutional/industrial (C/I/I) users range from \$1,000 to \$10,000 per customer. One utility reports that a single auditor can perform an average of 50 C/I/I audits in a year. Another possible approach could be the use of performance contractors to conduct the audits.

2. Continue to voluntarily incorporate increased water use efficiency measures in new government facilities and in renovations of existing facilities

What is the Concept? An important trend that will affect future water demands for new development is the “Green Building” movement. Green building developments incorporate advanced water and energy use efficiency measures, the use of natural, renewable and recycled materials in construction and building operations, and other eco-friendly practices.

Carrboro, Chapel Hill, Orange County, OWASA, and the Chapel Hill-Carrboro City Schools have been leaders in promoting sustainable building design and construction. There are several excellent local examples of government facilities that incorporate sustainable design and building practices, including water conservation.

The Town of Chapel Hill’s new Operations Center has a rainwater harvesting system that captures and uses stormwater from the site for toilet flushing and irrigation. The School System has installed similar systems at several schools and is including them in new school construction projects. The new Carrboro High School will also use harvested rainwater for cooling water make-up.

Orange County has drafted an “Orange Turning Green” report that includes developing and implementing a set of green building standards , including water use efficiency measures, for both public and private development.

To the extent possible, local governments should continue to incorporate state-of-the-art water use efficiency measures in new and renovated facilities.

Who Is Using This Strategy? The federal government, many states, and numerous cities throughout the country require new public buildings to meet the U.S. Green Building Council’s *Leadership in Energy and Environmental Design (LEED) Standards*, or other similar sustainable building performance standards.

How Is the Strategy Implemented? Federal, state and local governments have adopted official policies and regulations that require all public buildings to meet certain sustainable building standards or guidelines.

How Much Water Might the Strategy Help Us Save? Indoor water savings for ultra-efficient buildings could save well over 20 percent compared to buildings that simply meet the current plumbing code requirements.

Outdoor water savings could be 50 percent or more.

What are the Program Costs and Staffing Requirements? Program costs and staffing requirements have not yet been quantified.

3. Voluntary certification program for water efficiency in new development and renovations

What is the Concept? Voluntary certification programs involve the establishment of minimum water use efficiency criteria that new or renovated facilities and developments must voluntarily meet to be eligible for certification as a water efficient facility or development.

To be considered for certification, the site and uses would have to be designed, built, and operated in a manner that minimizes the undesirable impacts on the natural water cycle. The building should respect the natural features of the site, take advantage of nature's own water supply (precipitation), use water as efficiently as possible, reuse water where possible, and help maintain the quality of water leaving the site.

Such a program would enable local governments, OWASA and other partnering agencies and organizations to proactively promote total water cycle management from the inception of a new project.

When compared to traditional buildings that are built to current building codes, "waterwise" buildings:

- ✓ save money on water and sewer utility costs;
- ✓ save money on energy costs for hot water heating;
- ✓ promote good environmental stewardship;
- ✓ reduce greenhouse gas emissions; and
- ✓ should/could be more marketable.

A Draft OWASA "WaterWise Building" Program Concept Paper is included as Appendix C.

Who Is Using This Strategy? "Waterwise" building certification programs have been established at the national, state and local level. Examples are the "Leadership in Energy and Environmental Design (LEED) Green Building Rating System" program implemented by the U.S. Green Building Council; the "WaterWise Display Village" program developed by the Water Corporation of Western Australia (which has given OWASA permission to adapt and use their material); the "EcoBuild" program implemented by the Memphis Light, Gas and Water Division; the "Vermont Builds Greener" program developed by the State of Vermont; the "Green Building Program" of Scottsdale, Arizona; the "Water Smart Contractor" program developed by the Southern Nevada Water Authority; the San Antonio "Welcome H₂ome Package" program; and the "Florida Water Star" program developed by the St. John River Water Management District.

How Is the Strategy Implemented? Waterwise building programs generally include the following:

- ✓ a structured framework for educating developers, builders, landscapers, and others on principles and practices for sustainable water management, including information about how water use efficiency measures can help save money, reduce nonpoint

source pollution, maintain hydrologic balance, protect local and regional surface and ground water resources, and reduce flooding.

- ✓ incentives such as credits or reductions in water and sewer availability fees, and/or expedited plan review, etc. for new development that incorporates state-of-the-art water-efficiency measures.
- ✓ comparative analyses of life-cycle costs for alternate water use efficiency levels in new or existing development.
- ✓ criteria which will be used to rate the water resource sustainability level of participating developments and buildings.
- ✓ information and technology transfer, including documentation of how smart use of water can be accomplished while maintaining and perhaps enhancing the quality of life, and the economy.

As discussed under Regulatory Strategies, an alternative approach would be to mandate compliance with new water efficiency standards as new projects go through the respective land use planning and development approval processes of Chapel Hill, Carrboro, and Orange County, as well as OWASA's plan review and approval process and/or as a condition of service . Under either approach, OWASA could serve as the lead technical agency.

How Much Water Might the Strategy Help Us Save? The potential water savings from a waterwise building certification program will depend on the type and extent of development that participates in such a program, and the specific water use efficiency requirements that must be met to receive certification.

The LEED certification rating system provides:

- ✓ 1 point for projects that reduce potable water consumption for irrigation by 50 percent from a calculated mid-summer baseline case;
- ✓ 1 point if there is no irrigation or if no potable water is used for irrigation;
- ✓ 1 point for on-site wastewater treatment to tertiary standards and infiltration or use of the treated water on-site;
- ✓ 1 point for water use efficiency measures that use 20 percent less water than the water use baseline calculated for the building (not including irrigation) after meeting current plumbing code fixture requirements;
- ✓ 1 point for water use efficiency measures that use 30 percent less water than the calculated water use baseline.

If a certification program followed the baseline LEED standards for water use efficiency, indoor water use savings could be expected to be at least 20 percent, and outdoor savings 50 percent or more.

What are the Program Costs and Staffing Requirements? The program costs and staffing requirements for a voluntary waterwise certification program have not yet been determined.

Regulatory Options

1. Sustainable Landscaping Requirements

What is the Concept? The year-round water use restrictions adopted in 2003 include certain requirements for irrigation of turf and landscapes. However, our local conservation ordinances do not address the broader need to ensure proper design of the landscape, preparation of the soil, selection of plants, design and maintenance of irrigation systems, etc. Sustainable landscaping requirements are intended to ensure that landscape and irrigation systems design, installation, and maintenance practices are much more water efficient than traditional landscaping and irrigation methods.

Such practices not only save water – they can reduce costs, result in aesthetically pleasing landscapes, and protect our natural resources by reducing the use of pesticides and fertilizers and the associated nonpoint source pollution impacts on receiving waters.

To address a related issues, some states (such as Colorado) and communities have enacted laws that prohibit developers or homeowners associations (HOA) from requiring property owners to maintain a certain amount and/or type of turf grass or prohibiting them from using drought tolerant plants and sustainable landscapes. Under an ordinance approved by Castle Rock, Colorado, directors of HOAs could face a \$1,000 fine and possible arrest if they penalize homeowners that use drought tolerant plants and less grass.

In our community, there have been reports that some HOA restrictions and covenants may limit or prohibit property owners' efforts, including the installation of rainwater harvesting systems.

(There is a parallel example of state action to address a similar issue in North Carolina. During the 2007 Session, the North Carolina General Assembly enacted Session Law 2007-279 (Senate Bill 670) which prohibits laws, deed restrictions and covenants that would prohibit or have the effect of prohibiting the installation of solar collectors on detached single family residences. Similar legislation may be needed to prohibit restrictions on the use of sustainable landscaping practices and rainwater harvesting systems.)

Who Is Using This Strategy? Sustainable landscaping requirements are a commonly-used conservation strategy, and are in place in many communities around the country. Some states, including Florida and California, have enacted statewide legislation relating to sustainable landscaping requirements. At least two communities in North Carolina – Cary and Salisbury – have enacted sustainable landscaping ordinances.

How Is the Strategy Implemented? Examples of some commonly-found provisions in sustainable landscaping requirements are listed below. The specific elements of any potential requirements within the OWASA service area would be tailored to the specific needs and applicable conditions of our community.

- (a) Landscape conservation plans for new development and construction, and for redevelopment projects must be submitted for local approval to ensure that new and modified landscaping conforms to the requirements.
- (b) Turf grass must be a water-conserving species appropriate for the region.
- (c) The amount of irrigated turf that may be installed in a new landscape is limited to a specified area (in square feet and/or in the maximum percentage of landscaped area that can be in turf). Parks, playgrounds, athletic fields, etc. may be exempted from the turf area limitations.
- (d) The soil must be prepared and improved prior to landscaping (some communities require up to six cubic yards of organic matter to be incorporated for every 1,000 square feet of landscaped area).
- (e) Landscaped areas must be mulched to certain depths to retain moisture and reduce watering needs.
- (f) Soil moisture sensors and rain sensors with automatic system override capabilities must be installed on all irrigation systems. (*This is already required under our local water conservation ordinance.*)
- (g) Only subsurface irrigation systems can be used in landscaped areas adjacent to impervious surfaces.
- (h) New sprinkler heads must be located at least eight inches from a curb or impervious surface.
- (i) No overhead spray irrigation systems can be installed in median strips, areas between sidewalks and streets or paved areas, or other similar sites where the landscaped area is less than ten feet wide.
- (j) Irrigation systems must be designed to prevent overspray, ponding, and runoff of irrigation from the site. The system must also be designed to minimize free flow conditions in case of damage to the pipe, sprinkler heads, mechanical failure, etc.
- (k) Irrigation systems must be designed to separately serve turf and non-turf areas.
- (l) Permanent irrigation systems must have a separate irrigation-only water meter to be installed.
- (m) Plants having similar water use/irrigation demand shall be grouped together in distinct hydrozones.
- (n) Irrigation systems shall use reclaimed water where possible. Where reclaimed water is currently unavailable, irrigation systems must be designed to be readily connected, and shall be required to be connected, to the reclaimed water system when service is available to the property.
- (o) When an irrigation system is installed, the system designer/installer is to provide the property owner with:

1. Construction drawings, manufacturer's operational guides, and instructions on how to operate the system and shut-off the water;
 2. a monthly irrigation schedule that includes recommended run times (in minutes/cycle), cycles per day, and frequency of irrigation;
 3. an estimate of the recommended amount of water to be applied on a monthly and annual basis (in 1,000s of gallons). Such information is to be included in the landscape plan submitted to the local government; and
 4. a description of and recommended schedule for preventive maintenance of the irrigation system.
- (p) Irrigation system audits must be conducted at specified intervals for systems meeting certain thresholds (such as the size of the irrigated area or the total annual volume of water used for irrigation).

How Much Water Might the Strategy Help Us Save? Irrigation and the care of landscapes is an important target for water efficiency, particularly since water use for these purposes contributes to peak season and peak day water demands. The EPA WaterSense Program, the Rocky Mountain Institute, and the NC Cooperative Extension Service report that proper landscaping and watering practices can reduce landscape watering needs by 20 percent to 50 percent without adversely affecting the health of the lawn. Sustainable landscaping can also reduce the need for fertilizers and pesticides and lawn mowing, thereby reducing pollutant runoff to streams as well as greenhouse gas emissions.

During the 2002 drought, landscape irrigation accounted for a substantial amount of OWASA's water demand. An analysis of billing records indicated that the highest levels of single family residential water use occurred in a number of new neighborhoods with extensive grassed lawns and other landscaping. Water use at those homes declined substantially *only after* all outdoor water use *was prohibited*.

What are the Program Costs and Staffing Requirements? The program costs and staffing requirements have not yet been quantified.

2. Requirements for Plumbing Fixture Retrofit-on-Sale or Change of Use

What is the Concept? Retrofit-on-sale requirements mandate property owners to retrofit existing older buildings with ultra low flush toilets (ULFTs), low-flow showerheads and faucet aerators, and other water-saving fixtures as a condition of the sale, transfer of ownership, or change of use of a building.

The National Energy Policy Act of 1992 requires that water saving plumbing fixtures be used in all new construction and building renovations as of January 1, 1994. As homes and buildings are remodeled and renovated, the pre-1994 housing and building stock in the OWASA service area will over time be “naturally” and passively upgraded with the same water-saving fixtures that are currently required in all new buildings.

The expected water savings can be achieved much sooner if the process of retrofitting older less water efficient homes and buildings is accelerated through regulation and/or financial incentives.

Who Is Using This Strategy? Retrofit-on-sale requirements have been adopted by a number of communities in California, and by a few other communities in the U.S. and abroad. Table 1 summarizes some of the features of retrofit-on-sale programs enacted by several communities in California. California is a “home-rule” state in which local governments have broad powers and authorities to adopt local policies and ordinances.

It is very likely that local governments and water and sewer authorities in North Carolina would need to seek and acquire state enabling legislation before implementing this type of program.

How Is the Strategy Implemented? Retrofit-on-sale programs typically require the seller to ensure that the building being sold or transferred meets or exceeds the current water saving plumbing fixture flow requirements. Buyers sign a Notification/Disclosure Form acknowledging awareness and understanding of the requirements. Fixture change-outs must be completed as a condition of the property transfer. The seller must submit a certificate demonstrating compliance with the requirements; however, as an alternative, in many communities the buyer is permitted to accept responsibility for completing the required plumbing fixture retrofits. If the buyer assumes responsibility for compliance, a deposit must be made to the utility from the proceeds at the time of sale, and is refunded once the installation of water-saving fixtures has been completed and verified.

Some communities have applied retrofit-on-sale requirements only to residential properties, while others have also required retrofit-on-sale or change of use for non-residential properties.

An example of a retrofit-on-sale ordinance is included as Appendix D.

Oftentimes, communities that enact retrofit-on-sale requirements also offer their customers financial incentives for the installation of water-saving plumbing fixtures. This helps to increase public acceptance of the mandatory retrofit requirements.

How Much Water Might the Strategy Help Us Save? OWASA’s 2001 *Comprehensive Water and Sewer Master Plan* provides estimates of projected system-wide “passive” water savings (savings that are expected to occur without any specific action by OWASA). Most of the passive water savings are expected to result from the installation of more water efficient plumbing fixtures in new construction and as existing buildings are renovated. Passive conservation savings are projected to reduce the community’s raw water demand by 3.4 million gallons per day by 2050.

The OWASA Master Plan provided the following estimates of the general age category of single family and multi-family residential units built before 1994:

Year Built Range	Single Family Units	Multi-Family Units
Pre-1980	5,600	7,810
1981 – 1993	3,660	4,520

Based on “*Handbook of Water Use and Conservation*” (Vickers, 2001), it is estimated that retrofitting toilets, showerheads, and faucets in a typical single family home built before 1980 could save about 118 gallons per day per unit. Retrofitting a home built between 1980 and 1993 could be expected to save about 37 gallons per day.

What are the Program Costs and Staffing Requirements? Table 1 provides some limited information about staffing levels for retrofit-on-sale programs in a few other communities.

Potential program costs have not yet been evaluated. (Costs would be substantial if financial incentives are required to be provided for customers that install water-saving plumbing fixtures.)

TABLE 1 - Summary of Retrofit-on-Resale Programs

Agency	Description of Requirements	Process	No. of staff	Do they Inspect Properties?	Have Incentives Programs?	Comments
City of Los Angeles	All properties must retrofit at time of sale. Residential must replace toilets and showerheads; Commercial must replace showerheads and fit toilets with flush reduction devices.	Certificate of Compliance signed by owner, buyer and qualified inspector. No extensions allowed. Not required for customers outside the city limits.	Five customer service reps process paperwork, along with other duties.	No	Yes. They have a free ULFT distribution program and a \$100 toilet rebate program.	Would like to have more staff so that they would be able to inspect properties. Needed to work with the realtors. Fines up to \$1000.
City of San Diego	All properties must be retrofit at time of sale if toilets are larger than 3.5 gpf, urinals over 1.0 gpf, showers over 2.5 gpm, and sinks more than 2.2 gpm. Reverse osmosis systems must have shut-off valves.	Water Conservation Certificate signed by the buyer and seller required. Buyer can transfer the responsibility for the retrofit to buyer: Must file Transfer Certificate at time of sale and WCC certifying retrofit within three months.	One person does all the paperwork. (Staff of three for all conservation programs.)	No	Yes. They have a \$75 toilet rebate program.	A \$10 filing fee is required. They are considering increasing the fee.
City of San Francisco Water Dept.	Residential properties must be retrofit to 2.5 gpm showers, faucets need aerators, and 1.6 gpf toilets upon change of title, major improvement, condominium conversion, or within ten years of the passage of the ordinance which is pending at this time.	Inspection form provided by building department and completed by qualified inspector. Certificate of compliance required—must be signed and recorded with the SF PUC.	Not operational yet.	No	Yes, \$50 toilet rebate program and at \$10 toilet distribution program.	Ordinance has not passed yet. Could be passed in Jan. 01. Ordinance goes into effect 5 years after passage. Properties that do not do this will be charged a higher rate for water.
City of San Luis Obispo	All properties sold, remodels, additions, or change of use, must be retrofitted with 2.5 gpm showers, 2.2 faucets, 1.0 urinals, and 1.6 gpf toilets.	Conservation Certificate required.	One, he also works on other programs. Three people in department.	Yes, some random inspections with contractors, then he gives them a certificate to give realtors. Inspects all of the ones not installed by contractors.	A free showerhead program. Toilet rebate of \$100 per bathroom; Offset program for development provides toilets free.	Realtors did not like it at first. You need to act quickly when they call so they are satisfied. Recommends having recommended brands that keep people buying good toilets.

Agency	Description of Requirements	Process`	No. of Staff	Do they inspect Properties?	Have Incentives Programs?	Comments
City of Santa Monica	All properties must retrofit before change of ownership. ULFTs, urinals at 1.0 gpf, 1.0gpf urinals, showers and faucets 2.5 gpm, Reverse osmosis water filtration systems must have shut off valves.	Compliance Certificate required at escrow; proof or purchase or inspection required. Certificate issued after inspection verifies the retrofit.	Two full time.	Yes, all transfers are inspected, unless the City's direct install contractor has installed the toilet. Repeat transfers are inspected.	Toilet Rebate and direct install program, City selected contractors install toilets for \$35.	Failure to comply is a misdemeanor.
Marina Coast Water District	All properties must retrofit to 1.6 gpf toilets, 2.5 gpm showers at time of transfer of property, new additions/remodels, and commercial change of use.	Conservation Certification form required at time of sale.	1 full time conservation person does all programs.	Yes, all properties are inspected.	Toilet rebate available.	Failure to comply results in fines of up to \$50, termination of water or a fee of four times the regular water rate wasted. They are in the process of making this tougher.
Monterey County Water Resources Agency	Requires retrofit of toilets to 1.6 gpf and showers to 2.5 gpm upon sale of residential & commercial property, or commercial change of use. Required mandatory retrofit of all visitor serving facilities with 1.6 gpf toilets and 2.5 gpm showers by Dec 31, 2000.	Certificate of compliance required.	One person handles paperwork along with other duties.	No	No	Allows penalties of \$50 per day for 12 months, and \$100 per day after that.
Monterey Peninsula Water Management District	All properties must retrofit to 1.6 gpf toilets, 2.5 gpm showers, 2.2 gpm faucets at change in ownership, remodels or 25% or bathroom additions, and commercial change in use.	Inspection and Certification form required. Seller calls MPWMD for verification inspection, gets inspection report, and submits to buyer. Seller and buyer both sign the Water Conservation form. Buyer can get 120 day extension for retrofit.	Two, process paperwork and do inspections.	Yes, all properties, including subsequent property transfers.	Toilet Rebate available prior to change in ownership	Need to respond quickly to realtors. Realtors make the program happen. Places liens on property if not in compliance.

Agency	Description of Requirements	Process	No. of staff	Do they Inspect Properties?	Have Incentives Programs?	Comments
Marin Municipal Water District	Requires retrofit of toilets over 1.6 gpf and pressure regulation devices at the time of change in ownership of residential, hotels/motels and properties built for shelter or housing.	Seller and District inspector sign a Certificate of Compliance. A 20% surcharge based on the annual water bill is added to buyers monthly water charges if not in compliance six months after escrow.	Program not in effect yet.	Yes	They offer a \$75 rebate, which will end when the Retrofit on Change of Ownership law goes into effect, June 1, 2002.	Program started June 1, 2002. Commercial and industrial properties not affected.
City of Santa Cruz	Retrofit of toilets over 1.6 gpf and showerheads over 2.5 gpm at time of sale. Applies to residential, commercial, and industrial properties.	Seller must complete a Disclosure form, complete all retrofits, and sign the Water Conservation Certification. Failure to comply can result in civil penalties up to \$250 per fixture.	1	Yes. Licensed plumbing contractor can certify compliance.	\$75ULFT rebate available.	Program started March 1, 2003.

3. Requiring Increased Water Use Efficiency in New Development

What is the Concept? OWASA could require increased water use efficiency as a condition of service, and/or local governments could strongly support the incorporation of increased water use efficiency measures into new development plans. Conservation opportunities could be realized through more water efficient landscape design, installation of ultra low-flow plumbing fixtures, rainwater harvesting and bio-retention measures, use of reclaimed water where feasible, and other measures.

Who Is Using This Strategy? As of May 30, 2007 Soquel Creek Water District in California has required the installation of high efficiency toilets (1.28 gallons per flush or less) in new developments and retrofits of existing buildings. The District also requires new development to offset the amount of water the new development is projected to use so that there will be a “zero impact” on the District’s water supply.

The Town of Chapel Hill’s policy to promote energy efficiency and energy management planning in rezoning and Special Use Permit applications is an example of such an approach. Under that policy, developers are requested to incorporate a “20 percent more energy efficient” feature into their plans, and to consider sustainable energy strategies in the proposed development.

(In October 2007 California enacted a law requiring that by 2014, all new toilets installed are to have a flush capacity of 1.28 gallons or less, compared to the current National Energy Policy Act requirement of 1.6 gallons or less.)

How Is the Strategy Implemented? The active review, influence and/or control on water efficiency measures in new development and redevelopment could be accomplished through:

- (a) adoption of water use efficiency standards that are more conserving than current plumbing code requirements, as Soquel Creek Water District has done. Such standards could be pre-requisite conditions for receiving service from OWASA and/or
- (b) recommended or required conditions as part of the rezoning, Conditional Use Permit, Special Use Permit, or other approval processes by the agency with development plan approval authority.

How Much Water Might the Strategy Help Us Save? Increased water efficiency standards and requirements could reduce indoor water use in new buildings by more than 20 percent compared to buildings that simply meet the current plumbing code requirements.

Outdoor water use efficiency measures could reduce outdoor water use by more than 50 percent.

What are the Program Costs and Staffing Requirements? Program cost and staffing requirements have not yet been estimated.

4. Mandatory Requirements for Water Audits and Leak Detection and Repair Programs

What is the Concept? Mandatory water use audits are one important tool that can be used to assess water use practices at targeted facilities, and to identify the most cost-effective and practical conservation management opportunities at those facilities. Mandatory audits are usually required only for large volume water users.

Who Is Using This Strategy? Mandatory audits are required in a few communities. San Jose, California once required large volume users (over 100,000 gallons per day) to do water audits at their facilities. In 2006, Victoria, Australia approved a requirement for the 250 largest users of water and energy to complete audits of their water and energy use.

How Is the Strategy Implemented? Local governments and/or water utilities mandate water use audits through local requirements or utility service regulations. Audit services may be provided by local government staff, or by a private firm.

A trained conservation professional performs a complete review and inspection of all water fixtures, processes, water leaks, and water use practices on a site and makes site-specific recommendations on actions that can be taken to improve water use efficiency at the property. Some audit programs include the on-site installation of conservation measures at the time of the audit (e.g., faucet aerators, toilet and urinal valve retrofits). Trained staff or a competent contractor would be needed to perform water use audit.

Some communities require audits of landscape irrigation systems exceeding a certain size threshold, such as the amount of irrigated area or annual volume of water used. Trained auditors identify low-cost improvements, such as aligning sprinkler heads, replacing broken heads and repairing leaks, and trimming grass that disrupts spray patterns. The detailed audit includes an evaluation of the precipitation rate, distribution uniformity, grass type, root depth, and soil type.

The auditor prepares a customized report on the findings and recommendations, including projected water savings, and benefit/cost analysis for recommended measures.

Based upon findings of the water audit and/or other evaluations, the customer then considers replacing less efficient plumbing fixtures with water saving devices where feasible and cost-effective. Water leaks should be repaired as quickly as possible.

(In accordance with our local water conservation ordinance, leaks and water waste must be corrected within ten days notice from OWASA.)

Once the recommended measures are implemented the customer's water use is then tracked over time and reviewed to assess the effectiveness of the audit program.

Some communities hire and train individuals from diverse cultural backgrounds to conduct the water audits and implement conservation programs in neighborhoods that would be expected to have below average participation rates.

How Much Water Might the Strategy Help Us Save? Water audits and plumbing fixture retrofit projects have been reported to have a wide range of water savings, depending on the age of the facility and plumbing fixtures, the level of occupancy and activity at the facility, and other factors. Some communities have reported that an average indoor water savings of ten percent appears to be a reasonable expectation for water use audits that include measure(s) installation.

Other communities have reported that irrigation system audits can generally result in water savings of up to 15 percent for business and residential irrigation systems.

One utility has reported that high volume and/or complex water users can achieve a minimum of 25 percent reduction in water use by implementing the recommendations of a complete audit.

The City of Houston achieved a 72 percent savings in water use, and a corresponding 79 percent reduction in monthly water and sewer charges when it audited and retrofitted a low income housing development with water-efficient plumbing fixtures.

As noted previously, a water fixture retrofit program completed at an older condominium project in Carrboro resulted in a 35 percent reduction in water use, and a corresponding savings in water and sewer charges.

What are the Program Costs and Staffing Requirements? Two utilities have reported that the cost to conduct water audits for commercial/institutional/industrial (C/I/I) users range from \$1,000 to \$10,000 per customer. One utility reports that a single auditor can perform an average of 50 C/I/I audits in a year

5. Reclaimed Water System Connection Requirements

What is the Concept? Reclaimed water systems enable the beneficial use of highly treated wastewater for certain non-drinking purposes such as irrigation, street sweeping, dust suppression and soil compaction, cooling tower and boiler water make-up, toilet flushing, and other uses allowed by State regulation. The use of reclaimed water can reduce potable water demand, thereby reducing the community's risk to droughts and freeing up water supply and treatment capacity to meet essential water needs.

Reclaimed water system connection requirements establishes rules and regulations for extensions and connections to, and use of water from a reclaimed water system.

OWASA and the University of North Carolina at Chapel Hill are jointly developing a reclaimed water system that will initially serve the University's main campus. However, the system will be expandable to serve other customers where it is practical. The system is expected to be in operation around March 2009. OWASA and the University are also discussing the potential feasibility of developing a second reclaimed water system to serve the Carolina North project and surrounding areas.

The local governing boards and OWASA should consider requiring new developments to install reclaimed water pipes where feasible to achieve the maximum use of reclaimed water within the OWASA service area. Such a requirement would be similar to existing local requirements that mandate connections to the public water and sewer systems.

When new developments are not currently served by a reclaimed water system, but such service is anticipated to be available in the future, the developer could be required to install a "dual" piping system to facilitate future connection and use of reclaimed water. In the interim, potable water would be supplied through the reclaimed water piping.

Who Is Using This Strategy? Many communities in the country, and particularly in Florida, California and the Southwestern U.S., have enacted reclaimed water requirements. The Town of Cary has adopted perhaps the most comprehensive reclaimed water ordinance in North Carolina, and requires dual distribution systems to be installed in new developments that are currently or expected to be served by the Town's reclaimed water system. A copy of Cary's reclaimed water ordinance is included as Attachment E.

How Is the Strategy Implemented? Key provisions that are typically included in reclaimed water requirements are:

- (a) description of the allowable uses of reclaimed water;
- (b) requirements for new development to connect to the existing reclaimed water system or to extend the system where practical;
- (c) requirements for developers to install "dual" distribution piping to facilitate the future use of reclaimed water within the development;

- (d) provisions for property owners to apply for permission to use reclaimed water;
- (e) requirements for all new irrigation systems and other non-potable water uses to connect to the reclaimed water system if service is available;
- (f) requirements for existing irrigation systems to be disconnected from the potable water system if and when reclaimed water service is available; and
- (g) requirements for the conservation of reclaimed water.

How Much Water Might the Strategy Help Us Save? The reclaimed water system that will initially serve the main campus area will reduce the community's drinking water demands by about 0.57 mgd, or six percent, when it is placed into operation. That savings may increase to nearly 2 mgd, or 14 percent of the community's water needs, upon buildout of the main campus.

What are the Program Costs and Staffing Requirements? The University is paying all of the cost (more than \$10 million) to construct the reclaimed water system that will initially serve the main campus.

It is likely that there would be only limited incremental costs to implement reclaimed water requirements. Just as OWASA has the responsibility and authority for review and approval of extensions and connections to the public water and sewer systems, consideration should be given to having OWASA assume parallel responsibilities for the reclaimed water system. However, OWASA's enabling legislation may need to be revised to specifically address this.

PART IV

Key Observations and Recommendations

After considerable study and discussion of the various water conservation practices and program options described within this report and their respective potential feasibility and/or applicability for inclusion in our community's local water supply management strategy, the interlocal staff workgroup committee offers the following observations, conclusions and recommendations.

Observations

- ✓ The community's water conservation strategies developed in response to the 2001-2002 drought of record have resulted in lower customer demands, including peak-day demand, compared to pre-2002 demand levels.
- ✓ The ongoing exceptional drought of 2007 has again reminded us of the vulnerability of our water supplies to extended drought. That vulnerability will increase as our community's demand for water increases. Fortunately, we have some lead time to select and develop specific water use efficiency strategies that will comprise our community's long-term conservation and demand management plan.
- ✓ Our community has begun to meet the challenge of increasing its water use efficiency through a variety of approaches, such as individual residential conservation practices, more efficient utility management practices, implementation of the local water conservation ordinances, adoption of the seasonal rates, and active public education and outreach efforts.
- ✓ The October 1, 2007 implementation of OWASA's new inverted block rate structure for individual residential customers will further strengthen conservation pricing signals and promote conservation by rewarding low use and discouraging excessive use.
- ✓ The reclaimed water system project being undertaken in partnership with the University is a major commitment that will reduce long-term demands for drinking water.
- ✓ There is uncertainty as to the inter-related dynamics of and variables affecting a long-term demand management strategy. These include response to the new rate structure and water price elasticity, rate of updates of older buildings and homes, new and developing technologies, new development/density demands, among others. This supports the need to carefully and deliberately select the most effective and appropriate options for achieving the next increment of desired reduction.
- ✓ Whatever measures, practices and/or policies are ultimately selected for implementation, they should be flexible, adaptive and commensurate with the desired additional reduction. They should also be consistently applied throughout the OWASA service area.

Recommendations

Based upon the proposed *Goals* and *Guiding Principles*, the interlocal staff workgroup recommends that the local governing boards and OWASA consider the following:

- ✓ Undertaking pilot demonstration water use efficiency projects at public facilities. The results and feedback of these pilot projects could provide important lessons and more accurate information regarding expectations, financial and staff resource needs, and effectiveness of the various measures or programs.

Examples of such projects might initially include:

- Collaboration between OWASA and the Chapel Hill Public Housing Authority (CHPHA) to facilitate the retrofit of about 350 public housing units with water efficient fixtures (such as was done by the City of Houston). OWASA staff has made initial inquiries regarding the possibility of obtaining high efficiency toilets (1.28 gallons per flush) at a discounted cost for this potential demonstration project. This project would not only save water – it would reduce the water and sewer costs for the CHPHA and occupants of the public housing units that are customers of OWASA.
 - OWASA Board of Directors should consider an Availability Fee Water Conservation Credit program for new development where a builder/developer could voluntarily certify that the building or development meets certain prescribed water efficiency standards in exchange for a reduced availability fee and/or expedited review and permit process.
 - Local Governments should lead by example by initiating water use audits, leak repairs and retrofits at key existing public facilities. For new public buildings, local governments should plan, design, and build public facilities to achieve the greatest and most cost-effective water efficiency practical.
 - The University should continue its progressive approach to water use efficiency as demonstrated by its Carolina North design principles.
- ✓ Selecting which of the non-regulatory and regulatory strategies are considered acceptable, and direct staff to develop specific implementation proposals, including a schedule and assessment of financial and staff resources needed to implement the strategy.
 - ✓ Determining the need for and benefits of pursuing specific enabling legislation directly related to the implementation of selected water conservation strategies that are presented in this report, and that may be needed to achieve our community's long-term water conservation and demand management goal and objectives.

ACKNOWLEDGMENTS

OWASA hereby expresses appreciation to contributions of time, interest, expertise and participation provided by the following in the preparation of this report:

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Board of Aldermen

Staff: Will Autry (no longer with Carrboro)
Randy Dodd
Patricia McGuire
Martin Roupe
Roy Williford

Town of Chapel Hill

Town Council

Staff: Curtis Brooks
J.B. Culpepper
Robert Minnick
John Newark
Lance Norris
Gene Poveromo
George Powell
Frost Rollins (no longer with Chapel Hill)
John Richardson
Gordon Sutherland (no longer with Chapel Hill)
Richard Terrell

Orange County

Board of County Commissioners

Staff: Craig Benedict
Glenn Bowles
Mark Danieley
David Stancil

OWASA also sincerely appreciates the comments and suggestions, as well as the conservation commitment – made by many of our customers.

APPENDICES

- Appendix A Goal and Objectives of OWASA's Long-Term Conservation and Demand Management Program**
- Appendix B Local Water Conservation Ordinance**
- Appendix C Draft Concept Paper – WaterWise Building Program**
- Appendix D Retrofit-on-Sale Ordinance - Santa Cruz, CA**
- Appendix E Reclaimed Water Ordinance –Town of Cary, NC**
- Appendix F Local Governments' Real Property Inventories**

APPENDIX A

Goal and Objectives of OWASA's Long-Term Water Conservation and Demand Management Program April 7, 2005

Introduction

The water conservation goal, objectives, and target demands presented below are intended to serve as planning tools for OWASA and the community it serves. The technical basis for this paper will be revisited and updated periodically as additional information becomes available about water supply options, customer demand patterns, climate trends, and so forth. Future OWASA Boards of Directors may choose to modify the *Goal and Objectives* to reflect such new information and/or new policy direction.

Water Conservation Goal:

To develop, fund, and implement a cost-effective water conservation and demand management program that will meet our community's long-term water supply needs (through 2050) by making the highest and best use of our local water resources and eliminating the need for costly new water supply sources and facilities.

Objectives and Targets

1. **Water Supply Sources:** To assure that annual average day raw water demand does not exceed the reliable capacity of OWASA's existing and planned supply sources (Cane Creek Reservoir, University Lake, and the Stone Quarry Reservoir), where "reliable capacity" is the estimated yield of the system under extended periods of low streamflow conditions, such as those that recur approximately once every 30 years, or under more extreme conditions, such as those of the 2001-2002 "drought of record."

To achieve this objective, annual average day raw water demands should not exceed the target limits shown in Table 1.

2. **Treatment, Storage, and Distribution Facilities:** To manage peak day treated water demands in ways that will allow the deferral of major capital projects, such as expansion of the Jones Ferry Road Water Treatment Plant and associated finished water pumping and storage facilities.

To achieve this objective, OWASA's annual peaking factor (the ratio of peak day demand to annual average demand) should not exceed 1.45, and peak day treated water demands should not exceed the target limits shown in Table 2.

Table 1. Raw Water Demands: Projected and Target Levels			
<u>YEAR</u>	<u>CURRENT PROJECTION</u> ^A	<u>TARGET LIMITS</u>	
	Average Day Raw Water Demand (mgd)	Average Day Raw Water Demand (mgd)	
		<i>For 30-Year Drought Event</i>	<i>For Drought of Record (2002)</i>
2010	9.4	9.4	9.4
2015	10.6	10.6	10.6
2020	11.9	11.9	11.7
2025	13.2	13.2	11.7
2030	14.4	13.2	11.7
2035	15.4	19.3	16.8
2040	16.4	19.3	16.8
2045	17.4	19.3	16.8
2050	18.4	19.3	16.8

Shading indicates higher risk of water supply shortfall if severe drought conditions occur at these times

Note A: Current projections were obtained from the Lesser Reuse column of the Raw Water Equivalents portion of the March 28, 2005 version of OWASA's Billed Water, Raw Water, and Peak Day Demand Projections, 2006-2050.

Table 2. Peak Day Treated Water Demands: Projected and Target Levels		
<u>YEAR</u>	<u>CURRENT PROJECTION</u> ^B	<u>TARGET LIMITS</u>
	Peak Day Treated Water Demand (mgd) PF=1.55	Peak Day Treated Water Demand (mgd) PF=1.45
2010	14.5	13.6
2015	16.5	15.4
2020	18.5	17.3
2025	20.5	19.1
2030	22.3	20.8
2035	23.8	22.3
2040	25.4	23.7
2045	26.9	25.2
2050	28.5	26.6

Shading indicates the need to expand OWASA's water treatment plant beyond its present capacity of 20 mgd.

Note B: Current projections were obtained from the Lesser Reuse column of the Peak Day WTP Demand portion of the March 28, 2005 version of OWASA's Billed Water, Raw Water, and Peak Day Demand Projections, 2006-2050.

3. **Cost-Effectiveness and Customer Acceptance:** To promote and implement conservation measures that are cost-effective and acceptable to both OWASA and its customers, with special consideration given to economic, environmental, and social costs and benefits.
- *Cost-effective for OWASA means that a conservation measure will achieve a desired increment of demand reduction for less cost than an equivalent expansion of the water supply system.*
 - *Cost-effective for customers means that a conservation measure will have a payback period of approximately five years or less. Such calculations will consider total capital and maintenance costs, as well as water, sewer, and energy cost savings.*
 - *Acceptable to OWASA's customers means that a conservation measure will sustain the level of service and "quality of life" which OWASA's customers expect. Conservation measures will be promoted primarily through public information, economic incentives, and conservation-based rates.*
4. **Fiscal Impacts to OWASA:** To implement the long-term conservation and demand management program in a timely manner that provides cost benefits to OWASA's customers and minimizes the near-term revenue and cash flow effects caused by reductions in customer demand. This objective will be attained by:
- *Proactively assessing the likely demand, revenue, operating costs, and cash flow effects of a proposed conservation initiative such that short-term revenue impacts and financial uncertainties will be minimized.*
 - *Assigning high priority to supply-side alternatives that have little or no effect on water sales, such as water treatment plant process water recycling, distribution system leak detection, and water main replacement projects.*
 - *Assigning high priority to conservation measures that increase revenues and cash flow, such as meter testing and new conservation-oriented rate structures.*
 - *Phasing in conservation initiatives in order to smooth out any anticipated revenue reductions.*
 - *Explaining to customers the estimated effects of conservation initiatives on OWASA's revenues and rates, as well as the future benefits associated with conservation.*

Key Technical Assumptions

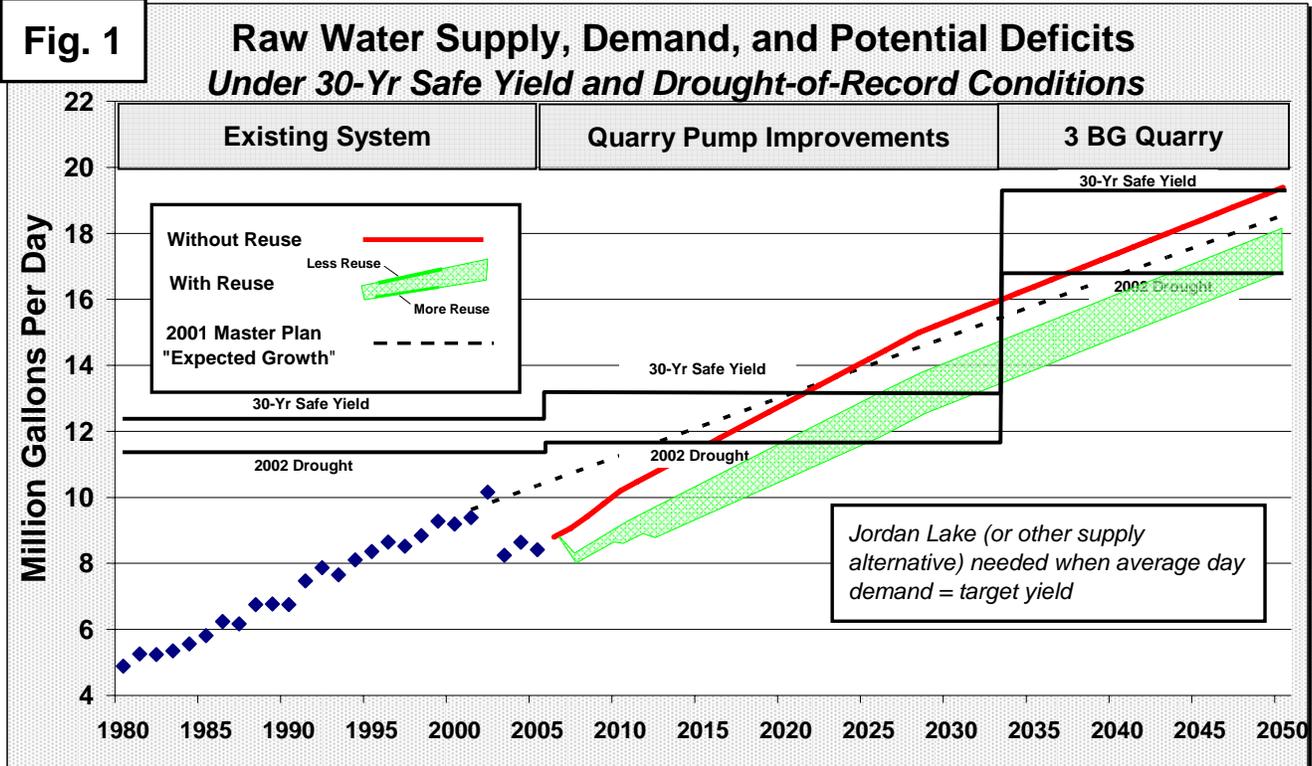
OWASA's water conservation and demand management program is based on the following primary technical assumptions. As noted above, the overall goals, objectives, and implementation plan will be periodically evaluated and adjusted to reflect new and updated information related to these and other assumptions.

1. "Current Projection" water demands will be provided in annually updated demand projection reports. These will reflect reductions expected from the gradual "natural" replacement of

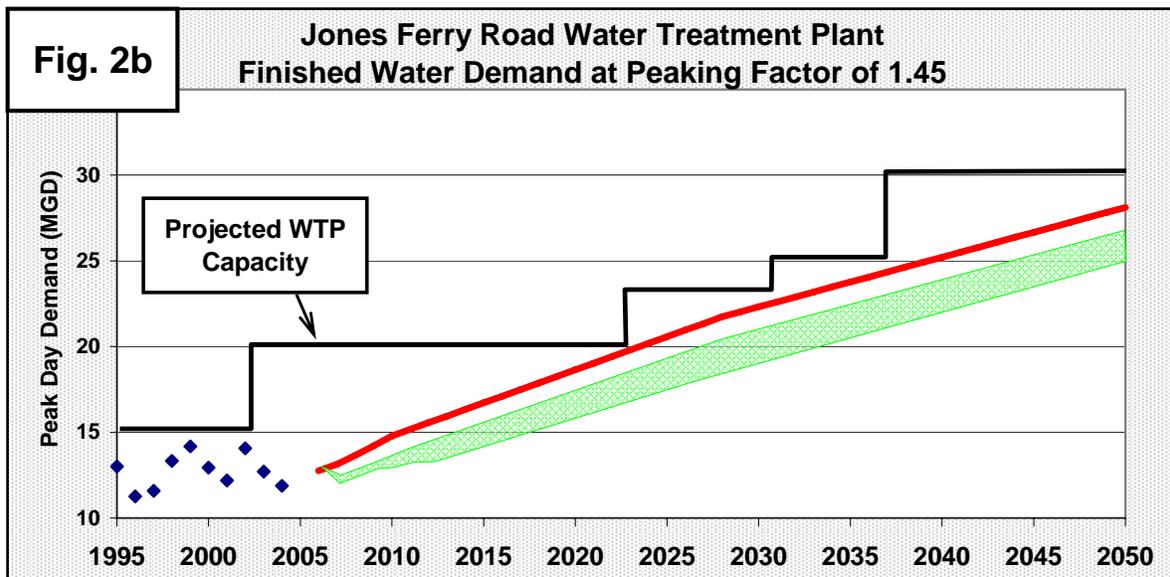
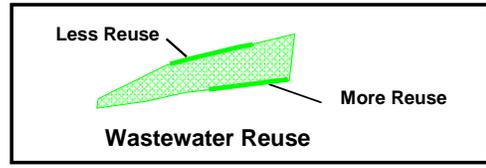
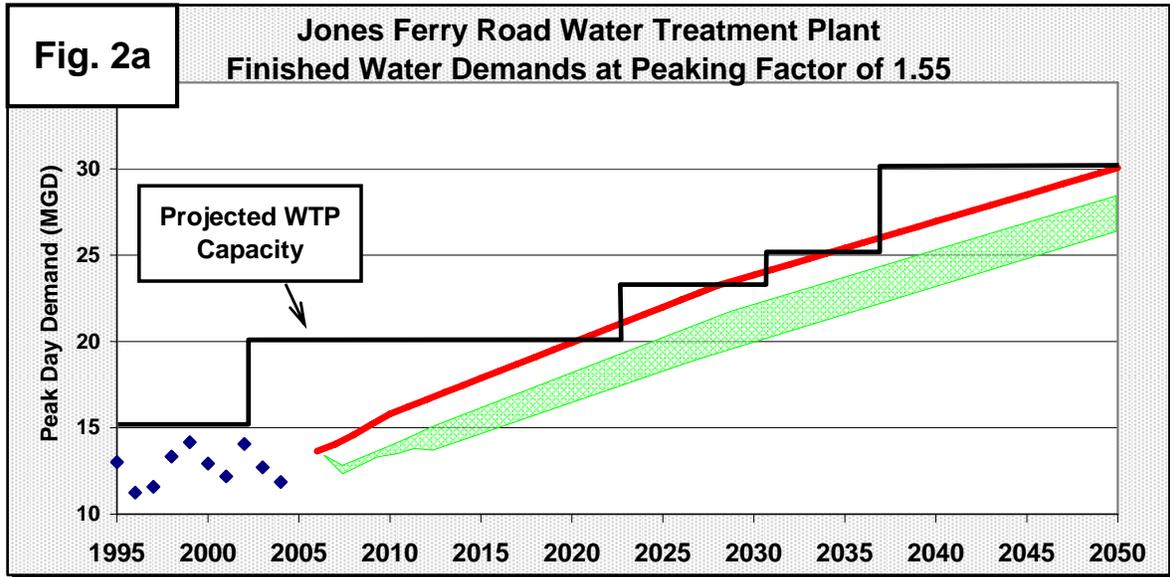
older less efficient plumbing fixtures and technologies, as well as current estimates of wastewater reuse demands and other conservation options.

2. Upon completion of improvements currently underway at the Stone Quarry pumping station, the estimated 30-year safe yield of OWASA's existing supply system will be about 13.2 mgd, or 11.7 mgd under drought of record (2002) conditions. These estimates will be revisited periodically as different model assumptions are analyzed and new information becomes available.
3. The 30-year safe yield of the system after the expanded Stone Quarry Reservoir becomes operational (assumed to be in 2035) will be about 19.3 mgd, or 16.8 mgd under drought of record conditions. As noted above, these estimates will be revisited periodically.
4. The water plant process water recycle system is assumed to be in operation on a permanent basis, which reduces raw water demands by about 8 percent. This will equate to approximately 1.4 mgd by 2050.
5. The water reclamation and reuse system that will initially serve UNC's main campus is assumed to begin operating in 2007, which will achieve an annual average day water savings of 0.6 mgd, which will increase to 0.9 mgd by 2025. Corresponding peak day savings for the facilities served by the reclaimed water system will begin at about 1.7 mgd and reach 2.7 mgd by 2025. These demand levels reflect water reuse system Scenario 1B (service to the University's four chiller plants on the south side of the main campus). Future expansion of the water reuse system may result in substantial increases in the average day and peak day reclaimed water demands shown above.
6. The Current Projections do not include any water reuse at Carolina North, but such provisions may be incorporated in the future.
7. Jordan Lake is assumed to be the primary alternative for expanding the community's water supply capacity. The cost of developing Jordan Lake as a future 5 mgd water supply source is estimated to be nearly \$31 million (2004 dollars). The levelized net present cost of the Jordan Lake water supply alternative is estimated to be \$1.84 per 1,000 gallons, based on a 25-year evaluation period and an annual discount rate of 5 percent. Conservation measures that can be implemented for a net present cost below \$1.84 per 1,000 gallons should be considered as potentially cost-effective alternatives to water supply capacity expansion.

As noted above, these assumptions will be periodically reviewed and adjusted as new information becomes available.



Note: The "Less Reuse" line includes approximately 0.9 mgd of currently programmed demand for four existing chilled water plants on the UNC Campus. The "More Reuse" line includes approximately 1.0 mgd of additional demand for other facilities and uses (Cogeneration Plant, new Northeast Chilled Water Plant, new Manning Drive Steam Plant, existing UNC Hospitals chilled water plant, and irrigation of certain athletic fields), but plans and commitments for these are less certain at the present time.



APPENDIX B

Local Water Conservation Ordinance

AN ORDINANCE AMENDING CHAPTER 11 OF THE TOWN CODE OF ORDINANCES TO PROVIDE FOR YEAR-ROUND CONSERVATION OF WATER AND FOR TEMPORARY RESTRICTIONS DURING WATER SHORTAGES AND EMERGENCIES (2003-06-23/O-6.1)

BE IT ORDAINED by the Council of the Town of Chapel Hill as follows:

Section 1. Article X, Chapter 11 is hereby replaced in its entirety with the following:

“ARTICLE X. WATER CONSERVATION STANDARDS AND REGULATIONS

DIVISION 1. GENERALLY

Section 11-101 Purpose

This ordinance is enacted for the purposes of:

1. Reducing the rate of increase in overall water use through year-round water conservation practices that will help maximize the community’s existing and planned water supply sources and help reduce seasonal peak day demands that result in the need for costly expansion of water treatment, storage, and transmission facilities. Such year-round practices shall include:
 - a. Reducing indoor water waste by encouraging the installation and maintenance of ultra-low flow toilets, faucet aerators, low-flow showerheads and similar devices, as well as other creative and commonsense indoor conservation practices.
 - b. Reducing irrigation and irrigation-related water waste without sacrificing landscape quality through the cultivation of lower water use plants; improved landscape design and planting practices; more efficient watering practices; and improved irrigation system design and maintenance.
 - c. Increasing the use of reclaimed wastewater and stormwater for irrigation and other uses that do not require water of potable quality.
2. Providing an orderly process for reducing community-wide water demands during periods of drought or other naturally occurring causes of water shortages; and

3. Providing an orderly process for reducing community-wide water demands during periods of water shortages due to natural disaster (other than drought), major facility failures, or other unexpected and sudden loss of water supply, treatment, or distribution capacity that constitutes a water supply emergency.

Section 11-102 Definitions

For the purpose of this ordinance, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

AUTOMATIC CONTROLLER. A mechanical or electronic device capable of operating an irrigation system and its component valve stations according to a pre-determined schedule of irrigation frequency and duration.

CISTERN. A tank or container, typically located underground, for the storage and subsequent reuse of rainwater collected from rooftops or other impervious surfaces that would have otherwise evaporated or drained off the premises.

DRIP IRRIGATION. The application of irrigation water through drip emitter devices at low pressure, volume, and velocity near or at ground level in order to minimize runoff and evaporative losses. Drip irrigation emitters are typically used for irrigating non-turf vegetation and release water in the range of 0.04 to 0.40 gallons per minute.

EVEN-NUMBERED PROPERTIES. Properties with street addresses that end in even-numbered digits, or other properties so designated for the purposes of these Standards through special arrangements with OWASA.

GRAYWATER. Domestic wastewater collected from household fixtures and appliances, such as washing machines, dishwashers, showers, sinks, and bathtubs, but not from toilets or urinals. Graywater may only be reused in accordance with practices approved by public health authorities.

HAND WATERING. The application of water for irrigation purposes through a hand-held hose or watering container.

HARVESTED WATER. Precipitation or irrigation runoff collected, stored and available for reuse for irrigation purposes.

IRRIGATION SYSTEM. Any permanently installed system of pipes, hoses, or other conveyance devices and appurtenances that provides water to living plant material through spray heads or other emission devices located at, above, or below the ground surface. For the purposes of these Standards, a sprinkler, soaker hose, or other device connected to its water source via a moveable above-ground garden hose is not considered to be an irrigation system.

LANDSCAPE AREA. That portion of a parcel that contains turf or non-turf vegetation.

LOW-PRECIPIATION BUBBLER. An irrigation head which typically operates within six inches of ground level and delivers water at a rate of less than 0.45 gallons per minute within a radius of less than two feet of the head. Low-precipitation bubblers are typically used for irrigating non-turf vegetation.

MICRO SPRAY. The application of irrigation water through small, low volume sprayer heads in order to minimize runoff losses. Micro sprays are typically used for irrigating non-turf vegetation. Individual micro spray heads typically operate less than 12 inches above ground level and typically deliver water in the range of 0.10 to 0.50 gallons per minute within a radius of five feet or less of the head.

MULCH. A protective covering of organic material, such as sawdust, wood chips, compost, or other vegetative matter, spread on the ground to reduce evaporation and increase water retention.

ODD-NUMBERED PROPERTIES. Properties with street addresses that end in odd-numbered digits, or other properties so designated for the purposes of these Standards through special arrangements with OWASA.

OWASA. The Orange Water and Sewer Authority.

POTABLE WATER. Treated water provided by OWASA that is suitable for drinking, cooking, and other domestic use. Water that is collected indoors in containers from indoor faucets or spigots that would otherwise be discharged into drainpipes while a user awaits the warming of the water for dishwashing, other washing, shaving, bathing, or showering is not considered to be potable water for the purposes of these Standards.

PRECIPITATION RATE. The amount of water applied per unit of time, usually expressed in inches per hour.

PUBLIC RIGHT-OF-WAY. The area of land owned or maintained by municipal, county, or state government primarily for the use of the public for the movement of people, goods, vehicles, or storm water. For the purposes of these Standards, the public right-of-way shall include curbs, streets, sidewalks, and storm water drainage inlets, but shall not include adjacent landscaped areas that may also be located within the legally delineated public right-of-way.

RAIN BARREL. A tank or container, typically located on the ground beneath a roof drainage system, that captures and stores rainwater for subsequent reuse.

RAW WATER. Water drawn from a reservoir or other water source before treatment.

RECLAIMED WATER. Highly treated effluent from a wastewater treatment plant that can be safely used for such non-potable purposes as irrigation, heating/cooling, street

cleaning, dust control, firefighting, and other applications that do not require water of potable quality.

RUNOFF. Water which is not absorbed by the soil or landscape to which it is applied. Runoff occurs when water is applied too quickly (application rate exceeds infiltration rate), particularly if there is a severe slope. These Standards do not apply to stormwater runoff which is created by natural precipitation rather than human-caused or applied water use.

SERVICE AREA. The geographic area in which OWASA provides or is authorized to provide water and/or sewer service.

SHUT-OFF NOZZLE. A device attached to the end of a hose that completely shuts off the flow, even if left unattended.

SOAKER HOSE. A flexible hose designed to emit a trickle of water along its entire length, either through numerous small-diameter (less than 1/32-inch) perforations or through the permeable material of its composition.

SPRAY IRRIGATION. The application of water to landscaping by means of a device that projects water through the air in the form of small particles or droplets.

SPRINKLER HEAD. A device that projects water through the air in the form of small particles or droplets.

UNDERGROUND SYSTEM. An irrigation system with emitters installed beneath the ground surface.

WATER WASTE. The non-beneficial use of OWASA potable water. Non-beneficial uses include but are not restricted to:

- a. Landscape water applied in such a manner, rate and/or quantity that it overflows the landscaped area being watered and runs onto adjacent property or public right-of-way; or landscape water applied during periods of rainfall or when soil moisture is already adequate.
- b. The use of water for washing vehicles, equipment, or hard surfaces, such as parking lots, aprons, pads, driveways, or other surfaced areas, in such quantities to flow onto adjacent property or the public right-of-way.
- c. Water applied in sufficient quantity to cause ponding on impervious surfaces.
- d. Water lost through plumbing leaks that can be readily identified and corrected.

XERISCAPING. An approach to landscape design and maintenance that uses small amounts of water but sustains a traditional look through the proper conditioning of soil, the selection of appropriate drought-tolerant plants, generous use of mulch, efficient use of water, and other proven techniques.

Section 11-103 Water Waste Prohibited

No person, party, or entity shall use, cause, waste, or permit to be wasted any OWASA -supplied potable water, in violation of the standards set out herein.

Section 11-104 Penalties

OWASA may discontinue water service to any customer where, after notice of a prohibited use is delivered to the service address, OWASA-supplied potable water continues to be used or wasted in violation of the standards set out in this Article.

DIVISION 2. YEAR ROUND REQUIREMENTS

Section 11-105 Year Round Requirements - Exterior Use

1. The following outdoor or exterior use requirements shall apply to all customers using OWASA-supplied potable water:
 - a. Spray irrigation shall not occur more than three days per week. Even-numbered properties may be irrigated with spray systems only on Sundays, Wednesdays, and/or Fridays. Odd-numbered properties may be irrigated with spray systems only on Tuesdays, Thursdays, and/or Saturdays. All spray irrigation shall occur only between the hours of 8:00 p.m. and 9:00 a.m. These restrictions shall not apply to properties using underground, drip irrigation, micro spray, low precipitation bubblers, hand watering, or where watering of containerized plants and commercial plant stock in trade is maintained for resale.
 - b. Regardless of irrigation methods used, no more than one inch of water may be applied to plant material in any given week.
 - c. All irrigation systems shall be equipped with automatic controllers that activate the system according to a desired frequency and duration, and shall also be equipped with rain or soil moisture sensors that will prevent irrigation during periods of rainfall or when there is sufficient moisture in the ground for plant health and survival.
 - d. All hoses used for hand watering, car washing, or other allowable outdoor uses shall be equipped with shutoff nozzles.

- e. No exterior use of OWASA-supplied potable water shall result in the flow of water onto adjacent property or public right-of-way, and all irrigation systems shall be designed and maintained to prevent to the extent practicable water from flowing onto paved or other impervious surfaces. Watering of plant beds, shrubs, and trees in public rights-of-way is permitted in accordance with this Section.
 - f. Outdoor water leaks on property or facilities of OWASA customers must be repaired within ten (10) days of discovery and notification by OWASA.
2. The use of reclaimed or harvested water for outdoor uses is strongly encouraged. OWASA shall periodically publicize methods of collecting and storing harvested water in appropriate devices, such as rain barrels and cisterns; appropriate practices, such as xeriscaping, drought tolerant landscaping and mulching; and shall otherwise educate its customers on water conservation strategies and techniques.
 3. Unless superceded by the declaration of a Water Supply Shortage or Emergency, the year-round requirements of III.A.1.a and III.A.1.b above shall not apply to the following:
 - a. Outdoor irrigation necessary for the establishment of newly sodded lawns and landscaping within the first 30 days of planting, or watering of newly seeded turf within the first six months of planting-
 - b. Irrigation necessary for one day only where treatment with an application of chemicals requires immediate watering to preserve an existing landscape or to establish a new landscape.
 - c. Water used to control dust or to compact soil when alternate methods are not available.
 - d. Visually supervised operation of watering systems for short periods of time to check system condition and effectiveness.
 - e. Water applied to prevent or abate health, safety, or accident hazards when alternate methods are not available.
 - f. Water used for construction or maintenance activities where the application of water is the appropriate methodology and where no practical alternative exists.
 - g. Water used for firefighting, firefighter training, fire hose testing, fire pumper testing, and other emergency situation mitigation purposes.
 - h. For situations in which there is no practical alternative, OWASA-supplied potable water may be used for other special purposes, such as washing out garbage trucks, cleaning up hazardous or unsanitary materials, etc., or for other purposes necessary to protect public health, safety, and welfare – provided that such water is used in the least quantity needed to accomplish the task.

Section 11-106 Year Round Requirements - Interior Use

1. The following indoor or interior use requirements shall apply to all customers using OWASA-supplied potable water:
 - a. Restaurants and dining facilities shall serve water only on request of the customer.
 - b. Hotels, motels, and other facilities providing sleeping accommodations shall change bed linens only upon request of the customer, or upon customer changeover, or every five days for long-term customers.
 - c. The operation of dishwashers and clothes washers only when loaded to their maximum capacity, or at water level settings appropriate for the size of the load being washed, shall be strongly encouraged.
 - d. The use of ultra-low flow toilets, tank dams, flow restrictors (aerators) and low-flow showerheads, where not otherwise required, shall be strongly encouraged; and additional indoor conservation practices – as well as devices – shall also be encouraged.
 - e. Plumbing systems shall be properly maintained and repaired to prevent water leaks.
 - f. Indoor water leaks on property or facilities of OWASA customers must be repaired within ten (10) days of discovery and notification by OWASA.
2. Unless superceded by the declaration of a Water Supply Shortage or Emergency, the year-round requirements of III.B.1. above shall not apply to the following:
 - a. Visually supervised operation and flushing of plumbing systems for short periods of time to check system condition and effectiveness.
 - b. Water used for construction or maintenance activities where the application of water is the appropriate methodology and where no other practical alternative exists.
 - c. For situations in which there is no practical alternative, OWASA-supplied potable water may be used for other special purposes, such as washing out garbage trucks, cleaning up hazardous or unsanitary materials, etc., or for other purposes necessary to protect public health, safety, and welfare – provided that such water is used in the least quantity needed to accomplish the task.
3. OWASA shall periodically publicize and otherwise educate its customers on additional methods to conserve the interior use of water.

DIVISION 3. WATER SHORTAGE REGULATIONS

Section 11-107 Determination of Water Shortage or Water Supply Emergency

1. Drought Condition Shortage

OWASA shall base its determination of existing or potential water shortage conditions on its analysis of reservoir levels, streamflow, existing and anticipated demand, availability of supplemental supplies, as well as other elements of reasonable professional judgment and management. The determination of drought shortage conditions shall be guided by periodic estimates of the risk (i.e., probability) that water stored in OWASA's reservoir system will decline to unacceptably low levels within the foreseeable future. Until improved or alternative criteria are developed, such guidance shall be based on a five percent or greater risk that total reservoir storage will decline to 20 percent or less of total storage capacity within an 18 month period. This guidance shall apply to the initial declaration of a Water Supply Shortage or Emergency and shall inform subsequent declarations of more or less severe Water Supply Shortages or Emergencies.

2. Water Treatment, Storage, or Distribution Capacity Shortage

In addition to conditions caused by drought, OWASA may declare a Water Shortage or Water Supply Emergency whenever customer demand – as averaged over three consecutive days – exceed 85 percent of OWASA’s capability of treating and delivering water. The stage and duration of such a Water Shortage or Water Supply Emergency shall be guided by the degree to which customer demands approach or exceed OWASA’s capacity to meet those demands, and by the degree to which conservation efforts successfully reduce short-term demands.

3. Natural and Man-Made Disasters, Catastrophic Equipment, Plant Failure Shortage

Any other circumstances, including service losses caused by equipment or facility failure, human error, deliberate act, weather, or other natural disaster, which constrain OWASA’s water supply, treatment, or distribution capacity to less than that reasonably needed by its customers, shall constitute a Water Shortage up to and including a Water Supply Emergency, requiring immediate action by OWASA.

Section 11-108 Required Actions Under Water Shortage or Water Supply Emergency Conditions

In the event of a water supply shortage, OWASA shall, using its best professional judgment determine which of the following stages is the most appropriate response to the estimated level of risk.

1. Water Supply Advisory

A Water Supply Advisory shall represent an alert to the public of a potential shortage and notification that water use restrictions may be imposed if the water supply and/or demand conditions do not improve in the near future. In the event of a declared Water Supply Advisory:

- a) No mandatory water use restrictions other than year-round requirements already in place will be implemented.
- b) OWASA shall make extensive use of media releases, advertising, and other reasonable means of publicizing the water supply advisory and the need for immediate voluntary conservation.
- c) OWASA shall inform the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners of its declaration of a Water Supply Advisory.

2. Stage One (1) Water Shortage

In the event that OWASA declares a Stage One Water Shortage, OWASA shall advise the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners of its declaration and shall request that they issue Proclamations. Upon OWASA's declaration of a Stage One Water Shortage, the following actions shall be taken with the goal of reducing overall water demand by ten (10) percent:

- a) Water use by individually metered residential customer accounts and by individually metered single family residential irrigation-only accounts shall be limited to no more than an average of one thousand (1,000) gallons per day during any monthly billing cycle beginning after the declaration of a Water Supply Shortage or Water Supply Emergency and ending while such restrictions are still in effect.
- b) Spray irrigation using OWASA-supplied potable water shall not occur more than one day per week with a maximum of one-half inch of water applied to plant material in any given week. Even-numbered properties shall be allowed to spray irrigate only on Tuesdays; odd-numbered properties shall be allowed to spray irrigate only on Thursdays. Spray irrigation shall occur only between the hours of 8:00 p.m. and 9:00 a.m. These restrictions shall not apply to the watering of containerized plants and commercial plant stock in trade.
- c) Irrigation by underground, drip irrigation, micro spray, low precipitation bubblers, soaker hose systems with automatic shutoffs, or by hand held hoses or watering cans may occur at any time or frequency, but shall be limited to a maximum of one-half inch of water applied to plant material in any given week.
- d) No OWASA-supplied potable water may be used to re-fill ornamental fountains, ponds, and like devices.
- e) No OWASA-supplied potable water may be used for the routine cleaning or washing of paved areas, such as sidewalks, decks, driveways, roadways, or parking lots. This restriction shall not apply to the pressure cleaning of exterior building surfaces.

Notwithstanding the restrictions specified in Sections 11-108. 2.a) through 11-108. 2.e), the protection of public health, safety, and welfare may, under special circumstances, require the use of limited amounts of OWASA-supplied potable water for such purposes as washing out garbage trucks, cleaning up hazardous or other unsanitary materials, etc. Such uses shall be permitted during declared Water Shortages or Emergencies, provided that other practical alternatives are not available and water is used in the least practical amount.

3. Stage Two (2) Water Shortage

In the event that OWASA declares a Stage Two Water Shortage, OWASA shall advise the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners of its declaration and shall request that they issue Proclamations, if not already issued. Upon OWASA's declaration of a Stage Two Water Shortage, the following actions shall be taken with the goal of reducing overall water demand by fifteen (15) percent:

- a) Water use by individually metered residential customer accounts and by individually metered single-family residential irrigation-only accounts shall be limited to no more than an average of 800 gallons per day during any monthly billing cycle beginning after the declaration of a Water Supply Shortage or Water Supply Emergency and ending while such restrictions are still in effect.
- b) Spray irrigation with OWASA-supplied potable water shall not be permitted, except by persons regularly engaged in the sale of plants, who shall be allowed to irrigate their commercial stock in trade.
- c) Irrigation by underground, drip irrigation, micro spray, low precipitation bubblers, soaker hose systems with automatic shutoffs, or by hand held hoses or watering cans shall be limited to a maximum of one-half inch of water applied to plant material in any given week.
- d) No OWASA-supplied potable water shall be used to re-fill ornamental fountains, ponds, and like devices.
- e) No OWASA-supplied potable water shall be used for washing vehicles, except at commercial or institutional car washes in which at least 50 percent of the water has been recycled.
- f) No OWASA-supplied potable water shall be used for filling or re-filling empty swimming pools. OWASA-supplied potable water may be used to top off operating swimming pools.
- g) No OWASA-supplied potable water shall be used for the routine cleaning or washing of exterior building surfaces, decks, or paved areas, such as sidewalks, driveways, roadways, and parking lots. This restriction shall not apply to the pressure cleaning of exterior building surfaces or decks prior to painting or re-painting that is necessary to protect or maintain the physical integrity of the structure.
- h) No OWASA-supplied potable water may be used for fire department training or equipment testing unless required by State or Federal regulations.

Notwithstanding the restrictions specified in Sections 11-108. 3.a) through 11-108. 3.h), the protection of public health, safety, and welfare may, under special circumstances, require the use of limited amounts of OWASA-supplied potable water for such purposes as washing out garbage

trucks, cleaning up hazardous or other unsanitary materials, etc. Such uses shall be permitted during declared Water Shortages or Emergencies, provided that other practical alternatives are not available and water is used in the least practical amount.

4. Stage Three (3) Water Shortage

In the event that OWASA declares a Stage Three Water Shortage, OWASA shall advise the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners of its declaration and shall request that they issue Proclamations, if not already issued. Upon OWASA's declaration of a Stage Three Water Shortage, the following actions shall be taken with the goal of reducing overall water demand by twenty (20) percent:

- a) Water use by individually metered residential customer accounts and by individually metered single-family residential irrigation-only accounts shall be limited to no more than an average of 600 gallons per day during any monthly billing cycle beginning after the declaration of a Water Supply Shortage or Water Supply Emergency and ending while such restrictions are still in effect.
- b) The use of OWASA-supplied potable water for heating and/or cooling purposes shall be reduced in all but the most essential facilities to the extent allowable in consideration of indoor air quality standards, weather conditions, and health and safety requirements.
- c) No irrigation with OWASA-supplied potable water shall be permitted, except via hand held hoses or watering cans. Such irrigation shall not occur more than three days each week, according to the schedule prescribed in III.A.1.a of these Standards; shall be applied to non-turf plant material only; and shall be limited to a maximum of one-half inch of water per week
- d) OWASA-supplied potable water may not be used for any other outdoor purposes, except for emergency fire suppression or other activities necessary to maintain public health, safety, or welfare.
- e) No bulk sale of potable OWASA water will be allowed except for purposes necessary to maintain public health, safety, or welfare.
- f) No OWASA-supplied potable water may be used for washing any vehicles.
- g) No OWASA-supplied potable water may be used for pressure washing building exteriors.
- h) No OWASA-supplied potable water may be used for the flushing or pressure testing of new distribution lines unless that water is returned to the OWASA water supply system through methods approved by OWASA. This restriction shall not apply to the testing of in-building fire control sprinkler systems.

- i) No OWASA-supplied potable water shall be used for filling or re-filling empty swimming pools or for topping off operating swimming pools.
- j) No OWASA-supplied potable water may be used for fire department training or equipment testing.

Notwithstanding the restrictions specified in Sections 11-108.4.a) through 11-108.3.j), the protection of public health, safety, and welfare may, under special circumstances, require the use of limited amounts of OWASA-supplied potable water for such purposes as washing out garbage trucks, cleaning up hazardous or other unsanitary materials, etc. Such uses shall be permitted during declared Water Shortages or Emergencies, provided that other practical alternatives are not available and water is used in the least practical amount.

5. Water Supply Emergency

In the event that OWASA declares a Water Supply Emergency, OWASA shall so advise the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners and shall request the issuance of a Proclamation of a Water Supply Emergency. In addition to those applicable measures listed above for a Stage Three Water Shortage, the following actions shall be taken upon OWASA's declaration of a Water Supply Emergency:

- a) No OWASA-supplied potable water may be used for any outdoor purposes other than emergency fire suppression or other activities necessary to maintain public health, safety, or welfare.
- b) The use of OWASA-supplied potable water for heating and/or cooling purposes shall be reduced in all but the most essential facilities to the extent allowable in consideration of indoor air quality standards, weather conditions, and health and safety requirements.
- c) Water service may be discontinued or reduced to designated users or in designated portions of the OWASA service area in order to preserve the availability of water for essential public health and safety requirements, such as fire protection, hospitals, clinics, and other critical community needs.

Section 11-109 Proclamation of Water Shortage or Water Supply Emergency

Upon notification from OWASA of a declaration of a Water Shortage or Water Supply Emergency, the Mayor of the Town of Chapel Hill is authorized, in order to more effectively protect the health and safety of the people within Chapel Hill, to issue a public Proclamation invoking the applicable provisions of this Division.

Section 11-110 Penalties and Remedies

Any violations of the provisions of this Division shall constitute a misdemeanor punishable upon conviction by a fine not exceeding fifty dollars (\$50.00) or imprisonment not exceeding thirty

(30) days as provided by General Statute Section 14-4 and in addition thereto such violation may be enjoined and restrained as provided in General Statute Section 160A-175.

A violation of any of the provisions of this Division shall subject the offender to a civil penalty of twenty-five dollars for the first offense, fifty dollars for the second offense within a thirty-day period, and one hundred dollars for the third or any additional offense that occurs within any thirty-day period. The Town may seek to recover the penalty by filing a civil action in the nature of a debt if any penalties are not paid within 30 days.

Each day that a violation continues after the offender has been notified of the violation shall constitute a separate offense.

The Town may seek to enforce this Division by using any one or a combination of the foregoing remedies.

Section 11-111 Severability

If any section, subdivision, clause, or provision of this Article shall be adjudged invalid, such adjudication shall apply only to such section, subdivision, clause, or provision so adjudged, and the remainder of this Article shall remain fully valid and effective.”

Section 2. This ordinance shall become effective on July 1, 2003.

This the 23rd day of June, 2003.

APPENDIX C

***** DRAFT *****

“WATERWISE BUILDING” A POTENTIAL KEY STRATEGY FOR ACHIEVING OUR WATER CONSERVATION GOAL

Purpose and Summary

This paper describes a conceptual proposal for a “WaterWise Building Program” for the Orange Water and Sewer Authority (OWASA) service area. If implemented, this program would promote state-of-the-art water efficiency measures in new buildings and in renovations of existing buildings. This could be one important component of OWASA’s comprehensive water conservation and demand management strategy and the community’s commitment to sustainability.

As presented below, the program would be accomplished through voluntary participation. An alternative approach would be to mandate compliance with new water efficiency standards as new projects go through the respective land use planning and development approval processes of Chapel Hill, Carrboro, and Orange County, as well as OWASA’s plan review and approval process. Under either approach, OWASA could serve as the lead technical agency.

The WaterWise Building program concept and details described below incorporate portions of similar “smart building” programs implemented in other areas. These include the “WaterWise Display Village” program developed by the Water Corporation of Western Australia (which has given OWASA permission to adapt and use their material); the “EcoBuild” program implemented by the Memphis Light, Gas and Water Division; the “Vermont Builds Greener” program developed by the State of Vermont; the “Leadership in Energy and Environmental Design (LEED) Green Building Rating System” program implemented by the U.S. Green Building Council; the “Green Building Program” of Scottsdale, Arizona; and the “Water Smart Contractor” program developed by the Southern Nevada Water Authority.

Increased Conservation Efforts Are Needed

OWASA’s Mission Statement states:

OWASA will provide our customers with high quality water and wastewater services through responsible, sustainable, and creative stewardship of the resources and assets we manage. We will do this with a productive, empowered, talented, and diverse work force, which strives for excellence.

Working closely with Carrboro, Chapel Hill and Orange County, OWASA developed a new water conservation ordinance that includes mandatory year-round use restrictions, as well as

restrictions that apply during extended droughts or other emergencies. The Towns and the County adopted the ordinance in June, 2003.

In April 2005, the OWASA Board of Directors approved the *Goal and Objectives of OWASA's Long-Term Water Conservation and Demand Management Program*. The primary goal of OWASA's conservation program is:

To develop, fund, and implement a cost-effective water conservation and demand management program that will meet our community's water supply needs (through 2050) by making the highest and best use of our local water resources and eliminating the need for costly new water supply sources and facilities.

Key OWASA initiatives include:

To help achieve the water conservation and goal and objectives, OWASA has implemented a process water recycling system at the Jones Ferry Road Water Treatment Plant, where backwash clarifier water that was formerly released to a stream is now returned to the head of the plant for treatment. This measure has resulted in a seven percent (7%) reduction in raw water withdrawals from OWASA's reservoir system.

OWASA is also working with the University of North Carolina at Chapel Hill to develop a water reclamation and reuse system through which highly treated wastewater effluent from the Mason Farm Wastewater Treatment Plant will be used to meet certain non-potable water needs on the University's main campus. The planned reuse system is expected to reduce near-term and long-term average-day water demands by seven percent (7%) and thirteen percent (13%), respectively.

Although these measures will extend the available water supply capacity, our projections indicate that if we are to avoid the need for costly additional water supply capacity, further demand reductions will be needed. One possible water use reduction strategy to consider is the development and implementation of a "WaterWise Building" program.

Increased Water Efficiency Can Be Achieved in Building Construction and Renovation

To help achieve long-term demand reduction, it is recommended that OWASA, and the joint local governments of the Towns of Carrboro and Chapel Hill and Orange County pursue partnerships with the development, building, landscaping, irrigation and plumbing industries to improve water use efficiency in new and existing buildings and development.

A cornerstone of this partnership could be a new "WaterWise Building" program that helps integrate development design, technology selection, landscape planning, and stormwater management to achieve more sustainable management of our water resources. The program could include:

- ✓ a structured framework for educating developers, builders, landscapers, and others on principles and practices for sustainable water management, including information about how water use efficiency measures can help save money, reduce nonpoint source pollution, maintain hydrologic balance, protect local and regional surface and ground water resources, and reduce flooding.

- ✓ incentives such as credits or reductions in water and sewer availability fees, and/or expedited plan review, etc. for new development that incorporates state-of-the-art water-efficiency measures.
- ✓ comparative analyses of life-cycle costs for alternate water use efficiency levels in new or existing development.
- ✓ criteria which will be used to rate the water resource sustainability level of participating developments and buildings.
- ✓ information and technology transfer, including documentation of how smart use of water can be accomplished while maintaining and perhaps enhancing the quality of life, and the economy.

Such a program would enable OWASA and partnering agencies and organizations to proactively promote total water cycle management from the inception of a new project.

What Is WaterWise Building?

To be considered WaterWise Building and development, the site and uses would be designed, built, and operated in a manner that minimizes the undesirable impacts on the natural water cycle. The building and development should respect the natural features of the site, take advantage of nature's own water supply (precipitation), use water as efficiently as possible, and help maintain the quality of water leaving the site. WaterWise Building incorporates on-site collection, treatment and use of water in an integrated manner.

What is our WaterWise Building Program Concept?

As envisioned, the WaterWise Building program would be a voluntary certification program that promotes the use of more sustainable water-saving and environmentally-friendly measures in construction of new buildings and renovation of existing buildings.

WaterWise Buildings could be buildings that are at least __% more water-efficient than typical buildings that meet the water efficiency standards of the National Energy Policy Act of 1992.

An alternate approach would be to offer different levels of certification depending on the extent of the water efficiency measures incorporated into the building. The LEED Green Building Rating System is such an approach, with four levels of achievement.

What are the Benefits of WaterWise Building?

When compared to traditional buildings that are built to current building codes, WaterWise Buildings:

- ✓ save money on water and sewer utility costs;
- ✓ save money on energy costs for hot water heating;
- ✓ promote good environmental stewardship;
- ✓ reduce greenhouse gas emissions; and

- ✓ should/could be more marketable.

The WaterWise Building program is about making the right choices – those that will save money and energy while helping to protect our community’s essential water resources. As we approach the limits of our water supply, water charges will increase, and the cost savings associated with this program will be even greater in the years ahead.

How Might the WaterWise Building Program Work?

The proposed WaterWise Building program would include seven major components:

- 1. *Project Planning:*** Before preparing detailed project plans, the developer would first meet with OWASA to discuss the conceptual plans for the project. OWASA would accept the developer’s plans for extension of and/or connection to the water and sewer system only after such a meeting had been held.
- 2. *WaterWise Building Standards:*** A set of WaterWise Building standards to evaluate the water efficiency of the proposed new building or renovation project would be developed. Each standard would be assigned a certain number of points according to the expected water savings associated with the measure. A building would need to score a specified minimum number of points to receive the WaterWise Building designation.
- 3. *WaterWise Building Application and Checklist:*** Parties interested in receiving a WaterWise Building program certification for their building would be required to submit a WaterWise Building Application and Checklist. The Checklist would indicate which water efficiency standards they would commit to incorporate into their building.
- 4. *WaterWise Building Agreement:*** Builders interested in receiving certification of their building would complete the WaterWise Building Agreement and submit it along with the application. The Checklist would be incorporated into the Agreement. To ensure that the water efficiency measures are permanent, the Agreement would be binding to all parties that have or acquire any right, title, or interest in the property.
- 5. *On-site Inspections:*** WaterWise Buildings would be inspected to ensure the buildings are being constructed in compliance with the WaterWise Building standards.
- 6. *WaterWise Building Certificate:*** Upon verification that the building has been completed in accord with the WaterWise Building Agreement, A WaterWise Building Certificate for the applicable building would then be issued. Any applicable rebate of availability fees (or other incentives) would then be issued.
- 7. *WaterWise Building Information Package for Owner***

What Could We Do for Waterwise Building Program Participants?

For builders and developers who formally commit to incorporate extra water use efficiency measures in their building or development, OWASA and/or the local governments could consider offering the following:

- ✓ assist in providing a life-cycle cost analysis of the water use efficiency measures to be incorporated in the building or development;
- ✓ provide a “WaterWise Building” partner sign that can be placed on the property;
- ✓ reduce the water and wastewater availability fees that are to be paid to OWASA by the builder/developer or by customers within the development, as applicable.
- ✓ announce the building’s or project’s designation on our respective website’s sections relating to the WaterWise Building program;
- ✓ issue a news release regarding the signing of the WaterWise Building agreement if the development exceeds _____ (specified size) and post the release on appropriate websites;
- ✓ provide WaterWise Building program educational opportunities and materials; and
- ✓ maintain a directory of WaterWise Building program partners, including planners, architects, builders, and plumbing and landscape contractors.

Examples of Potential WaterWise Building Standards

Following are examples of potential standards upon which a proposed building could be evaluated for designation as “WaterWise Building.” Each standard would be assigned a certain number of points according to the expected water savings associated with the measure. To achieve the targeted ___% reduction in water use, participants would need to score a specified minimum number of points in order to receive the WaterWise Building designation.

Site and Landscape Design and Management:

- ✓ Landscaping requires no irrigation once mature
- ✓ Lawn type selected to minimize water use, mowing and lawn maintenance
- ✓ Landscape has at least 90% native species
- ✓ High-efficiency drip irrigation system is used for gardens
- ✓ Land surface is shaped to collect and direct rainwater runoff to vegetated areas
- ✓ Rainwater collection system with storage is used for irrigation during dry weather
- ✓ Where garden areas are to be located, soil is tilled and improved with a soil conditioner to a minimum depth of ___
- ✓ Where lawn is to be planted, soil is tilled and improved with a soil conditioner to a minimum depth of ___
- ✓ Garden beds are mulched to a depth of at least ___
- ✓ Sub-meter is installed at a point where it can measure 100% of external water use
- ✓ Permeable pavement is used for driveway and parking areas
- ✓ Surface run-off from paved areas is directed to planted areas

Residential Buildings:

- ✓ Hot water heater is located within 20 feet pipe run of all showers, baths, and kitchen areas
- ✓ Hot water lines are insulated to R-3 or better throughout the entire building
- ✓ Whole house hot water recirculating system is installed
- ✓ Point of use hot water recirculating system is installed
- ✓ Water service line leak detection and control system (such as FloLogic system) is installed
- ✓ Hot water tank leak detection and water service line shut-off valve (such as WAGS valve) is installed
- ✓ Clothes washer water line leak detection and shut-off valve is installed
- ✓ Air conditioning condensate is recycled and reused
- ✓ Rainwater is collected and used for interior needs
- ✓ EnergyStar Clothes Washing Machine is installed
- ✓ EnergyStar Dishwashing Machine is installed
- ✓ Showerheads with flow rate of 2.0 gpm or less are used
- ✓ Faucets/faucet aerators with flow rate of ___ gpm or less are used
- ✓ High quality Ultra Low Flow Toilet using 1.0 gallons or less per flush are installed
- ✓ Dual flush toilet (1.6 gpf/0.8 gpf) is installed
- ✓ Composting toilet is installed
- ✓ Two-pipe drain system for future grey water reuse system is installed
- ✓ Complete grey water reuse system is installed
- ✓ Centrally located manifold (home-run) water distribution system is installed
- ✓ Pressure reducing valve is installed to limit normal water pressure to a maximum of ___ psi
- ✓ Owners/occupants are provided educational materials relating to the use and care of the building

Non-Residential Buildings:

Many of the standards for residential buildings would also apply to non-residential buildings; however, additional standards will be needed. For example, water efficiency standards for refrigeration units, ice-makers, commercial dishwashers, and spray rinsers would apply to food service facilities and restaurants.

The WaterWise Building program standards for residential and non-residential buildings would be developed in consultation with representatives from the building, plumbing, landscaping, and planning and design industries.

WaterWise Development Concept

We could also consider offering a “WaterWise Development” certification for those property owners and developers that agree to have all buildings within their development to comply with the WaterWise Building program requirements. The approach and services provided to those developments would be similar to those offered for WaterWise Buildings.

To achieve long-term demand reduction, it is essential that we proactively work with the building industry and others to increase water efficiency of new buildings and in renovation of existing buildings. The WaterWise Building program would be a voluntary, incentive-based approach to meeting this challenge.

APPENDIX D

RETROFIT ON SALE ORDINANCE – SANTA CRUZ, CA

MARCH 2003

NEW WATER CONSERVATION INSTALLATION RULES FOR THE CITY AND COUNTY OF SANTA CRUZ EFFECTIVE MARCH 1, 2003:

COUNTY OF SANTA CRUZ CHAPTER 7.69

All Sellers of Commercial, Industrial and Residential property in the unincorporated area of the County, at time of sale, must provide a Local Disclosure Form regarding installation of toilets with 1.6 gallons per flush and low flow showerhead of 2.5 gallons per minute.

The only exemptions in the County where this requirement does not apply are: A) All structures that were constructed or renovated in 1994 or later; B) Structures that already have low flow fixtures; C) Any emergency showers installed for health or safety purposes that cannot operate safely at a flow rate that does not exceed 2.5 gpm; D) Any shower requiring significant modification to comply; and E) Any shower that will not function after being retrofitted in accordance with this law F) Already installed 1.6 gallon toilet.

NOTE: THIS LAW APPLIES IN THE UNINCORPORATED AREA OF SANTA CRUZ AND INCLUDES THE SOQUEL CREEK WATER DISTRICT, AND PROPERTIES WITH PRIVATE WATER SYSTEMS OR PRIVATE WELLS.

Seller provides an executed Water Conservation Certification form that the above items have been installed, and mails the original Certification form to the County. Buyer shall install the fixtures within 90 days of the date of sale, if the Seller does not install them.

COUNTY OF SANTA CRUZ CHAPTER 7.74

All Sellers who are served by the City of Santa Cruz Water System are required to follow the requirements mandated by the City of Santa Cruz, and are to complete the City of Santa Cruz Local Disclosure Forms, and must provide the Water Conservation Certificate as required by the City--EVEN THOUGH THE PROPERTY IS LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY. FOLLOW GUIDELINES BELOW.

CITY OF SANTA CRUZ CHAPTER 16.03

1. Low consumption plumbing fixtures shall be installed in all existing residential, commercial and industrial buildings at the time of sale. Toilets must be 1.6 gallons per flush, showerheads 2.5 gallons per minute Urinals 1.0 gallons per flush.
2. Seller must provide verification prior to the time of sale by A) physical inspection by City Staff; B) Licensed plumbing contractor, general contractor or other City authorized person; C) documentation of retrofit from the City's rebate program; D) Documentation that all structures were constructed or renovated in 1994 or later. The City issues a water conservation certificate to the Seller once compliance has been verified.
3. The Seller and Buyer may mutually agree to transfer responsibility to the Buyer for retrofitting. The Seller must submit a "Transfer of Responsibility" form to the City of SC Water Dept before the property is sold. The Buyer then has 90 calendar days from the date of the sale of the property to perform the retrofit and verify compliance.

4. An exemption from these requirements may be granted if the Water Director (or if outside the City limits, the County Public Works Director) determines that the building drainage system or public sewer, or both are incompatible with low consumption toilet specifications, and require a greater quantity of water to flush the system in a manner that is consistent with public health. Sufficient evidence must be submitted to substantiate any exemption.

APPENDIX E

RECLAIMED WATER ORDINANCE – TOWN OF CARY

ORDINANCE NO. 99-013

WHEREAS, potable water is a valuable resource which needs to be conserved; and

WHEREAS, treated wastewater is also a valuable water resource which can safely be used for nonpotable purposes, thereby substantially contributing to the conservation of potable water; and

WHEREAS, the Town of Cary, hereinafter referred to as Town, has a water and wastewater system and has determined to establish and construct a reclaimed water system which will make treated wastewater available in certain areas of the Town for nonpotable purposes such as for irrigation; and

WHEREAS, the Town is planning to have portions of said reclaimed water system constructed and in operation by 2000; and

WHEREAS, the Town Council wishes to establish certain terms and conditions regarding the establishment and use of the reclaimed water system.

NOW, THEREFORE, BE IT ORDAINED BY THE CARY TOWN COUNCIL, that the following new Reclaimed Water System Ordinance be adopted, and the following amendments to Chapter 19 be adopted.

Section 1. Adoption of new Ordinance concerning reclaimed water.

ARTICLE V. RECLAIMED WATER SYSTEM

Sec. 19-105 Purpose and Intent.

It is the Town's purpose and intent to establish a reclaimed water system and to extend such system to certain areas of the Town where the Town Council determines that the extension of such a system is practical and economical. Once such reclaimed water is made available to a property, use of reclaimed water will be required for landscape and grounds irrigation systems and will be permitted for other authorized uses. The reclaimed water distribution system will be constructed in sections and phases to provide reclaimed water service to designated areas as determined by the Town Council and pursuant to the terms and conditions set forth herein.

Sec. 19-106 Reclaimed Water System Part of Town Water System and Other Definitions.

The Reclaimed Water System is a part of the Town of Cary water system. All provisions of Articles I, II and III of Chapter 19, Utilities, shall apply to the reclaimed water system unless otherwise indicated herein. To this end, the terms water system, water pipe, town water, waterworks, water service, water distribution system, water, water meters, water mains and other

references to the water system contained in Articles I, II and III shall be deemed to include and mean such portions of the reclaimed water system, unless in conflict with the provisions contained in this Article V, or specifically excluded herein. Among the sections that do not apply to the reclaimed water system are Sections 19-6 (2), 19-22, and 19-45.

For the purpose of this Ordinance, the definitions contained in this section shall apply unless otherwise specifically stated.

Available, means that a reclaimed water distribution main is or will be located at a property line of a property on which an irrigation system is installed or proposed, or a property proposed to be serviced with reclaimed water.

Cross-Connection means any physical connection or arrangement which would allow the movement of fluids between the potable water system and any other piping system, such as the reclaimed water system.

Customer means the Town of Cary reclaimed water customer and the actual user of the reclaimed water.

Director means the Director of Public Works and Utilities of the Town of Cary and his or her designee.

Distribution Mains means those conduits used to supply reclaimed water to service lines from transmission mains.

Department means the Department of Public Works and Utilities.

Irrigation System means a device or combination of devices having a hose, pipe, or other conduit installed in the landscape which transmits town water, through which device or combination of devices town water, or a mixture of town water and chemicals is drawn and applied to residential or commercial lawns, landscapes or greenspace.

Potable Water means potable water treated or produced by the Town of Cary water system.

Reclaimed Water means water that has received at least advanced secondary treatment, meets water quality requirements defined by the North Carolina rules and is reused after flowing out of a wastewater treatment facility.

Reclaimed Water System means .all equipment, piping, valves and associated hardware and other appurtenances, including meters, from the Customer's reclaimed water meter back to, and including the reclaimed water production and pumping facility.

North Carolina Rules means the regulations for reclaimed water and water reuse as stated in the North Carolina Administrative Code Section 15A NCAC 2H.0200 as amended from time to time.

Service Line means that conduit for reclaimed water from the distribution main to the property line.

Transmission Mains means those conduits used to supply reclaimed water from the pumping station or treatment plant to the distribution mains.

Sec. 19-107 General.

Once reclaimed water is available to property, the property owner may connect to the reclaimed water system upon submission of a fully executed application as required by the Director, and upon compliance with all other Town requirements. Reclaimed water may be used for irrigation purposes and for other nonpotable water purposes in accordance with federal, state and local ordinances, rules, and regulations. If reclaimed water is to be used for any purpose other than land irrigation, the customer shall obtain prior approval of such use from the Director.

As an incentive to development of an initial demonstration phase of this project, customers that have signed letters of intent for the initial phase of the reclaimed water project may have conditions in their agreements with the Town that are different from the conditions in this ordinance.

Sec. 19-108 Mandatory Use of Reclaimed Water for Irrigation Systems.

It is unlawful to use potable water for irrigation systems ninety (90) days after a property owner or water customer has been notified by the Director that reclaimed water is available to a particular property or site ("Notification of Availability").

Sec. 19-109 Connection to Reclaimed Water System

a. Customers with Existing Irrigation Systems When reclaimed water becomes Available to a property, the Director shall provide written notice to the Town water customer located on that property of such Availability. Customers with existing irrigation systems using potable water *who desire to continue to maintain such systems using Town water*, must apply for reclaimed water in accordance with the application procedures specified in this Ordinance and must disconnect said systems from the Town potable water system and connect to the reclaimed water system within 90 days of such written Notice of Availability. The Director shall have the authority to grant temporary exemptions from this section in the event of reclaimed water shortages or for other good cause, in which case the temporary exemption shall not exceed 180 days.

b. Customers with New Irrigation Systems, All new irrigation systems designed to use Town water constructed after the effective date of this Ordinance must connect to the reclaimed water system at construction, if reclaimed water is available to the property. Such connection must be made prior to, or contemporaneously with connection of other improvements on the property to the Town's potable water system. If reclaimed water is not available to a property at the time of construction of an irrigation system, connection to the reclaimed water system must be made within ninety (90) days of Notice of Availability from the Director.

Sec. 19-110 Reclaimed Water Service Application Requirements.

Applications for reclaimed water service shall be made and will be accepted in the same manner as applications for water and sewer service, subject to the provisions of this Ordinance. Articles I,II, and III of Chapter 19, UTILITIES outlines the requirements for service. In addition, the Town of Cary Finance department and the Department of Development Services, Inspections and Permits division have specific procedures and policies in place for servicing, regulating, billing, and collecting of bills of utility customers. Such policies, along with all policies and procedures concerning enforcement and fining and setting standards for the design and installation utility pipelines and other appurtenances apply to the reclaimed water system, including its design, installation, and maintenance e.

Sec. 19-111 Installation of Lines and Easement Dedications.

The Town will be responsible for reclaimed water service lines to the applicant's property line, provided easements or other access is available to the Town. The applicant shall be responsible for all costs and expenses of installation and maintenance of the reclaimed water line and all appurtenances from their property line on their property. In the event the Town is required to locate the reclaimed water meter or any other part of the Town reclaimed water system on applicant's property, the applicant shall dedicate land or perpetual easements on, over and through applicant's land for the reclaimed water transmission and distribution facilities as necessary to provide reclaimed water service to applicant's property. No reclaimed water lines or other facilities will be installed or accepted by the Town for maintenance unless such lines or facilities are in a dedicated public right-of-way or dedicated public easement. Any new easement shall be adequately sized to accommodate construction and maintenance of the reclaimed water line or system component. No obstruction of any kind shall be planted, built, or otherwise created within the limits of the easement or right-of-way without written permission of the Director. Details of the Town's requirements for easements can be found in the this Chapter 19, UTILITIES and the applicable sections of the Towns Technical Specifications. Delays by applicant in granting easements or dedications will result in the loss of potable water for irrigation, if more than ninety (90) days have passed from Notification of Availability and if no good cause is shown for the failure to grant the necessary easements.

Sec. 19-112 Meter Requirements.

Metering of reclaimed water is mandatory. There will be no exceptions to this requirement. Metering requirements are outlined in Chapter 19, UTILITIES, and in the Towns Standard Specifications.

Sec. 19-113 Permits.

All applicants for reclaimed water, at the applicant's own cost and expense, shall apply for, obtain and meet all requirements of all necessary permits, licenses, conditions, and approvals for the initial construction and the operation of the onsite reclaimed water facilities and the use of reclaimed water.

Chapter 19, UTILITIES, set forth additional requirements for utility work.

Sec. 19-114 Authority to Adopt Rules and Regulations.

The Town Council may by Resolution establish reasonable rules and regulations concerning the reclaimed water system and the use of reclaimed water. Additional standard policies and procedures may be adopted concerning the reclaimed water system. Insofar as there is not conflict with the provisions of this Ordinance, Town policies and procedures pertaining to potable water service shall apply.

Sec. 19-115 Authority to Adopt Rates, Fees and Charges.

The Town Council may by Resolution, duly adopted after a public hearing, establish rates, fees and charges for the reclaimed water system and provide terms and conditions for the payment and collection of same. After the initial establishment of a reclaimed water rate, and fee or charge for connection to the reclaimed water system, these rates, fees and charges will normally be reviewed and adjusted annually as part of the annual budgeting cycle, as provided in Article I, Chapter 19, UTILITIES.

Sec. 19-116 Priorities for Extending Reclaimed Water Service.

The Town Council will establish priorities for extension of the reclaimed water system, as it does for water and sewer system extensions. The Town Council may establish priorities for extension of service outside the utility service boundaries. Provision of reclaimed water service outside the Town limits will be considered on a case-by-case basis and may be time limited to benefit the Town.

Sec. 19-117 Conditions of Reclaimed Water Service Use

a. General

The Town may terminate, discontinue, or suspend reclaimed water service in accordance with this Chapter 19 and Town policies and procedures in the event of (i) a violation of this Ordinance or Town regulations, policies or procedures, (ii) failure to pay bills by the due date, (iii) tampering with any utility service, (iv) the existence of a plumbing cross-connections with another water source, or (v) any customer condition or action that may be detrimental to the Town's potable water system, its reclaimed water system, or its wastewater collection and treatment system. The Town may, at its option, suspend service until the condition is corrected and all costs due the Town are paid. These costs may include delinquent billings, connection charges, and payment for any damages caused to the potable water, reclaimed water, or wastewater collection or water distribution system. The details of the Town's procedures for discontinuing service are found in Chapter 19, UTILITIES of the Towns Code of Ordinances and in appropriate Town Policies and Finance Department procedures.

b. Cross Connection Control.

There shall be no cross connections between the reclaimed water system on a customer's property and the Town potable water system. In all premises where reclaimed water service is provided, the public or private potable water supply shall be protected by an approved cross connection control plan. The plan for cross connection control must be submitted with the application for reclaimed water service and must receive the prior approval of the Director. In the event a cross connection is found, the cross connection shall be immediately disconnected, and reclaimed water service will be suspended. Before reconnection of the reclaimed water service, the public potable water system shall be protected against the possibility of future cross connections to the Director's satisfaction. Additional protection against cross connection may be required as specified by the Director at the customer's expense before reclaimed water service is resumed.

c. Right of Entry.

In addition to the authority to enter property contained in 19-13, the Director may enter any premises to determine the presence of any cross connections or other potential hazards to the Town potable water system. Each customer of reclaimed water service shall, by completing the reclaimed water application, give written consent to such entry upon the customer's premises.

Sec. 19-118 Service Interruption.

The Town reserves the right to temporarily discontinue service to any portion or all of the reclaimed water system as deemed necessary by the Director. In addition, the Director shall have the authority to establish schedules which restrict the use of reclaimed water at certain times in order to reduce maximum pressure demands on the system and to regulate usage during periods of limited reclaimed water availability. This authority is in addition to the water conservation provisions of Article III of this Chapter, and the disclaimer of liability contained in Sec 19-10.

Sec. 19-119 Maintenance by Customer

The property owner and/or customer shall be responsible for the maintenance of all reclaimed water lines and appurtenances on the customer's property, unless the meter was, of necessity, located beyond the customer's property line, in which case the customer shall be responsible for all reclaimed water lines and appurtenances beyond the meter. The Town reserves the right to disconnect the service to any property when the reclaimed water system and appurtenances are not properly maintained. In addition, should the customer require reclaimed water at different pressures, or different quality, or in any way different from that normally supplied by the Town, the customer shall be responsible for the necessary devices to make adjustments and for obtaining approval by the Director.

Sec. 19-120 Conservation of Water Resources

It is the policy of the Town of Cary to wisely use natural resources. In addition to all other conservation measures contained in this Chapter the Town may terminate, suspend or discontinue reclaimed water service if customer usage of reclaimed water varies substantially from the overall loading rates outlined in the customer's application for service.

Sec. 19-121 Right to Refuse Service.

The Town makes no guarantees that reclaimed water service will be provided, or, once provided, continued. The Town may, at any time, and from time to time, refuse to extend or suspend or terminate service on the basis of a use detrimental to the system, an inadequate supply of reclaimed water, the failure to pay required fees, or for any other reason which, in the judgment of the Director, will cause the extension not to be the benefit of the Town.

Sec. 19-122 Ownership by Town.

In accordance with Articles I, II and III, all reclaimed water facilities and appurtenances within dedicated public easements when constructed or accepted by the Town, shall become and remain the property of the Town. No person shall by payment of any charges provided herein, or by causing any construction of facilities accepted by the Town, acquire any interest or right in any of these facilities or any portion thereof, other than the privilege of having their property connected thereto for reclaimed water service in accordance with this Ordinance and any amendments thereof.

Sec. 19-123

As to the provision of reclaimed water service, in the event of a conflict with the provisions of any other Town Ordinance, the provisions of this Ordinance shall take priority over other ordinance provisions.

Sec. 19-124 Severability.

If any section, subsection, sentence, clause, phrase, or portion of this Ordinance is for any reason held invalid or unconstitutional by any Court of competent jurisdiction, such portion shall be deemed a separate, distinct, and independent provision and such holding shall not affect the validity of the remaining portions hereof.

Section 2. Adoption of Amendment to Town of Cary Code of Ordinances, Sections 19-13, 19-38 and 19-41.

AMENDMENTS TO EXISTING SECTIONS OF CHAPTER 19

Section 19-13 shall be amended as follows:

Sec. 19-13. Right of entry.

The director of Public Works and Utilities or the finance director, or any of the assistants of either, shall have the right to enter, at any reasonable time, any premises for the purposes of billing for services, reading meters, or operating or maintaining any part of the waterworks or sewer works systems as required by this chapter or by the sewer use ordinance.

Section 19-38 shall be amended as follows:

Sec. 19-38. Connection required.

(a) *Improving property.* Every person improving property located within the corporate limits of the town which (1) abuts or adjoins a street or alley along which is located a water line, or (2) is located within one hundred (100) feet of a town water line shall make an approved water connection to the house, building or other place of human habitation or occupancy, provided that no person shall be required to cross the private property of another to make such a connection.

(b) *Compliance with codes.* All water connections shall be in accordance with the North Carolina State Plumbing Code and the requirements of this Code and any and all local, state and federal requirements that apply.

(c) *Fees due.* At the time any connection is made by the property owner to the town water system, all water connection charges, acreage fees and outstanding assessment, or fee in lieu of assessment, shall be due and payable.

(d) *Occupancy.* No person shall occupy any house or building for human habitation after the water supply has been cut off, except in cases where it is cut off temporarily for the purpose of effecting necessary repairs.

Section 19-41 (6) shall be amended as follows:

Sec. 19-41. Sale of water from public works facility and hydrants.

Water may be purchased from the town at designated facilities or from any fire hydrant under the following conditions:

(1) The charge for such water shall be at the rate established in the annual operating budget ordinance.

(2) When water is obtained through a fire hydrant, only town employees may turn the fire hydrant on or off.

(3) The fire hydrant shall have a hydrant meter properly attached to register the amount of water being purchased. Only town employees shall attach or detach the hydrant meter.

(4) The charge of the use of a hydrant meter and accessory equipment shall be as established in the annual operating budget ordinance.

(5) The finance department shall establish rules for the use of hydrant meters and accessory equipment, hours of operation, etc., as may be necessary.

(6) Reclaimed water may only be purchased, when available, at the water reclamation facilities during hours established by the town's finance department.

APPENDIX F

LOCAL GOVERNMENT REAL PROPERTY INVENTORIES

Town Of Chapel Hill Real Property Inventory

Building Description	Address	Dept.	Square Feet	Year Built/ Acq'd	Maintenance Operating Budget Responsibility
Town Hall	306 N. Columbia St	Various	31,932	1971	Pubwks, Buildings
Housing And Com Dev Admin	317 Caldwell St	Housing	5,100	1989	Housing
Housing And Com Dev Maint	505 Craig St	Housing	2,000	1989	Housing
Ifc Shelter	100 W. Rosemary St	Rental	10,368	1938	Pubwks, Buildings
Rosemary St Parking Deck	150 E. Rosemary St	Parking	180,000	1993	Parking Services
Post Office/Court	179 E. Franklin St	Rental	15,985	1979	Pubwks, Buildings
Library Old	523 E. Franklin St	Rental	12,800	1965	Museum
Police Station	828 Mlk Jr Blvd	Police	23,800	1982	Police
Fire Station #1	302 S. Columbia St	Fire	7,015	1963	Fire
Fire Station #2	1003 S. Hamilton St	Fire	3,600	1959	Fire
Fire Station #3	1615 E. Franklin St	Fire	4,100	1970	Fire
Fire Station #4	1695 Mlk Jr Blvd	Fire	3,600	1982	Fire
Fire Station #5	100 Bennet Rd	Fire	5,400	2001	Fire
Modular Training Room	1695 Mlk Jr Blvd	Fire	1,680	2004	Fire
Fire Training Tower	1695 Mlk Jr Blvd	Fire	2,400	1986	Fire
Fire Training Burn Bldg	1695 Mlk Jr Blvd	Fire	1,600	1986	Fire
Library, New	100 Library Lane	Library	27,315	1994	Library
Transit Maintenance	1089 Mlk Jr Blvd	Transit	14,500	1980	Transportation
Transit Administration	1089 Mlk Jr Blvd	Transit	1,736	1986	Transportation
Transit Tire Shed	1089 Mlk Jr Blvd	Transit	315	1980	Transportation
Public Works Administration	1099 Mlk Jr Blvd	Public Works	1,800	1978	Pubwks, Buildings
Garage #1	1099 Mlk Jr Blvd	Public Works	8,250	1978	Pubwks, Buildings
Garage #2	1099 Mlk Jr Blvd	Public Works	7,250	1978	Pubwks, Buildings
Covered Storage I	1099 Mlk Jr Blvd	Public Works	2,400	2001	Pubwks, Buildings
Covered Storage Ii	1099 Mlk Jr Blvd	Public Works	1,200	2001	Pubwks, Buildings
Covered Storage Iii	1099 Mlk Jr Blvd	Public Works	1,200	2001	Pubwks, Buildings
Field Operations Building	1099 Mlk Jr Blvd	Public Works	8,400	1978	Pubwks, Buildings
Public Wks Storage Building	1099 Mlk Jr Blvd	Public Works	5,000	1978	Pubwks, Buildings
Modular Break Room	1099 Mlk Jr Blvd	Public Works	1,960	2001	Pubwks, Buildings
Boy Scout Warehouse	1099 Mlk Jr Blvd	Public Works	600	2005	Pubwks, Buildings
Utility Shed - Vehicle Wash Rack	1099 Mlk Jr Blvd	Public Works	342	1978	Pubwks, Buildings
Community Center	200 Plant Rd	Parks & Rec	23,213	1980	Pubwks, Buildings
Parks & Recreation Admin	200 Plant Rd	Parks & Rec	5,000	1973	Pubwks, Buildings
Hargraves Recreation Center	216 N. Roberson	Parks & Rec	11,900	1943	Pubwks, Buildings

*DRAFT Water Conservation Report
Local Government Options
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Building Description	Address	Dept.	Square Feet	Year Built/ Acq'd	Maintenance Operating Budget Responsibility
Hargraves Gym	216 N. Roberson	Parks & Rec	9,800	May-98	Pubwks, Buildings
A.D. Clark Pool Bathhouse	216 N. Roberson	Parks & Rec	2,050		Pubwks, Buildings
Lincoln Gym	750 S. Merritt Mill Rd.	Parks & Rec	8,720		Pubwks, Buildings
Lincoln Arts Center	750 S. Merritt Mill Rd.	Parks & Rec	4,750		Pubwks, Buildings
Meadowmont Cabin	Meadowmont Lane	Parks & Rec	200	Jun-04	Pubwks, Buildings
Carolina Sport Art	Homestead Rd	Parks & Rec	6,300	Jun-04	Pubwks, Buildings
Umstead Park Bathhouse	351 Umstead Drive	Parks & Rec	950	Jun-95	Pubwks, Buildings
Northern Comty Park Admin	Mlk Jr Blvd	Parks & Rec	900	Jun-98	Pubwks, Buildings
Northern Comty Park Restrooms	Mlk Jr Blvd	Parks & Rec	950	Jun-98	Pubwks, Buildings
N. Forrest Hill Bathhouse	Collums Rd	Parks & Rec	950	Jun-96	Pubwks, Buildings
Ephesus Park Bathhouse	Ephesus Church Rd	Parks & Rec	600		Pubwks, Buildings
Cedar Falls Park Bathhouse	Weaver Dairy Rd	Parks & Rec	960		Pubwks, Buildings
Nunn Mtn. Radio Repeater Shelter	Piney Mountain Rd	Public Works	200		Pubwks, Buildings

Total 471,091

Town of Carrboro Real Property Inventory

<u>Building Description</u>	<u>Square Feet</u>	<u>Police</u>	<u>Rec & Pks</u>
Town Hall	22,599		
Public Works Facility, offices	3,651		
Garage Area	3,000		
Fire Station	11,283		
Century Center	23,600	11,729	11,871
Total Square Footage	64,133		

Town Hall Breakdown

Maintenance Shop, total	1,140
<u>Basement & 1st floor, total:</u>	7,000
Human Resources	1,850
IT Office	650
Conference Room	750
Break Room/Fuse Room	750
Police Evidence Room	1,359
Recreation Storage	2,100

*DRAFT Water Conservation Report
Local Government Options
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<u>2nd floor, total</u>	7,000
Boardroom	1,500
2 conference rooms	640
ECD	350
Mgrs Office	900
Mayor/Mayor Assistant/Zaffron PC area	950
Town Clerk	450
Mgmt Svcs	2,210
<u>3rd floor, total</u>	7,000
Planning	2,600
Rec. storage	2,160
MS Storage	750
Planning storage	1,490

Orange County Real Property Inventory

Community

Carrboro

Moody Building

Cedar Grove Township

Northern Human Services Center -- NC 86

Chapel Hill

501 West Franklin Street

Animal Shelter -- off MLK

Homestead Community Center -- off Homestead Road

Northside

Southern Human Services Center -- off Homestead Road

Skills Development Building

Chapel Hill Township

Blackwood Farm -- off New Hope Road

EMS —911 — off New Hope Road

Efland Area

Efland Community Center — off Richmond Road

Efland Rescue

Hillsborough Downtown

Court Street Annex

Historic Courthouse

New Courthouse

Link Governmental Service Center

Governmental Services Annex

Graham Building

Jail

Purchasing

Sawyer Building

Sheriff Department Building

Whitted Main Building

Whitted Recreation Annex

Hillsborough Savings and Loan

Other locations

Eno Mountain EMS tower

Meadowlands

Sportsplex

Motor Pool Facility

Old Motor Pool Facility

OPT Modular Office

Planning and Agricultural Building

11 County Recycling Drop-off Sites

Little River Regional Park Buildings