

Annual Report
With
Recommendations Supporting Enhanced Water Efficiency

*The North Carolina
State Water Infrastructure Commission*

To

*The Governor
and Members of the North Carolina General Assembly*

November 1, 2008

The State Water Infrastructure Commission was created by act of the North Carolina General Assembly in 2005. The purpose of the Commission is to identify the State's water infrastructure needs, develop a plan to meet those needs, and monitor implementation of the plan. The Commission is comprised of 13 members representing State agencies and non-profits, organizations representing North Carolina local governments and members of the water infrastructure and water resources professions.

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Executive Summary

Recognizing that the water and air resources of the State belong to the people, the General Assembly affirms the State's ultimate responsibility for the preservation and development of these resources in the best interest of all its citizens and declares the prudent utilization of these resources to be essential to the general welfare.

North Carolina General Statutes Article 21, Section 143-211(a)

Executive Summary

Since first convening in 2005, the members of the State Water Infrastructure Commission have been firmly committed to enhancing the environmental sustainability of our State. As charged by the North Carolina General Assembly, the group has put forward recommendations each year which we believe will encourage stronger State and local commitment to our water future.

Outlined in this 2008 Annual Report are a series of “do-able” recommendations that we believe will deliver water efficiency gains for our State. This year we have examined three water efficiency tools: Water Audits and Leak Detection, Reclaimed Water and Water Rates/Rate Structures. Each alone has the potential to reduce the amount of water we use daily. Together, as part of an overarching policy shift by the State on water efficiency, they have potential to change the way we think about and value our water resources.

Water systems across the State are making choices today regarding where their next increment of water will be found. We have distinct choices how we meet both current and future demand. On the one hand, where ground water or surface water is available, we can develop new supplies, build new intakes, drill new wells and develop new treatment facilities. Where supplies are not so plentiful we can attempt to secure an Interbasin transfers of water, moving large quantities of water from one river basin to another. The costs associated with all these options are significant. New regulations, problems with water quality that drive up the costs of treatment and rising construction prices all contribute to the growing expense of new construction and major renovations of treatment and distribution systems.

On the other hand, we can begin to look seriously at the water savings found through more efficient use of our existing supplies. We can reduce the demand for highly treated drinking water through a variety of conservation and efficiency measures. On the supply side (the water system side) we can conduct water audits and determine where and how much water is leaking from the system and prioritize repairs. We can use highly treated drinking water only for the purposes needed—drinking, bathing, cooking, food processing – and substitute reclaimed wastewater for the uses that do not require treated drinking-quality water – lawn and golf course irrigation and irrigation of crops among others. We can price water appropriately through changes to rates and rate structures. On the demand side (the customer side) we can become more conscious of our daily water use, and reduce consumption through conservation tools such as low-flow showerheads, water conserving appliances and fixtures and by changing our habits associated with water use to become more water efficient.

Our recommendations for consideration by the Governor and the members of the North Carolina General Assembly include the following:

Infrastructure Financing

Recommendation: Establish permanent State funding for water, wastewater and stormwater improvements. Estimates of needed infrastructure investment to meet 2030 demands exceed \$16 billion for North Carolina. Current (2008) unmet need in funding application submitted to State funding agencies exceeds \$100 million.²⁵

Recommendation: Establish a stakeholder process to determine whether and if so, how much to increase in the Median Household Income Threshold used for determining grant eligibility under current State law. The SWIC should recommend changes, if any, to the legislature by March 30, 2009 with sensitivity incorporated for economically distressed communities.

Recommendation: Develop an annual process for reporting on all state and federal grant and loan resources utilized for water, wastewater and stormwater projects. The report should catalog the types of projects funded, show the geographic distribution of funds and be used as an assessment tool in the gauging of need for State-level infrastructure investment.

Drought Preparedness and Water Resource Management

Recommendation: Section 17 of Session Law 2008-143, Improve Drought Preparedness and Response (HB 2499), directed the State Water Infrastructure Commission to develop guidelines for water rate structures that are adequate to maintain and operate water systems and consistent with the State guidance on water conservation. Utilize the Water Rates Guidelines being developed by the State Water Infrastructure Commission as a policy guide for discussion on allocation of State funding for water infrastructure.

Recommendation: Section 9 of Session Law 2008-143, Improve Drought Preparedness and Response (HB 2499) encourages water systems applying for State infrastructure funds to become more efficient by requiring them to demonstrate they have met thresholds to be established by State funding agencies. SWIC will support the funders of water infrastructure to implement Section 9 of SL 2008-143.

Recommendation: Once the statewide water efficiency standards have been developed and implemented by the Department of Environment and Natural Resources, additional incentives are needed to encourage water efficient practices by local systems. Additional public policy, regulation and education is needed to encourage the use of techniques such as developing new utility business models based upon selling water services instead of selling gallons of water; system pressure management to reduce water leaks; local land use policies to support water-efficient development; improvements to the State Building Code to support water conservation strategies such as water efficient fixtures and appliances and water reuse.

Water Audits

Recommendation: Require the AWWA Water Audit methodology or an equal standard for guidance to local systems conducting water audits as a means to increase water system efficiency and financial stability.

Recommendation: SWIC recommends that North Carolina Department of Environment and Natural Resources – Division of Water Resources consider modifications to the Local Water Supply Plan format to collect needed information from these water audits. Local Water Supply Plans are required for public water systems are a five year interval. The format for collecting the data can be readily adjusted to collect the additional and important information on non-revenue water.

Recommendation: The North Carolina Local Government Commission should consider requiring a water audit before approving debt to finance water infrastructure. State infrastructure funders – DENR and the Rural Center - should consider including the costs of financing a water audit for needy communities in their grant and loan packages. Water audits should be reported to Division of Water Resources and made available to the public.

Reclaimed Water

Recommendation: Consider a change to the reference in the North Carolina Administrative Code and related Statute(s) to categorize water reuse as a “water resource”. Reclaimed water is highly treated wastewater, water treated to standards above the quality on influent water to most of the state’s drinking water systems. Reclaimed water is a vital part of our water resource future in North Carolina and should be utilized to replace treated drinking water for uses not requiring treated drinking-quality water.

Recommendation: Continue discussion of the permitted uses for reclaimed water to include the more options and incentives for reclaimed water. Replacement of highly treated drinking water with reuse water makes sense if we are to effectively and efficiently manage of our State’s water resources. Other uses for reclaimed water may be available in other states in the US and abroad, including aquifer storage and recovery (ASR), aquifer recharge, stream augmentation and potable reuse. The SWIC will continue its review of appropriate uses of reclaimed water.

Recommendation: Reduce the competitive price disadvantages to expanded use of reclaimed water. So long as those who need water can secure it cheaply and with little or no administrative permitting challenge, reclaimed water will always suffer a price disadvantage. Comprehensive management of all the State’s water will help prioritize uses of water and eliminate one of the competitive disadvantages for using reclaimed water. The 2009 General Assembly should seriously consider requiring large users of surface water and ground water to apply for water withdrawal permits.

Recommendation: Develop or enhance existing local policy frameworks and institutions for management of water resources. Reclaimed Water is best managed at the local level- it is a localized resource. Therefore, strong local policy and management structures provide the best opportunity for effective operation of water resource programs, including water reuse programs. In North Carolina, local government system owners make the policy decisions on rates and rate structures, how the systems are managed and determine how prepared systems are for the future. SWIC recognizes the value of thinking beyond local borders when sustainably managing water resources and encourages the use of basinwide management and planning that supports regional collaborations and enables the wise use of resources – both financial and natural. SWIC recognizes the need for continued education of water consumers on the value of these

local planning frameworks and management institutions and encourages State financial support of education and training for local elected officials and other decision-makers.

Regional Partnerships

Recommendation: Support the development of regional infrastructure partnerships through direct State investment in policy development, funding, and technical assistance. In FY '07-'08, the State Water Infrastructure Commission explored the value of regional partnerships to drinking water, wastewater and stormwater infrastructure systems. SWIC concluded that regional partnerships, when the partners are ready for regional collaboration, provide an efficient and effective management structure for infrastructure systems. SWIC reiterates in this 2008 Annual Report the value of regional efforts and specifically encourages the State to consider the following:

- Develop and implement a set of criteria for evaluating system “readiness” for regionalization. This may prevent bringing systems that are not ready i.e., not yet managing their systems efficiently and effectively, into a regional configuration where they cannot participate as an equal.
- Fund a study to identify the most promising regions for water regionalization that could then inform local decision makers, funders and the public.
- Provide Start-Up funding for regional projects to match local investments for the engineering, planning and legal work associated with forming a regional entity.

Fund the State Water Infrastructure Commission

Recommendation: The State Water Infrastructure Commission recommends that the Governor and 2009 General Assembly appropriate \$250,000 per year to fund the ongoing work of SWIC. The State Water Infrastructure Commission provides a necessary forum for discussion and decision-making on water resources and infrastructure matters for the State of North Carolina. This funding will allow the SWIC to complete its charge in the 2008 Drought Bill and continue its ongoing work with the Water Allocation Study of the Environmental Review Commission.

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Members of the State Water Infrastructure Commission

Members of the State Water Infrastructure Commission: January 2008 – December 2010

Standing Members

Bill Holman, Chairman, Appointee of Speaker Pro Tem

William Laxton, Deputy-Assistant Secretary, NC Department of Environment and Natural Resources

Vacant, NC Department of Commerce

Billy Ray Hall, President, NC Rural Economic Development Center

Ellis Hankins, Executive Director, NC League of Municipalities

Vance Holloman, Deputy State Treasurer, Office of State Treasurer

David Thompson, Executive Director, NC Association of County Commissioners

Richard Rogers, Executive Director, Clean Water Management Trust Fund

Appointed Members

Dr. Downey Brill, Professor, NC State University (Chancellor's Appointee)

Steve Cavanaugh, P.E., Cavanaugh Associates (American Council of Engineering Companies Appointee)

Harold Herring, Executive Director, Neuse Regional Water and Sewer Authority (Appointee of the Governor)

The Honorable Bill Owens, NC House of Representatives (Appointee of House Speaker)

Richard Whisnant, Associate Professor, UNC School of Government (Appointee of Water Resources Research Institute)



Bill Holman, Chairman



Bill Laxton



Billy Ray Hall



Ellis Hankins



Vance Holloman



David Thompson



Steve Cavanaugh, P.E.



Dr. Downey Brill



Richard Rogers



Harold Herring



Rep. Bill Owens



Richard Whisnant

Introduction

Introduction

North Carolina's population is growing. This growth is expected to continue through the year 2030. Information from the State Data Center shows an expected 30 percent increase in population between 2010 and 2030, bringing the State's population to more than 12 million people.

Most of us are already experiencing the impacts of that population growth. It comes in many forms that touch our lives everyday. School overcrowding and plans for the development of new school facilities. Traffic congestion. New subdivisions that bud and blossom seemingly overnight on what was once productive farmland. The skyrocketing cost of mountain and beach property. Longer waiting time at recreational facilities, shops and restaurants.

As population increases, so does the amount of water we use. In the decade between 1995 and 2005, fresh water withdrawals by public systems increased 20 percent in North Carolina. This year as the drought of 2008 reached its height, water systems across the State experienced water shortages never before experienced. Weather events and climate change place additional pressure on supplies already stressed by growth. The combination of these forces calls into question whether we are managing this precious resource as effectively and efficiently as possible.

Water systems across the State are making choices today regarding where their next increment of water will be found. We have distinct choices how we meet both current and future demand. On the one hand, where ground water or surface water is available, we can develop new supplies, building new intakes, drilling new wells and developing new treatment facilities. Where supplies are not so plentiful we can attempt to secure a permit for the Interbasin transfers of water, moving large quantities of water from one river basin to another. The costs associated with all these options are significant. New regulations, problems with water quality that drive up the costs of treatment and rising construction prices all contribute to the growing expense of new construction and major renovations of treatment and distribution systems.

On the other hand, we can begin to look seriously at the water savings found through more efficient use of our existing supplies. We can reduce the demand for highly treated drinking water through a variety of conservation and efficiency measures. On the supply side (the water system side) we can conduct water audits and determine where and how much water is leaking from the system and prioritize repairs. We can use highly treated drinking water only for the purposes needed- drinking, bathing, cooking, food processing – and substitute reclaimed wastewater for the uses that do not require treated drinking-quality water – lawn and golf course irrigation and irrigation of crops among others. We can price water appropriately through changes to rates and rate structures. On the demand side (the customer side) we can become more conscious of our daily water use, and reduce consumption through low-flow showerheads, water conserving appliances and fixtures and by changing our habits associated with water use.

The State Water Infrastructure Commission has dedicated the 2007-2008 year of work to exploring efficiency options that can help us meet the growing demand for water which can reduce the stress on our State's water resources. In this *Annual Report*, the State Water Infrastructure Commission offers an examination of water reuse, water audits, and rates/rate structures as three tools for enhanced management of our State's water resources. While there are many other techniques and efficiency strategies available, the SWIC focused on these because they can provide measurable, near-term results for the State.

In exploring these topics, SWIC members heard from a variety of experienced professionals in the water industry. We discovered that remarkable effort is being delivered by a variety of people and resources to change how we value water and in so doing, create a more sustainable water future for the State. We commend their work on this paradigm shift from "water waste" to "water efficiency" which must occur, and offer the following report from the State Water Infrastructure Commission to help guide the public policy changes that are needed to support that shift.

Bill Holman, Chairman
North Carolina State Water Infrastructure Commission

Background on the Commission

Background on the State Water Infrastructure Commission

The State Water Infrastructure Commission (SWIC) was created through passage of House Bill 1095 during the 2005 Session of the North Carolina General Assembly. Passage of this bill was led by The Honorable John Kerr of the NC Senate and The Honorable Pryor Gibson of the NC House of Representatives and supported widely by members of the General Assembly. The bill is codified as Session Law 2005-454, "An Act to Establish Uniform Criteria for Drinking Water, Wastewater and Stormwater Loans and Grants, to Clarify and Revise the Procedures that Apply to These Loans and Grants to Reflect the Exhaustion of the 1998 Clean Water Bond Proceeds, and to Provide for Greater Coordination Among Agencies that Make Loans and Grants for Water Projects by Establishing the Water Infrastructure Commission."

The drive for creating the SWIC was to have available a forum where members could engage in proactive policy discussions relating to infrastructure. Of significance to the creators of SWIC were: 1) to make certain that the State's policies governing infrastructure financing were refined and updated to better align with current trends, and 2) to define the role of the State in providing financial resources and supporting best management practices for needed infrastructure investments.

The creation of the Commission and the modifications to the State's existing water and wastewater finance law were the product of a collaborative effort between major State funders of infrastructure including the Department of Environment and Natural Resources, the Clean Water Management Trust Fund and the Rural Economic Development Center. Together, these three entities have served as the administering agents of State funds and through this continue to make important water, wastewater and storm water investments that have protected public health and the environment and created opportunities for economic growth and development.

Specifics of the Legislation

The legislation offered numerous modifications to Section 159G. Previously called the North Carolina Clean Water Revolving Loan and Grant Act of 1987, the new section title is simply and inclusively, *Water Infrastructure*. This decision, as others in this revision to existing law, symbolized the intent of the drafters to create a more cohesive set of guidelines for management of State funding resources for infrastructure improvements and focus for those investments. Water Infrastructure, in this case, refers inclusively to drinking water, wastewater and stormwater infrastructure.

The newly adopted version made a number of technical corrections, consolidating the existing State water and wastewater funds into one fund- the Water Infrastructure Funds - where the accounts for the Clean Water State Revolving Fund and the Drinking Water Revolving

Fund would now be housed. Along with these accounts, the Drinking Water Reserve and the Wastewater Reserve accounts were established for the purpose of receiving State funds for loans and grants. The new version also established a set of common criteria upon which certain points in applications reviewed would be determined.

Article 4 established the State Water Infrastructure Commission. The purpose of the Commission as set out in the law is to identify the State's water infrastructure needs, develop a plan to meet those needs, and monitor the implementation of these plans. The Commission consists of both appointed (6) and standing (7) members.

Appointments were completed in May 2006 and the Commission held its first meeting that month. Specific duties of the Commission include:

1. To assess and make recommendations on the role of the State in the development and funding of wastewater, drinking water, and storm water infrastructure in the State.
2. To analyze the adequacy of projected funding to meet projected needs over the next five years.
3. To propose State priorities for funding.
4. To make recommendations on ways to maximize the use of current funding resources, whether federal, State, or local, and to ensure that funds are used in a coordinated manner.
5. To review the application of management practices in wastewater, drinking water, and stormwater utilities and determine the best practices.
6. To assess the role of public-private partnerships in the future provision of utility service.
7. To assess the application of the river basin approach to utility planning and management.
8. To assess the need for a "troubled system" protocol.

Review of Commission Work 2006-2007

Commission Examines Regional Partnerships and Supports Infrastructure Financing in 2006-2007

Completing its second year of activity, the Commission submitted its 2007 report to the Governor and the members of the Environmental Review Commission offering a series of recommendations outlining how the State might support the development of regional infrastructure partnerships. To develop these recommendations, the SWIC conducted research on the practice of regionalization both within North Carolina and in other states and heard from numerous regional system owners on the “why” and “how” their regional partnerships were developed.

Continuing in its efforts to assist in refining the State’s role in infrastructure development and finance, the SWIC also allocated efforts to support additional State funding in the 2007-08 legislative session and acted as a sounding board for the North Carolina Funder’s Forum, the consortium of State, Federal and Non-Profit funders of infrastructure in the State.

Regional Partnerships

The SWIC examined benefits of regionalization, but paid particular attention to the policy and regulatory barriers that might exist which discourage regional efforts. In summary, the SWIC found that the benefits of regional partnerships were found not only in the regional connections – regional treatment systems- but in the collaborative thinking that must be in place to support the partnership. SWIC found that regional collaborations and partnerships, when founded on a principal of equity and fairness among partners, provided most successfully delivery of safe and affordable service to its customers.

The SWIC noted the benefits of regional partnerships to be the following:

- Regional collaborations, whether they involve a physical connection between systems or a managerial or administrative connection, can provide an economy of scale that systems operating alone cannot achieve. Many of the costs associated with constructing infrastructure are fixed costs – planning, permitting, and engineering- that will not increase significantly by adding another partner. These economies of scale can be seen in the improved quality of delivery, improved ability to keep pace with regulatory changes and demands including attracting and maintaining qualified staff.

- Regional collaboration involving a physical connection between systems can reduce the need for establishing new treatment facilities by requiring connection to an existing regional facility with available capacity. Reducing the number of plants in operation can lessen operations and maintenance costs and duplication of service.
- As the federal investment in infrastructure continues to decline and change form from grant to loan, more emphasis is being placed on State and local resources to fund needed improvements. States across the country are grappling with defining their role in infrastructure funding. Locally, system owners are challenged to maintain rates at levels that demonstrate their customers are paying “their fair share”. Working in a regional collaboration may offer a better way to face increasing costs of replacement and new infrastructure and operation and maintenance.
- In today’s environment of scarce financial resources and looming capital needs for infrastructure improvements, funders may provide priority to regional systems as a more cost-effective investment of the funding resource.
- Establishing a network of regional infrastructure systems can provide needed assurance for backup supplies in emergency situations such as those caused by hurricanes, flooding and drought. Health risks often associated with these emergency situations can be mitigated through regional collaboration.
- In order to be successful in the global economy, local governments and states are challenged to think about economic development on a regional basis, evaluating and capitalizing on regional assets. In today’s environment, this may be the only way to ensure that their regions are efficient and competitive. Water infrastructure is an essential support for economic development. Safe and vital regional infrastructure networks must be in place to support future economic development.

SWIC found several immediate and significant barriers to developing regional systems within the State. Primary among these was the perception of “loss” associated with regionalization. Regional systems are founded on cooperation and require system owners to be visionary - to see beyond the immediate challenge to a future several years hence. It also requires system owners to come together without

fear of loss of identity and control – a tall order for most of us. Local politics, whether we like it or not, continues to stand in the way of good decision-making and play a major role in whether regions develop or not.

SWIC also found financial barriers to regionalization. Our existing funding environment provides only minimal (\$40,000 per community) financial grant assistance to regional start-ups. In most cases, regional partners had had to pay all the costs of developing the partnership including studies, preliminary engineering and permitting. SWIC noted that this is exceptionally challenging for smaller systems that may see the benefit of regional collaboration, but have limited capital to contribute. SWIC determined that predictable revenue available from the State would allow strategic development of regional facilities. Multi-year, predictable public investment needed s needed to support regional efforts.

For small systems, SWIC noted that the distance between systems and the relatively small number of users per system limited the financial ability of the system to operate efficiently as an independent entity. Thus, many small systems appeared on the surface to be good candidates for regionalization. However, many of these same small systems have significant structural problems within their treatment, distribution and collection systems that can render them poor candidates for physical connection to another system until those internal deficiencies are corrected.

Finally, SWIC found through a brief review of existing public policy that both regulatory and legal barriers exist in North Carolina to regionalization. As the State grows in population competing uses for water have emerged and will continue to emerge. While the development of regional infrastructure seems to make sense to both protect the environment and public health as the population pressures increase, regionalization runs headlong into the Interbasin Transfer Rules as they are now established in the State.

SWIC concluded its examination of regional partnerships in the fall of 2007, finding that regional collaborations, whether they involve an actual physical connection between systems or a management or administrative connection such as sharing operators and equipment, provide an important service to the State.

Thinking regionally is thinking collaboratively. Working together to address our State's infrastructure and water management challenges, especially in an environment of scarce financial resources and demanding political accountability, makes sense in a regional context. How we do that in North Carolina can be improved.

SWIC set forth the following recommendations in 2006-2007:

- Remove existing barriers to regional cooperation.
- Develop and implement a set of criteria for evaluating system “readiness” for regionalization.
- State funders of infrastructure should develop a “Cooperation Alternatives Analysis” process and documentation as a way to ensure that systems seeking State funds have analyzed all regional alternatives available.

- Federal and State funders of infrastructure should execute a Memorandum of Understanding to support funding collaboration on regional projects.
- Fund a study to identify the most promising regions for water regionalization that could then inform local decision makers, funders and the public.
- Start-up funds for regional efforts should be made available for strategic investment in regional collaborations.
- System regionalization should also allow for cooperation between private and public water entities.
- Encourage the state Division of Water Resources to explore and employ water resource management strategies that compliment regionalization such as allowing communities to bank the excess water capacity for future use.
- System owner education on fiscal management and its relationship to regional partnerships is necessary and needed. Educational materials are also need for the consuming public on the value of regionalization as a tool for managing the state's water resources.

Infrastructure Financing

During the 2007-2008 Short Session of the General Assembly, the SWIC reiterated its commitment to both short-term critical needs funding and a longer-term permanent strategy for infrastructure development and funding. The SWIC recommended appropriation of \$50 million to address immediate and critical water infrastructure needs in fiscal years 2007-2008.

The SWIC noted that the last major State investment in drinking water and wastewater infrastructure was the through the Clean Water Bond Act of 1998. These important funds have been exhausted and many necessary projects were still unfunded. SWIC supported a \$50 million appropriation in the short session which would ensure that systems with time-sensitive and critical needs would have the resource they need.

At the close of the 2007-2008 Session, the General Assembly had appropriated \$50 million for critical drinking water and wastewater needs. These funds are to being administered by the North Carolina Rural Economic Development Center. In light of numerous competing needs of the State, the General Assembly was unable to act on the recommendation for dedication of a permanent source of revenue for water and sewer infrastructure improvements. In the face of at least \$16.6 Billion in capital needs to improve the state's drinking water, wastewater and stormwater infrastructure, the growing population of the State and the recent drought event, SWIC maintains that dedication of a permanent source of State revenue for infrastructure is the preferred option for addressing this need.

Water Efficiency: Commission Work 2007-2008

Water Efficiency: Commission Work 2007-2008

As the State Water Infrastructure Commission released its Annual Report in November of 2007, the consequences of the ongoing drought were brought into clear focus. By the end of December 2007, 67 counties were designated as under “exceptional drought”, the most severe of the drought designations. Another 20 were in extreme drought and 13 in severe drought.¹ There were no moderate drought counties.

This drought of 2007 was more remarkable than the recent drought of 2002, not only because all 100 counties in the State of North Carolina were affected, but because of the speed with which the drought progressed. Within four months, as shown by the graphics below, the drought had spread across the State, engulfing 55 additional counties in exceptional drought conditions.

Figure 1: NC Drought Status 8/07 and 12/07

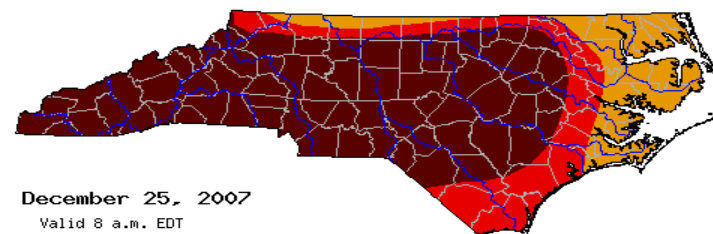
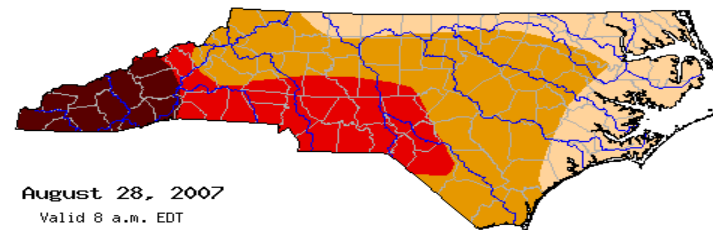
Drought status is assigned to each county through a consensus of opinion by members of the North Carolina Drought Management Advisory Council. Members are professionals in weather and climate and evaluate data on existing conditions for rainfall, stream flow, wildfire activity and other similar indicators. The group recommends an assignment to the U.S. Drought Monitor and weekly updates to the maps and county designations are made and posted each Thursday.

Drought Status: August 2007

12 – Exceptional drought
29 – Extreme drought
43 – Severe drought
16 – Moderate drought

Drought Status: December 2007

67 – Exceptional drought
20 – Extreme drought
13 – Severe drought



Source: NC Drought Management Advisory Council

By December 2007, the severity of the drought made water conservation a reality for many water systems and consumers. In Raleigh, the Falls Lake water supply had dwindled to less than 70 days of supply remaining. In Durham, the supply was down to 50 days remaining. On December 20, 2007, Governor Easley conducted a press conference as part of the NC Drought Monitoring Advisory Council Meeting and called for 30 percent conservation reduction in all systems, and 40 percent in those hardest hit by the drought.

Figure 2: Falls Lake, Raleigh Water Supply, Winter 2007



Source: *Google Images*

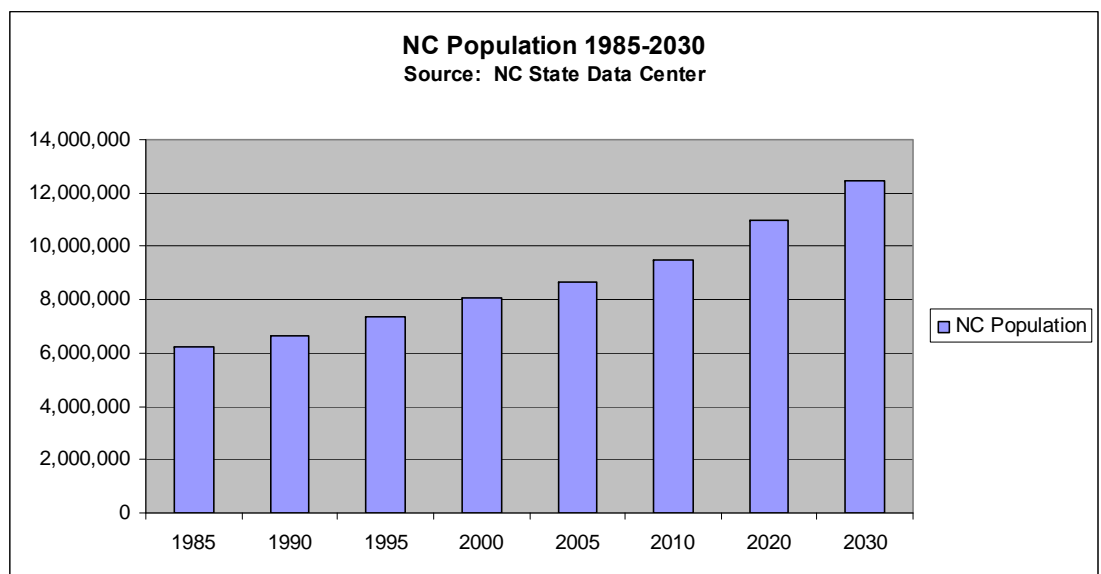
In addition, the Governor asked systems to adopt water conservation pricing systems, announced creation of a drought website, and called for the 30 most drought-affected communities to convene in January 2008 to determine their plans for water supply should the drought deepen.

While most previous drought response efforts had been focused on demand side – consumer – reduction, this call by the State was for both supply and demand side conservation. Water systems were called upon to conserve water through their own operations. For many systems this was the first time attention was placed on the reduction of water use on the supply side. Water audits, leak detection and conservation pricing became regular parts of the conversation on how North Carolina would deal with its most severe drought.

Population Growth and Water Demand

The drought of 2008 created real water shortages in many areas of the State. For most systems, it amplified the apparent challenge of meeting the water demands for a growing population. Population growth in North Carolina has exceeded population growth in the nation as a whole since the year 2000.² In the twenty year period between 1985 and 2005, North Carolina’s population grew by 39 percent. Growth through 2030 calculated by the State Data Center shows an expected 30 percent increase in population between 2010 and 2030, bringing the State’s population to more than 12 million people (see Figure 3).

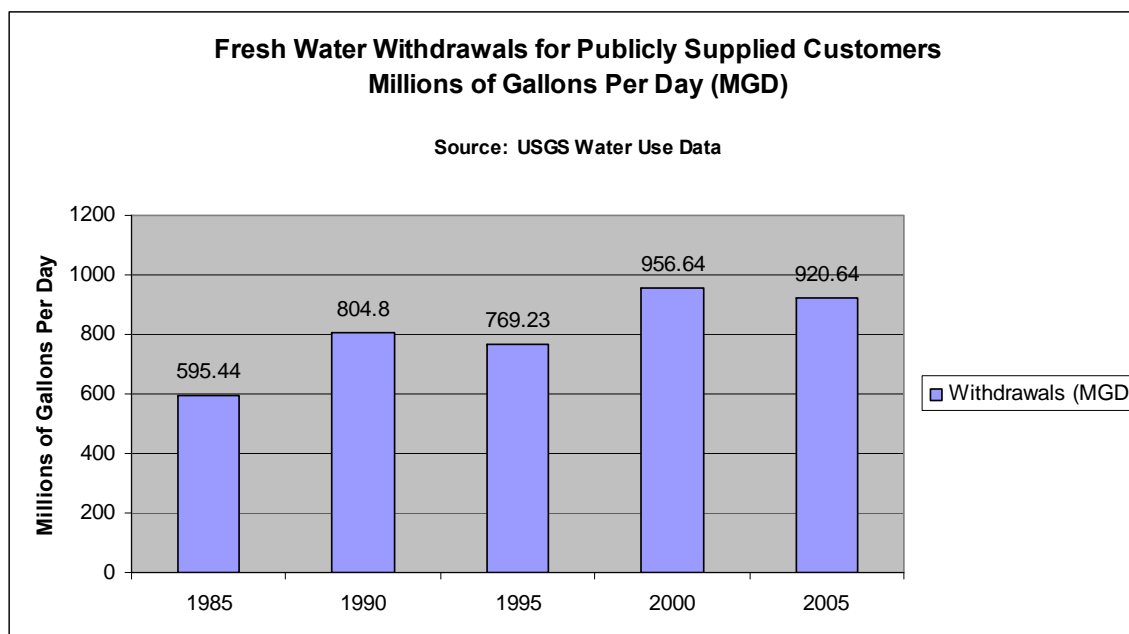
Figure 3: North Carolina Population 1985-2030



Note: Population figures for 2010, 2020 and 2030 are estimates provided by the State Data Center.

Unlike many other states in the nation where agricultural irrigation accounts for the majority of water use, *people drive water use in North Carolina*. According to data gathered on water use by the United States Geological Survey, water supplied by public systems in North Carolina increased more than water use from private (domestic) wells, and the commercial, industrial, mining, livestock and crop irrigation sectors combined.³ As shown in the chart below, withdrawals of ground and surface waters by public systems increased 55 percent between 1985 and 2005 from 595.44 MGD to 920.64 MGD.⁴ Our water use as customers of public systems has exceeded our population growth, reflecting an increased use of water per capita.

Figure 4: Fresh Water Withdrawals for Publicly Supplied Customers: 1985-2005



The overwhelming majority of that water use increase occurred in the top twenty counties of the State when ranked by the amount of increase. As shown in **Figure 5** below, the increase in water use in these counties was 282.52 MGD from 1985 to 2005 – a doubling of use. The aggregate change in water use in the remaining 80 counties in the State was 42.97 MGD.⁵

Figure 5: Top Twenty Counties Ranked by Increased Water Use in MGD 1985-2005

| | County | 1985 | 1990 | 1995 | 2000 | 2005 | Change in MGD 1985-2005 | Percent Change 1985-2005 |
|--------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------------------------|---------------------------------|
| 1 | Mecklenburg | 50.91 | 65.02 | 72.95 | 106.5 | 120.48 | 69.57 | 137% |
| 2 | Wake | 34.36 | 40.94 | 43.22 | 72.76 | 77.53 | 43.17 | 126% |
| 3 | Bladen | 1.06 | 1.75 | 2.32 | 30.91 | 28.34 | 27.28 | 2574% |
| 4 | Cumberland | 18.26 | 29.94 | 25.17 | 39.73 | 35.13 | 16.87 | 92% |
| 5 | Gaston | 12.92 | 30.96 | 33.47 | 28.75 | 27.52 | 14.60 | 113% |
| 6 | Durham | 19.95 | 22.21 | 20.93 | 30.47 | 33.87 | 13.92 | 70% |
| 7 | Forsyth | 33.78 | 41.87 | 43.35 | 46.61 | 46.14 | 12.36 | 37% |
| 8 | Rockingham | 9.51 | 12.79 | 21.5 | 17.67 | 20.92 | 11.41 | 120% |
| 9 | Davie | 1.50 | 2.12 | 2.36 | 3.16 | 10.37 | 8.87 | 591% |
| 10 | Johnston | 2.57 | 5.37 | 4.61 | 6.89 | 10.21 | 7.64 | 297% |
| 11 | Cabarrus | 4.73 | 6.91 | 9.16 | 21.02 | 12.19 | 7.46 | 158% |
| 12 | Craven | 4.46 | 11.49 | 10.33 | 12.49 | 11.68 | 7.22 | 162% |
| 13 | Wayne | 4.99 | 7.47 | 9.15 | 12.02 | 12.13 | 7.14 | 143% |
| 14 | Catawba | 14.77 | 17.93 | 17.22 | 18.07 | 21.82 | 7.05 | 48% |
| 15 | Lee | 3.55 | 5.05 | 5.05 | 7.22 | 8.55 | 5.00 | 141% |
| 16 | Dare | 3.48 | 3.77 | 4.33 | 6.03 | 8.38 | 4.90 | 141% |
| 17 | Rutherford | 5.10 | 10.03 | 10.09 | 11.62 | 9.87 | 4.77 | 94% |
| 18 | Onslow | 6.74 | 8.91 | 8.48 | 17.32 | 11.47 | 4.73 | 70% |
| 19 | Orange | 7.52 | 9.49 | 10.75 | 12.96 | 11.83 | 4.31 | 57% |
| 20 | Guilford | 41.69 | 44.18 | 42.36 | 56.65 | 45.94 | 4.25 | 10% |
| Total | | 281.85 | 378.20 | 396.80 | 558.85 | 564.37 | 282.52 | 100% |

Commission Defines 2008 Work Plan

Against this backdrop, the State Water Infrastructure Commission designed its work agenda to determine if policy barriers existed which would inhibit the expanded use of water efficiency measures in public systems across North Carolina. The SWIC members recognized that water systems owners and consumers alike are being called upon to change how we value water. Recent events such as the droughts of 2002 and 2008 and the underlying increase in water use call on us to become more efficient in our use of this resource. SWIC members recognized that moving from our current mindset of cheap, readily available and limitless supply to one recognizing limits – an efficiency mindset- will require a significant shift in thinking on part of the consumer and our public policy. In 2008, the SWIC provided a needed forum for discussion on water efficiency measures.

The SWIC has also continued to devote efforts to examining infrastructure funding, including allocation and distribution of funds but also how funders of infrastructure are working together to become more coordinated and efficient in the use financial resources. In addition, the SWIC has been participating with the ongoing Water Allocation Study sponsored by the State Environmental Review Commission. A summary of activities and findings follows.

What is “Water Efficiency”?

Until recently, the water industry practices, education and public policy have focused on water conservation. *Water Conservation*, defined as, “any beneficial reduction in water loss, waste or use” means reducing the amount of water used.⁶

Water efficiency is different. To be water efficient means accomplishing the task with the minimal amount of water feasible. Best put by respected author Amy Vickers, water efficiency is *an indicator of the relationship between the amount of water required for a particular purpose and the amount of water used or delivered.*⁷ If we need 25 gallons of water to shower, but we use 125 gallons, we are not being “water efficient”.

Why Be Water Efficient?

North Carolina is not alone in grappling with the impacts of increased water demand of a growing population. Nationally, the Environmental Protection Agency (EPA) research has shown that at least 36 states are anticipating local, regional, or statewide water shortages by 2013.⁸ EPA’s WaterSense program is a partnership sponsored by EPA which seeks to protect the future of our nation’s water supply by promoting water efficiency and enhancing the market for water-efficient products, programs, and practices.

Being “water efficient” places a different lens on our water use. It challenges us to reduce the waste of water, to find better, more effective ways of doing things and to make behavioral changes in the way we use water. Being water efficient particularly makes sense given the conditions we are experiencing in North Carolina. Population growth and concentration, increasing regulation of drinking water, wastewater and stormwater and unpredictable variations in weather and climate all serve to drive up the cost of water and push us forward into developing new supplies. When local water systems respond to these conditions by finding ways within their own operation to reduce waste, it can help stabilize costs and defer the development of new supplies further into the future. By using water more efficiently, both drinking water systems and customers can help preserve water supplies for future generations, save money, and protect the environment.

Across the country, our growing population is putting stress on available water supplies. Between 1950 and 2000, the U.S. population nearly doubled. However, in that same period, public demand for water more than tripled! Americans now use an average of 100 gallons of water each day – enough to fill 1,600 drinking glasses! This increased demand has put additional stress in water supplies and distribution systems, threatening both human health and the environment.

Source: EPA WaterSense Website



Water Efficiency Drought Response Measures Selected

By February 2008, the drought had reached its peak. Local water system owners and operators were struggling to respond to dwindling supplies while still maintaining safe operations and continuing to serve their customers. In the absence of a prescriptive, mandatory State policy directive, each system was responding as its elected leaders saw fit, with either voluntary or mandatory water conservation measures, rate surcharges, and the closure of high volume water-related businesses such as car washes. Even in the face of drought, though, some systems chose not to enforce mandatory conservation. Water rates and rate schedules were as variant. The disparity of response to the severe drought conditions raised serious questions about the sustainability of water supplies for the future.

In May 2008, policy staff from the Department of Environment and Natural Resources presented legislation to reduce drought vulnerability across the State. Many stakeholders, including the North Carolina League of Municipalities, the Association of County Commissioners, and representatives of public utilities, private businesses and the agricultural and industrial sectors were involved in developing the final language. The bill, known as House Bill 2499 – “The Drought Bill”- was signed into law on July 31, 2008. Now codified as Session Law 2008-143, it contains a number of new policy directives giving the State more precise avenues to handle water emergencies (See Appendix A). The law also reflects a move forward in thinking about how we value and manage water resources and begins to incorporate water efficiency measures for public systems.

To compliment these efforts the SWIC selected three water efficiency measures to examine, each with significant potential to assist local water systems with responding to the drought and to longer-term improved management: Water Audits and Leak Detection, Water Reuse and Water Rates and Rate Setting. SWIC has explored the current State policy status to determine where barriers might exist to expanded utilization of these measures and examined whether the State is making the best use of regulation to support enhanced management of water resources. The SWIC provides this Report as a summary of its work.

Water Audits and Leak Detection

Measured in 2005, public water systems loose more than 35 billion gallons of drinking water they pay to treat - enough to supply the entire Charlotte-Mecklenburg region for that year - due to leaks and unmetered connections.⁹ If that water could be captured through efficiency gains to the system, it would not only protect the water resource from needless waste, but would allow the water systems to push into the future the time for development of new water supplies.

What is a Water Audit?

Evaluating where water goes once it enters into the distribution system can be accomplished through a water audit. The audit procedure is set to measure “water in” and “water out” of the system. Accounting on paper is generally done to determine the volume of water produced by wells or the surface water treatment plant. Accounting is also done to measure the volume of water sold using billing records. Water produced less water sold yields a preliminary, estimated figure of water “lost” in the system.

With building pressures on water supplies and the need to manage systems and resource more efficiently, the methodology of the water audit has been recently refined. In 1997 the Water Loss Task Force, a five-country group formed by the International Water Association (IWA), launched its effort to develop a workable water audit structure for drinking water utilities. The American Water Works Association (AWWA), the major trade and professional association for engineers and other water professionals, participated on this task force. The group published its results in 2000 as the “M36” publication entitled, *Water Audits and Leak Detection*.¹⁰

In 2003 the AWWA Water Loss Control Committee began the effort to rewrite the AWWA M36 publication, *Water Audits and Leak Detection*, to provide guidance on the IWA/AWWA Water Audit Method, including the means to calculate the performance indicators. The format of the water audit is based upon creating a water budget and is premised on the thinking that all water can be accounted for via metering and estimation, either as a form of consumption or loss.¹¹ This publication is now available and in use across the globe.

It is notable in that this new methodology moves thinking away from calculating how much water is “lost” to developing an greater understanding of the end points of water use. It is also notable that it provides a way to calculate the value of water that fails to produce

Each year public water systems loose more than 35 billion gallons of drinking water they pay to treat. That is enough water to supply the entire Charlotte- Mecklenburg region for one year.

- Water 2030 Report, 2006

Charlotte-Mecklenburg Utilities is a non-profit, public utility that provides quality drinking water and sanitary sewer services to more than 750,000 customers in the City of Charlotte and greater Mecklenburg County -- including the towns of Matthews, Mint Hill, Pineville, Huntersville, Davidson, and Cornelius.

- Charlotte Utilities Website

revenue and a greater understanding of costs and benefits – the economic value – of making various repairs to the system. Figure 1. below, illustrates the water balance formula.

Figure 6: IWA/AWWA Water Balance

| | | | | |
|---|---------------------------|---------------------------------------|--|----------------------------|
| System Input Volume (corrected for known errors) | Authorized Consumption | Billed Authorized Consumption | Billed Metered Consumption (including water exported) | Revenue Water |
| | | | Billed Unmetered Consumption | |
| | | Unbilled Authorized Consumption | Unbilled Metered Consumption | Non-Revenue Water (NRW) |
| | | | Unbilled Unmetered Consumption | |
| | Water Losses | Apparent Losses | Unauthorized Consumption | |
| | | | Customer Metering Inaccuracies | |
| | | | Data Handling Errors | |
| | | Real Losses | Leakage on Transmission and Distribution Mains | |
| | | | Leakage and Overflows at Utility's Storage Tanks | |
| | | | Leakage on Service Connections up to point of Customer metering | |

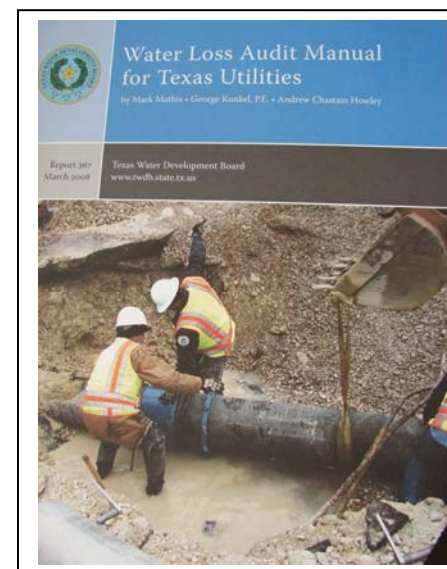
SWIC Examines Texas Water Audit Program

In February 2008 members of the North Carolina AWWA Water Loss Control Committee presented the AWWA Water Audit Standard to SWIC. In response to the presentation the SWIC members appointed a Task Force to further evaluate the new IWA/AWWA methodology and to report back on the utility of this water audit standard to North Carolina. SWIC member, Steve Cavanaugh P.E., was asked to chair the task force. Agencies and organizations represented on the Task Force included the five consulting firms selected by the State to provide water auditing services to the 30 most drought impacted systems, the Department of Environment and Natural Resources (DENR), the UNC Environmental Finance Center, AWWA, the Rural Water Association, NC League of Municipalities and various other local governments some of which had accumulated experience with a water audit.

The State of Texas was selected as a premier example of a state which had implemented the water audit process as a fundamental strategy of their State Water Management Program. The Task Force invited Mr. Mark Mathis, Leak Detection Program Manager, of the Texas Water Development Board (TWDB) to review the Texas program and offer comments on the usefulness of the water auditing process for both local government and the State-level planning process. The TWDB was created by the Texas Legislature in 1957. The mission of the organization is to provide leadership, planning, financial assistance, information and education for the conservation and responsible development of water for Texas. Today it provides all state-level water planning and education, administers to the EPA Clean Water State Revolving Fund and the Drinking Water State Revolving Fund and is authorized to sell state-backed bonds for water and wastewater construction projects.¹²

The Texas Water Audit methodology follows the guidelines of the audit prescribed by IWA/AWWA, but is adapted to the configuration of Texas water systems. Texas chose to utilize this guideline because it provides more useful information for the water system than the prior AWWA model and because it has clearly defined terms and meaningful performance indicators.¹³ Texas State law requires that utilities submit a water audit to the State standard on a five year interval.

The Task Force reported back to the SWIC in June 2008 with findings that supported the adoption by North Carolina of the IWA/AWWA Water Audit Model as a guideline for development of a North Carolina standard. Members of the Task Force determined that this could be readily implemented through modification of the ongoing Local Water Supply Plan process which requires submittal of a plan on a five-year interval to the State's Division of Water Resources within DENR. The Task Force members concluded that the benefit to the State of North Carolina would be enhanced stewardship of both water and capital resources relative to proper operation and maintenance and



establishment of water system benchmarks to be used for both current and long-term planning efforts.¹⁴ The Task Force recommended that implementation of the guidelines should be preceded and supported by education and training on the value of water audits and water loss reductions practices.

Findings of the State Water Infrastructure Commission on Water Audits

Following discussion, the SWIC adopted a position of support for the use of a standardized water audit format in North Carolina. SWIC determined that having a format adopted for use North Carolina in conjunction with the Local Water Supply Plans would increase the utility of the information gathered by the Division of Water Resources. SWIC found that no policy barriers currently existed to deter this modification. The SWIC recognized the utility of the updated IWA/AWWA model but acknowledged that the model was developed for most useful application in large water systems, and required information that many of the State's smaller systems likely would not be able to produce. Thus, the SWIC recommends adoption of the IWA/AWWA model as a guideline for development of a North Carolina water audit format.

City of Wilson Reclaimed Water Program

The City of Wilson was one of the first municipalities in North Carolina to undertake development of a reclaimed water system. As a discharger into the Neuse River Basin, the city was under requirements to reduce the amount of nutrients discharged to Contentnea Creek, a contributory to the Neuse River. The City is required to reduce Total Nitrogen (TN) being discharged into the creek by 30 percent. The City's reclaimed water program will help achieve the goal of reduction by lowering the volume of discharge and the amount of nutrient delivered to the creek.

The City's reclaimed water program serves two industrial parks, two golf courses and the public Rose Garden.



Reclaimed Water

With population increases and the growth in demand for water, the use of reclaimed water - water reuse – represents an opportunity to increase the efficiency with which we manage water supplies. By recycling the water available from wastewater discharges, local systems can increase the efficiency of water use.

What is Reclaimed Water?

Water Reuse – as known as reclaimed water - involves the use of highly-treated wastewater as a substitute for treated drinking water for end uses that do not require potable water quality. In accordance with State and Federal regulation, drinking water systems must be sized to meet peak demand. Meeting the peak demand often drives the development of new supplies and infrastructure investments. If peak demand can be reduced through increasing the efficiency of use, the sustainability of the system and the resources is supported.

SWIC Explores Options for and Barriers to Reclaimed Water

To gain an understanding of the current policy and practice of water reuse, the SWIC conducted its own research and also invited professionals in the water industry to provide their perspectives. SWIC sponsored a series of panel discussions on water reuse which were open to the public and drew significant attendance. The interests represented in the panels included Public Health, Agriculture, Industry, Local Governments already employing water reuse as part of their water management programs, the State of North Carolina represented by officials from the Department of Environment and Natural Resources (DENR) and members and Chair of the North Carolina American Water Works Association (AWWA) Water Reuse Committee. A summary of information and findings are captured in this Report.

The use of reclaimed water in North Carolina is driven by both water quality and water quantity considerations. Water quality concerns provided the initial impetus for the North Carolina water reuse programs as municipal and other dischargers looked for options other than continued discharge to nutrient sensitive waters. Limited assimilative capacity in receiving waters and Total Mass Daily Loads (TMDLs) continue to drive water reuse from the water quality perspective.

More recently, the State program and the practice of reuse has reflected concerns about the availability of water supply to meet future water demands. Water quantity shortages in areas of the piedmont and western portions of the State, and in larger metropolitan cities, have drawn attention to the value of reclaimed water as a substitute for treated drinking water to stretch the utility of infrastructure investments and supply.

North Carolina Reclaimed Water Laws and Regulation

North Carolina's water reuse program began officially in 1996. Staff and Officials within DENR initially developed the program as a means to encourage the alternative use of high quality effluents rather than direct discharge to surface waters. This was particularly important for coastal areas of North Carolina where protection of shellfish waters from pollutants was a priority. The authorizing Statute for reclaimed water in North Carolina is NCGS Article 21, Section 143-213, (18)a. Effectively, it delegates the responsibility for defining the reuse program to the State Department of Environment and Natural Resources and establishes rule making authority with the Environmental Management Commission (EMC). The Environmental Management Commission adopted the first water reuse rules in 1996, codified as 15A NCAC 2H .0200. The rules were modeled with significant attention to the guidance available from the Environmental Protection Agency (EPA) first published in 1992 and existing reuse programs in Florida and California. It is important to note that there are no federal regulations – only guidelines – for the development of reclaimed water systems and the end uses. Therefore, the reclaimed water programs in existence today have evolved on a state by state basis responding to needs for end uses and water quality concerns in each of those states.¹⁵ The survey of other states' regulations and

City of Goldsboro Reclaimed Water Program

The City of Goldsboro has recognized the value of using high quality reuse water and began using reuse for outdoor irrigation on two large city projects; the city golf course and the 114 acres of farmlands for hay production.

Reuse water is also made available, after reuse training, to other city departments, businesses, and Seymour Johnson Air Force Base through bulk hauling. The types of permitted reuse applications from the reuse bulk hauling program are: fire fighting, fire training, vehicle and equipment washing, concrete cutting, decorative ponds and fountains, industrial cooling or boiler water, irrigation of public and private landscapes and turfs, concrete production, sewer cleaning, street sweeping, and power washing. The availability of reuse water for these applications has been very beneficial, particularly in the mandatory conservation phase of the drought.



guidelines revealed that many states apply and adapt their land application of treated wastewater regulations for water reclamation projects. Only a subset of states, including North Carolina, have regulations written specifically to encourage and direct wastewater reclamation aimed at augmenting potable water supplies. North Carolina regulations are among the more comprehensive of these.¹⁶

The current rules found at 15A NCAC 02T .0900 provide for system-level (referred to hereafter as “municipal”) treatment regulations, permitting and options for the use of reclaimed water. Reclaimed water can be used for land application to areas intended to be accessible to the public such as lawns, golf courses, cemeteries, parks, schools, industrial or commercial sites, highway medians and roadways.¹⁷ Reclaimed water is to be used for purposes beneficial to the State and for the purpose of conservation of the State’s water resources by reducing the use of a water resource (potable water, surface water, and groundwater).¹⁸ Reclaimed water may not be used for toilet flushing in single family residences, irrigation of direct food chain crops, the filling of swimming pools, hot-tubs, spas or similar uses, nor for direct reuse as a raw potable water supply.

Reclaimed water projects have been permitted for North Carolina municipal systems since 2001. The City of Charlotte and the Town of Cary were the first permitted projects in the State. Currently, there are 84 active and pending reuse projects in North Carolina with an aggregate 54 MGD permitted flow (including municipal, industrial and private systems). (See Appendix B)

Proposed Modifications to the Reclaimed Water Rules

Following a stakeholder process which included representatives of major water using sectors in North Carolina and water professionals, the State Department of Environment and Natural Resources – Division of Water Quality proposed a series of modifications to the Reclaimed Water Rules.¹⁹ The amendment was heard by the Water Quality Committee of the Environmental Management Commission in September and, in a move that reflected the importance and timeliness of the amendments, referred the document to the full Commission the same month, waiving the notice requirement.

The proposed amendments address many of the water industry concerns with regard to barriers to expanded use of reclaimed water. Notably, the proposed rule changes do the following:

1. Allows for two classes of reclaimed water – Class A and Class B. Class B is established as the minimum standard for reuse water. Refer to the Figure 7 below for a comparison of effluent requirements.

Figure 7: Current and Proposed Reclaimed Water Effluent Treatment Standards

| <i>Parameter</i> | <i>Current Standard</i> | | <i>Class A Reclaimed Waters</i> | | <i>Class B Reclaimed Waters</i> | |
|--------------------------------|-------------------------------|-------------------|---------------------------------|-------------------|---------------------------------|-------------------|
| | <i>Monthly Avg.</i> | <i>Daily Max.</i> | <i>Monthly Avg.</i> | <i>Daily Max.</i> | <i>Monthly Avg.</i> | <i>Daily Max.</i> |
| BOD5 | 10 mg/l | 15 mg/l | 5 mg/l | 10 mg/l | 10 mg/l | 15 mg/l |
| TSS | 5 mg/l | 10 mg/l | 5 mg/l | 10 mg/l | 5 mg/l | 10 mg/l |
| NH3 | 4 mg/l | 6 mg/l | 1 mg/l | 2 mg/l | 4 mg/l | 6 mg/l |
| Fecal Coliform | 14 mg/100 ml (geomean) | 25 /100 ml | 14 mg/100 ml (geomean) | 25 /100 ml | 14 mg/100 ml (geomean) | 25 /100 ml |
| Turbidity | | 10 NTUs | | 5 NTUs | | 10 NTUs |
| E. Coli | | | 3/100ml | 25/100ml | | |
| Coliphage | | | 5/100ml | 25/100ml | | |
| Clostridium Perfringens | | | 5/100ml | 25/100ml | | |

2. Permits the use of Class B reclaimed water for wetland augmentation where a net benefit to the ecological function of the water body can be demonstrated.
3. Permits the application of Class A reclaimed water for irrigation of direct food chain crops that will not be peeled, skinned, cooked or thermally processed prior to consumption. Class B reclaimed water are permitted for food chain crops that will be processed as above prior to consumption.

The DENR staff is currently developing the fiscal note which must accompany the proposed amendment to public hearing. These amendments, if finally approved by the EMC following a public hearing, could possibly take effect in late 2009.

Reclaimed Water Recognized in Public Policy as a “Valuable Resource” in 2008

In addition to the DENR proposed rule modifications, water reuse was recognized as a valuable resource by House Bill 2499, the “Drought Bill”. Codified as Sessions Law 2008-143, the law provides that it is the public policy of the State that the use of reclaimed water is critical to meeting the existing and future water supply needs of the State. Water reuse is recognized as able to provide benefits that are environmentally acceptable and protect public health.²⁰ The law directs the EMC to promulgate rules that identify and facilitate acceptable uses of reclaimed water and facilitate permitting of reclaimed water facilities. The law also requires that water reuse be considered as an option for meeting future water needs as part of the Local Water Supply Plans and in applications by local systems for State-provided infrastructure funding.

Barriers to Expanded Use of Reclaimed Water in North Carolina

During the panel discussions sponsored by SWIC, it became readily apparent that the expansion of water reuse as a tool for efficient management of water resources would most likely occur 1) there was sufficient collective experience with water reuse at the system level to demonstrate its utility, 2) when the laws and regulations provide incentives for reuse and 3) when the pricing of water services more accurately reflected the full costs thereby reducing the risks of investment in costly reuse infrastructure. A summary of barriers to expanded use of reclaimed water brought forward by panelists follow.

► Perceived Negative Impacts to Public Health

Policy makers, regulators and consumers, alike, express concerns regarding the potential for microbiological contaminants in reclaimed wastewater. Invited speaker, Dr. Mark Sobsey, Kenan Distinguished Professor, UNC School of Public Health, acknowledged expert on public health risks related to reclaimed water, affirms that public health risks can be addressed by responsible regulations, policies and practices that are health-risk based.²¹ Noting research and practice worldwide, Dr. Sobsey conveys that recognizing the risks and taking appropriate actions to minimize them to acceptable levels is not only possible but has already been accomplished in states such as Florida and California. Water reclamation and reuse is possible in all situations and settings and can be done in ways that protect public health. Public education is essential to the expanded use of reclaimed waters and is not yet funded as part of a statewide water resource management program.

► Competitive Price Disadvantages

Reuse Water experiences a competitive disadvantage in relation to the use of ground and surface waters by water systems. Currently in North Carolina there are no extraction costs for water and regulatory limits on withdrawals are defined only in capacity use areas. Essentially, groundwater and surface water are available free and unlimited. In addition, the pricing of water by local systems is unregulated. Both rates and rate structures are established at the local level and may or may not adequately cover the costs of treatment and distribution. Reclaimed water systems are costly, requiring advanced treatment technologies and separate distribution systems. Water that can be extracted at no cost, in unlimited quantity, and undervalued in price, creates a significant comparative disadvantage for the expanded use of reclaimed water.

► Setback (Buffer) Requirements

Setback requirements stipulate the distances (in linear feet) that must exist between the application of reclaimed water to land as irrigation water and surface waters. At the time that the setbacks were determined (1996), they were based upon the programs and experiences in other states. Setbacks were established in part to reduce the runoff and therefore the increased load of pollutants potentially caused by reclaimed water to streams and other water bodies that would subsequently be used for shell fishing purposes. The North Carolina program required an additional 50 to 100 feet of buffer than many other state's and no corresponding reduction in the fecal coliform limit.²² As brought forward in the panel discussions, North Carolina regulation currently allows irrigators (such as golf courses) to withdraw water from a stream and apply that water, with no attention or regulation as to water quality, to the land or crops – even crops for human consumption. This absence of regulation permits the application of wastewater discharged from an upstream wastewater facility where effluent treatment standards may be significantly less than those required for reclaimed water. In contrast, if the irrigator is purchasing water from a reclaimed water facility, they would be purchase highly treated wastewater –water treated to tertiary standards and safe for the environment and public health.

► Reclaimed Water for Agricultural Uses

Current regulations require the treatment of reclaimed municipal wastewater to tertiary effluent limits. Land application of municipal wastewater to restricted access agricultural fields, crops, and woodlands has been permitted and practiced in North Carolina for decades and can require less restrictive effluent limits. Opportunities for the application of reclaimed water to agricultural lands are plentiful in North Carolina and could be facilitated, as part of an overarching statewide water management strategy, by relaxing the treatment requirements for non-food crops. As cited by Dr. Garry Grabow of North Carolina State University, a perception change in application rates for effluent

would also need to occur.²³ Land application of reclaimed water would be based on crop needs, not on assimilative capacity of the crop and nutrient loading.

► **Groundwater Recharge through Aquifer Storage and Recovery and Stream Augmentation**

Attention has been drawn in recent years to locations in eastern North Carolina where groundwater was found to be depleted by overuse. Recharge of groundwater through the injection, infiltration and storage of reclaimed water within an underground capsule confined by natural features is not currently permitted under the North Carolina reuse program. Injection of waters for storage and future use is currently limited to treated drinking water. Aquifer Storage and Recovery using reclaimed water has been used successfully in other states (Florida), particularly those along the eastern seaboard, as a means to augment water supplies and to create a barrier against the further intrusion of saltwater inland into fresh water supplies.²⁴ The North Carolina General Statute identified as the impediment to this end use for reclaimed waters is NCGS 143-214.2(b).

► **Inconsistencies in Regulatory Treatment of Gray Water, Harvested Rain Water and Reclaimed Water**

Gray water, harvested rainwater and reclaimed water are currently available options for reducing the use of potable (treated) drinking water, thereby enhancing the sustainability of water supplies for the future. Regulatory treatment of each is unique and inconsistent particularly from with water quality perspective and available end uses. Gray water is defined by the North Carolina Plumbing Code as “waste discharged from lavatories, bathtubs, showers, clothes washers and sinks.”²⁵ Under the current plumbing code, gray water – which may contain high levels of pathogens – is permitted for use in urinals and toilet flushing after being filtered, chlorinated and dyed. Use of gray water requires no certified operator, no monitoring or reporting.

Harvested rainwater is defined as rainwater captured for reuse. In 2007, the North Carolina Plumbing Code added the use of harvested rainwater as an alternate water supply method specifically to reduce the use of treated drinking water in schools. There is no detention limit, no size limit and no filtering required on the discharge end. Use of harvested rainwater requires no monitoring, no treatment, no certified operator and no reporting. Rainwater can also be used for toilet flushing under a current interpretation of the administrative code. Rainwater can be used for lawn watering and individual homeowners are allowed to design and pipe their own systems.

Reclaimed water is defined as wastewater treated to meet the performance levels in compliance with State rules and beneficially used for authorized purposes under the law. Reclaimed water is highly regulated, limited in end use, requires a certified operator to manage the reuse system, and monitoring and reporting on a regular, prescriptive schedule. Reclaimed water, though treated to a higher standard than harvested rainwater and gray water, is not available for uses inside a single family residence.

Findings of the Commission on Water Reuse

The members of the State Water Infrastructure Commission support the expanded use of reclaimed water, gray water, harvested rain water and stormwater subject to adequate provisions to protect public health. The SWIC has adopted a resolution in support of the use of reclaimed water (See Appendix C) which it has distributed to the Governor, members of the North Carolina General Assembly and others. The SWIC supports the proposed rule enhancements for reclaimed water which are currently being considered by the EMC. SWIC notes with concern the inconsistencies in regulatory treatment of gray water, harvested rainwater, stormwater and reclaimed water and supports the timely reconciliation of these differences.

Water Rates and Rate Structures

The level at which water and wastewater rates are set and the structure under which the charges are defined are varied across North Carolina. Pricing of water services is a statement of value of the resource and the service of the provider. In North Carolina, as in other states across the country, the need exists to price water services so that they more accurately reflect the costs involved in the production, treatment and distribution of drinking water and the collection, treatment and discharge of wastewater effluent.

The SWIC has been working with the staff of the Environmental Finance Center (EFC) at the University of North Carolina at Chapel Hill – School of Government to evaluate rates and rate structure in North Carolina. The EFC together with the North Carolina League of Municipalities conducts an annual survey of all water utilities in North Carolina for the purpose of collecting information on rates and rate structures. Findings of their efforts in summary form are available on the EFC website.

This year, the SWIC engaged the EFC to assist in meeting the requirements established for SWIC in the “Drought Bill” (Session Law 2008-143). Specifically, the SWIC is charged as follows:

SESSION LAW 2008-143: SECTION 17. The State Water Infrastructure Commission, in consultation with the Department of Environment and Natural Resources, the School of Government at the University of North Carolina at Chapel Hill, the North Carolina Utilities Commission, the Public Staff of the North Carolina Utilities Commission, and the Local Government Commission, shall develop guidelines for water rate structures that are adequate to pay the cost of maintaining, repairing, and operating the system, including payment of principal and interest on indebtedness incurred for maintenance or improvement of the water system. The guidelines shall also consider the effect of water rates on water conservation and recommend rate structures that support water conservation. Copies of the guidelines shall be made available to the Department of Environment and Natural Resources, the North Carolina Utilities Commission, and to all local government water systems and large community water systems, as defined in G.S. 143-350. The Commission shall report to the Environmental Review Commission on its progress in developing the guidelines no later than January 1, 2009.

The research effort has been designed to study the relationships between water usage for specific utilities and 1) pricing signals, 2) the application of conservation policies, 3) utility demographic data, 4) climate data and 5) other factors that are likely to influence water usage.²⁶ The survey sample will include the majority of the non-Public Utility Commission regulated water systems within the state and a small sample of Utility Commission Regulated Utilities. The research will target 65% of these utilities serving at least 80% of the State’s public water system customers. The pricing data for the study will come from database developed by the survey conducted by the NC League of Municipalities (NCLM) and the UNC School of Government Environmental Finance Center (EFC).

Findings of the Commission on Rates and Rate Setting

The State Water Infrastructure Commission will report to the Environmental Review Commission in January 2009 on its preliminary findings.

Our Recommendations for 2008-2009

Infrastructure Financing

Recommendation: Establish permanent State funding for water, wastewater and stormwater improvements.

Justification: To ensure that North Carolina can protect human health, preserve its water resources for the future and sustain economic growth the Commission's first priority is to recommend that the Governor and the 2009 General Assembly provide a permanent State funding source for drinking water, wastewater and stormwater infrastructure. Estimates of needed infrastructure investment to meet 2030 demands exceed \$16 billion for North Carolina. Current (2008) unmet need in funding application submitted to State funding agencies exceeds \$100 million.²⁷

Recommendation: Establish a stakeholder process to determine whether and if so, how much to increase in the Median Household Income Threshold used for determining grant eligibility under current State law.

Justification: Ten years ago, in the Clean Water Bond Act of 1998 the General Assembly considered both local efforts to raise rates to finance water infrastructure and the ability of residential customers to pay higher rates. The legislature adopted a threshold measure called the "high unit-cost threshold" for determining the eligibility of public systems and non-profit corporations for state grant funds. The 2005 General Assembly codified the high unit cost threshold in SL 2005-454, Clarify Clean Water Funding (HB 1095). A high-unit-cost grant is available for the portion of the construction costs of a water or wastewater project that results in an estimated average household user fee for water and sewer service in the area served by the project that exceeds the high-unit-cost threshold of 1.5 percent of median household income for both water and wastewater service. In the decade since its adoption, the pressures on our state's water resources have increased due to events such as drought and population increase. How we value water – what we are willing to pay for it- is changing and most systems have increased rates within the last two years. The rates of many systems are well above the 1.5% high unit cost threshold and the amount of available grant funds has decreased. The Stakeholder Process, including water systems and funders, should be convened by the State Water Infrastructure Commission to determine whether and if so, how much to increase the median household income threshold. The SWIC should recommend changes, if any, to the legislature by March 30, 2009 with sensitivity incorporated for economically distressed communities.

Recommendation: Continue to work with the Program Evaluation Division of the North Carolina State Legislature as the work toward recommendations on refining State infrastructure funding for consideration by the legislative body.

Justification: Representatives of SWIC have met with the Program Evaluation Staff and support their efforts to examine the current infrastructure financing available in North Carolina with an eye toward refining that system. SWIC has participated in their current evaluation and will offer response to their findings in November 2008.

Recommendation: Develop an annual process for reporting on all state and federal grant and loan resources utilized for water, wastewater and stormwater projects.

Justification: The State Water Infrastructure Commission should collaborate with the UNC School of Government – Environmental Finance Center to develop the process for and create the reports necessary to document the amounts and uses of funding across the State for infrastructure improvements. Such a report could catalog the types of projects funded, show the geographic distribution of funds and be used as an assessment tool in the gauging of need for State-level infrastructure investment.

Drought Preparedness and Water Resource Management

Recommendation: Utilize the Water Rates Guidelines being developed by the State Water Infrastructure Commission as a policy guide for discussion on allocation of State funding for water infrastructure.

Justification: Section 17 of Session Law 2008-143, Improve Drought Preparedness and Response (HB 2499), directed the State Water Infrastructure Commission to develop guidelines for water rate structures that are adequate to maintain and operate water systems and consistent with the State guidance on water conservation. SWIC has contracted with the Environmental Finance Center at the School of Government – UNC at Chapel Hill for research support. SWIC will work with DENR, the Public Staff of the Utilities Commission, the Local Government Commission, and others to develop water rate guidelines. A progress report will be provided to the Environmental Review Commission by January 1, 2009 and the report of findings delivered to the Commission and to State Funders by July 1, 2009. The findings of this report should help to inform discussion on future allocation of State infrastructure funding.

Recommendation: Implement Water Efficiency Provisions of SL 2008-143 and Increase State support for the implementation of water efficiency measures by water systems.

Justification: Section 9 of Session Law 2008-143, Improve Drought Preparedness and Response (HB 2499) encourages water systems applying for State infrastructure funds to become more efficient by requiring them to demonstrate they have met thresholds to be established by State funding agencies. SWIC will support the funders of water infrastructure to implement Section 9 of SL 2008-143 and will anticipate reports from this group on their findings.

Recommendation: Develop additional State policy and incentives to implement water efficiency measures in local/regional systems.

Justification: Once the statewide water efficiency standards have been developed and implemented by the Department of Environment and Natural Resources, additional incentives are needed to encourage water efficient practices by local systems. Additional public policy, regulation and education is needed to encourage the use of techniques such as developing new utility business models based upon selling water services instead of selling gallons of water; system pressure management to reduce water leaks; local land use policies to support water-efficient development; improvements to the State Building Code to support water conservation strategies such as water efficient fixtures and appliances and water reuse. Incentives could include tax savings for the purchase of water-efficient appliances such as washing machines and dishwashers for the individual homeowner and reduced interest rates combined with grant funds, when available, for efficiency improvements within the public water and wastewater systems.

Water Audits

Recommendation: Require the AWWA Water Audit methodology or an equal standard for guidance to local systems conducting water audits as a means to increase water system efficiency and financial stability.

Justification: The American Water Works Association's (AWWA) Water Loss Committee has developed a standardized format for conducting a water audit to account for water uses and to determine the amount of non-revenue producing water in the local system.

This standard has been adopted and modified for specific state conditions by both Texas and New Mexico and is being considered by many others as guidance for collecting water use and loss data on local systems. At its July meeting the SWIC adopted a resolution urging the use of water audits, consistent with AWWA guidelines. Use of this standard or an equal would allow the State to determine systems most at risk for loss and those having made improvements to reduce the loss of water that would otherwise produce revenue for the system. Such information could be used in allocation of funds for needed repairs. Water audits for water systems prepared by private engineering firms and funded by DENR and water audits for businesses prepared by retired engineers through the Division of Pollution Prevention and Environmental Assistance during the 2007-2008 drought were very valuable.

Recommendation: SWIC recommends that North Carolina Department of Environment and Natural Resources – Division of Water Resources consider modifications to the Local Water Supply Plan format to collect needed information from these water audits.

Justification: Local Water Supply Plans are required for public water systems are a five year interval. The format for collecting the data can be readily adjusted to collect the additional and important information on non-revenue water.

Recommendation: The North Carolina Local Government Commission should consider requiring a water audit before approving debt to finance water infrastructure. State infrastructure funders – DENR and the Rural Center - should consider including the costs of financing a water audit for needy communities in their grant and loan packages. Water audits should be reported to Division of Water Resources and made available to the public.

Justification: The benefit of these requirements to the State of North Carolina will be enhanced stewardship of both water and capital resources relative to proper operation and maintenance and establishment of water system benchmarks to be used for both current and long-term planning efforts.

Reclaimed Water

Recommendation: Consider a change to the reference in the North Carolina Administrative Code and related Statute(s) to categorize water reuse as a “water resource”.

Justification: Reclaimed water is highly treated wastewater, water treated to standards above the quality on influent water to most of the state’s drinking water systems. Reclaimed water is a vital part of our water resource future in North Carolina and should be utilized to replace treated drinking water for uses not requiring treated drinking-quality water. At its September 2008 meeting the Environmental Management Commission voted to send draft rules proposing major changes in the regulation and uses of reclaimed water to public hearing. Throughout 2008 the State Water Infrastructure Commission has invited a number of experts on reclaimed water to identify policy barriers for expanded use of reclaimed water. The SWIC is considering whether to recommend that the General Assembly and/or Environmental Management Commission define reclaimed water and stormwater as a resource and encourage broader use. The SWIC will continue in this work and deliver a recommendation to the Environmental Review Commission in 2009.

Recommendation: Continue discussion of the permitted uses for reclaimed water to include the more options.

Justification: Replacement of highly treated drinking water with reuse water makes sense if we are to effectively and efficiently manage of our State’s water resources. The Environmental Management Commission’s proposed rules increase the uses of reclaimed water. Other uses for reclaimed water may be available in other states in the US and abroad, including aquifer storage and recovery (ASR), aquifer recharge, stream augmentation and potable reuse. The SWIC will continue its review of appropriate uses of reclaimed water.

Recommendation: Reduce the competitive price disadvantages to expanded use of reclaimed water.

Justification: Under current policy and regulation, withdrawal of water from the State’s surface waters or groundwater is free and unlimited unless the applicant is located in a state-designated capacity use area. So long as those who need water can secure it

cheaply and with little or no administrative permitting challenge, reclaimed water will always suffer a price disadvantage. Comprehensive management of all the State's water will help prioritize uses of water and eliminate one of the competitive disadvantages for using reclaimed water. The 2009 General Assembly should seriously consider requiring large users of surface water and ground water to apply for water withdrawal permits.

Recommendation: Develop or enhance existing local policy frameworks and institutions for management of water resources.

Justification: Water Reuse/Reclaimed Water is best managed at the local level- it is a localized resource. Therefore, strong local policy and management structures provide the best opportunity for effective operation of water resource programs, including water reuse programs. In North Carolina, local government system owners make the policy decisions on rates and rate structures, how the systems are managed and determine how prepared systems are for the future. SWIC recognizes the value of thinking beyond local borders when sustainably managing water resources and encourages the use of basinwide management and planning that supports regional collaborations and enables the wise use of resources – both financial and natural. SWIC recognizes the need for continued education of water consumers on the value of these local planning frameworks and management institutions and encourages State financial support of education and training for local elected officials and other decision-makers.

Regional Partnerships

Recommendation: Support the development of regional infrastructure partnerships through direct State investment in policy development, funding, and technical assistance.

Justification: Regional collaborations, whether they involve an actual physical connection between systems or a management or administrative connection such as sharing operators and equipment, provide an important service to the State. These collaborations, initiated on the local level and many without state financial support, strengthen the infrastructure system in North Carolina. Through these systems, residents and business well outside the reach of a small, local system can be served more cost-effectively, drinking water can be moved from areas of availability to areas of scarcity and the impact of emergencies such as drought can be mitigated.

In FY '07-'08, the State Water Infrastructure Commission explored the value of regional partnerships to drinking water, wastewater and stormwater infrastructure systems. SWIC concluded that regional partnerships, when the partners are ready for regional collaboration, provide an efficient and effective management structure for infrastructure systems. SWIC offered a series of recommendations on how the State of North Carolina might enhance its support of regional partnerships in a role that would function to remove existing legal, regulatory and policy barriers to regional cooperation. SWIC reiterates in this 2008 Annual Report the value of regional efforts and specifically encourages the State to consider the following:

- **Develop and implement a set of criteria for evaluating system “readiness” for regionalization. This may prevent bringing systems that are not ready i.e., not yet managing their systems efficiently and effectively, into a regional configuration where they cannot participate as an equal.**
- **Fund a study to identify the most promising regions for water regionalization that could then inform local decision makers, funders and the public.**
- **Provide Start-Up funding for regional projects to match local investments for the engineering, planning and legal work associated with forming a regional entity.**

Fund the State Water Infrastructure Commission

Recommendation: The State Water Infrastructure Commission recommends that the Governor and 2009 General Assembly appropriate \$250,000 per year to fund the ongoing work of SWIC.

Justification: The State Water Infrastructure Commission was created through passage of House Bill 1095 in the 2005 Session of the North Carolina General Assembly. The creation of the Commission and the modifications to the State’s existing water and

wastewater financing laws were the product of a collaborative effort between major State funders of infrastructure including the Department of Environment and Natural Resources, the Clean Water Management Trust Fund and the Rural Economic Development Center. These three entities have served as the agents of the State in making important water, wastewater and storm water investments that have protected public health and the environment and have created opportunities for economic growth and development

In the current national environment, states are being called upon to define a broader and more comprehensive role in both the financing and development of infrastructure. The State Water Infrastructure Commission provides a necessary forum for discussion and decision-making on water resources and infrastructure matters for the State of North Carolina.

The Commission will benefit from a permanent staff comprised of an Executive Director in the short-term. Continuity is necessary to address the work of the Commission and to provide support for the members in their work.

Communications between the Commission and members of the public is essential to its effectiveness and success. These enhanced communications can be achieved through development of a website.

Endnotes

Endnotes

- ¹ North Carolina Drought Management Advisory Council. Website: <http://www.ncdrought.org> .
- ² U.S. Census of Population 2000 and NC State Data Center, 2008.
- ³ United States Geological Survey, North Carolina Water Science Center. Website: <http://nc.water.usgs.gov>.
- ⁴ United States Geological Survey, North Carolina Water Science Center. Website: <http://nc.water.usgs.gov>.
- ⁵ United States Geological Survey, North Carolina Water Science Center. Website: <http://nc.water.usgs.gov>.
- ⁶ Handbook of Water Use and Conservation for Homes, Landscapes, Businesses, Industries and Farms, Amy Vickers. 2001, page 434.
- ⁷ Handbook of Water Use and Conservation for Homes, Landscapes, Businesses, Industries and Farms, Amy Vickers. 2001. page 434.
- ⁸ U.S. Environmental Protection Agency. WaterSense website: <http://www.epa.gov/watersense>
- ⁹ Rural Economic Development Center, Inc., Report 3: Water, Sewer & Stormwater Capital Needs (2006)
- ¹⁰ Water Audits and Leak Detection. The M36 publication. 2008. American Water Works Association website: <http://www.awwa.org/Resources/Content.cfm?ItemNumber=588>
- ¹¹ Water Audits and Leak Detection. The M36 publication. 2008. American Water Works Association website: <http://www.awwa.org/Resources/Content.cfm?ItemNumber=588>
- ¹² The Texas Water Development Board website: <http://www.txwdb.state.texas.us>
- ¹³ *Texas Water Loss Audit*, Mark Mathis, George Kunkel, P.E., and Andrew Chastain Howley. March 2008. Downloaded from <http://www.txwdb.state.texas.us>
- ¹⁴ Summary Report: Water Audit task Force. State Water Infrastructure Commission, Water Audit Task Force. June 2008.
- ¹⁵ An Assessment of the North Carolina Water Reuse Regulations: Their Application to a New Reclamation Facility and Their Key Features When Compared to National Water Reuse Regulation Trends. Hilger and Sobsey, 2003. WRRRI Report No. 346.

¹⁶ An Assessment of the North Carolina Water Reuse Regulations: Their Application to a New Reclamation Facility and Their Key Features When Compared to National Water Reuse Regulation Trends. Hilger and Sobsey, 2003. WRRRI Report No. 346.

¹⁷ North Carolina Reclaimed Water Rules: 15A NCAC 02T .0900. Website: http://h2o.enr.state.nc.us/lau/documents/Section.0900-ReclaimedWaterSystems_002.pdf .

¹⁸ North Carolina Reclaimed Water Rules: 15A NCAC 02T .0900. Website: http://h2o.enr.state.nc.us/lau/documents/Section.0900-ReclaimedWaterSystems_002.pdf.

¹⁹ Proposed Modification to the North Carolina Reclaimed Water Rules: 15A NCAC 02T .0900. EMC Website: <http://h2o.enr.state.nc.us/admin/emc/AGENDASEPT2008.htm>.

²⁰ Sessions Law 2008-143. NCGA Website: <http://www.ncga.state.nc.us/Sessions/2007/Bills/House/HTML/H2499v6.html>.

²¹ Presentation by Dr. Mark Sobsey to State Water Infrastructure Commission, August 2008.

²² An Assessment of the North Carolina Water Reuse Regulations: Their Application to a New Reclamation Facility and Their Key Features When Compared to National Water Reuse Regulation Trends. Hilger and Sobsey, 2003. WRRRI Report No. 346.

²³ Presentation by Dr, Garry Grabow to State Water Infrastructure Commission, August 2008.

²⁴ Florida Reclaimed Water Rules. Website: http://www.dep.state.fl.us/water/reuse/final_610.htm

²⁵ North Carolina Plumbing Code, Chapter 6.

²⁶ Research proposal from UNC School of Government – Environmental Finance Center, September 2008.

²⁷ Conversations and data from State Funders, October 2008.

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Appendices

SECTION 9. Article 38 of Chapter 143 of the General Statutes is amended by adding a new section to read:

"§ 143-355.4. Water system efficiency.

(a) Local government water systems and large community water systems shall require separate meters for new in-ground irrigation systems that are connected to their systems.

(b) To be eligible for State water infrastructure funds from the Drinking Water Revolving Fund or the Drinking Water Reserve Fund or any other grant or loan of funds allocated by the General Assembly whether the allocation of funds is to a State agency or to a nonprofit organization for the purpose of extending waterlines or expanding water treatment capacity, a local government or large community water system must demonstrate that the system:

- (1) Has established a water rate structure that is adequate to pay the cost of maintaining, repairing, and operating the system, including reserves for payment of principal and interest on indebtedness incurred for maintenance or improvement of the water system during periods of normal use and periods of reduced water use due to implementation of water conservation measures. The funding agency shall apply guidelines developed by the State Water Infrastructure Commission in determining the adequacy of the water rate structure to support operation and maintenance of the system.
- (2) Has implemented a leak detection and repair program.
- (3) Has an approved water supply plan pursuant to G.S. 143-355.
- (4) Meters all water use except for water use that is impractical to meter, including, but not limited to, use of water for firefighting and to flush waterlines.
- (5) Does not use a rate structure that gives residential water customers a lower per-unit water rate as water use increases.
- (6) Has evaluated the extent to which the future water needs of the water system can be met by reclaimed water.
- (7) Has implemented a consumer education program that emphasizes the importance of water conservation."

SECTION 10. Article 38 of Chapter 143 is amended by adding a new section to read:

"§ 143-355.5. Water reuse; policy; rule making.

(a) Water Reuse Policy. – It is the public policy of the State that the reuse of treated wastewater or reclaimed water is critical to meeting the existing and future water supply needs of the State. The General Assembly finds that reclaimed water systems permitted and operated under G.S. 143-215.1(d2) in an approved wastewater reuse program can provide water for many beneficial purposes in a way that is both environmentally acceptable and protective of public health.

(b) Rule Making. – The Commission shall encourage and promote safe and beneficial reuse of treated wastewater as an alternative to surface water discharge. The Commission shall adopt rules to:

- (1) Identify acceptable uses of reclaimed water, including toilet flushing, fire protection, decorative water features, and landscape irrigation.
- (2) Facilitate the permitting of reclaimed water systems.
- (3) Establish standards for reclaimed water systems that are adequate to prevent the direct distribution of reclaimed water as potable water."

North Carolina Water Reuse Projects – Pending and Active

June 2008

| | Permit Number | Owner Organization Name | Facility Name | Permit Status | Permitted Flow (GPD) | Issue Date |
|----|----------------------|---------------------------------------|---------------------------------------|----------------------|-----------------------------|-------------------|
| 1 | WQ0000088 | Governors Club Limited Partnership | Governors Club | Active | 300,000 | 8/2/2004 |
| 2 | | Carolina Water Service, Incorporated | | | | |
| | WQ0001664 | of North Carolina | Belvedere Plantation WWTF | In review | 110,000 | |
| 3 | WQ0006085 | Town of Ocean Isle Beach | Ocean Isle Beach SBR WWTF | Active | 1,050,500 | 4/29/2004 |
| 4 | WQ0006878 | Brunswick County | Carolina Shores Conjunctive Re-Use | In draft | 300,000 | |
| 5 | | Carolina Water Service, Incorporated | | | | |
| | WQ0007569 | of North Carolina | Brandywine Bay WWTF | Active | 350,000 | 8/22/2003 |
| 6 | | | Smithfield Packing Company - Tar | | | |
| | WQ0010892 | Smithfield Packing Company Inc | Heel Division | Active | 2,100,000 | 10/14/2004 |
| 7 | WQ0011453 | Brunswick County | Brunswick Community College WWTF | In draft | 30,000 | |
| 8 | WQ0011614 | Ocean Ridge Properties, Inc. | Ocean Ridge Plantation WWTF | In draft | 900,000 | |
| 9 | WQ0011777 | Neon Impressions Inc | Neon Impressions Inc-Triangle | Active | 1,200 | 8/22/2001 |
| 10 | WQ0012151 | Brunswick County | St. James Plantation WWTF | Active | 600,000 | 10/1/2002 |
| 11 | | South Brunswick Water & Sewer | | | | |
| | WQ0012748 | Authority | Sea Trail WWTF | In review | 500,000 | |
| 12 | WQ0012821 | US Marine Corps - Camp Lejeune | U S Marine Corps-Golf Course | Active | 1,650,000 | 3/1/2004 |
| 13 | | | Southeast Brunswick Sanitary District | | | |
| | WQ0013200 | Southeast Brunswick Sanitary District | WWTP | Active | 500,000 | 12/10/2001 |
| 14 | | Charlotte Mecklenburg Utility | | | | |
| | WQ0013252 | Department | CMUD-Mallard Creek Reclamation | Active | 4,000,000 | 3/21/2003 |
| 15 | WQ0013398 | 904 Georgetown Treatment Plant LLC | Sandpiper Bay WWTF | Active | 550,000 | 7/29/2004 |
| 16 | WQ0013676 | Beacon's Reach Master Assoc Inc | Beacons Reach WWTF | Active | 135,000 | 3/15/2002 |
| 17 | WQ0013785 | Brunswick County | Winding River Plantation WWTF | In review | 500,000 | |
| 18 | WQ0014306 | Sandler Utilities at Mill Run LLC | Eagle Creek | Active | 321,000 | 5/14/2004 |
| 19 | WQ0015052 | Enviro-Tech of North Carolina Inc | Village at Ocean Hill | Active | 164,000 | 4/16/2004 |
| 20 | WQ0015869 | Lake Osseroga Association Inc | The Cottages at Lake Osseroga | Active | 8,000 | 4/14/2003 |
| 21 | WQ0015929 | K & M Development | K&M Dev-High Vista Falls | In review | 45,000 | |

| | Permit Number | Owner Organization Name | Facility Name | Permit Status | Permitted Flow (GPD) | Issue Date |
|----|----------------------|--------------------------------|-------------------------------------|----------------------|-----------------------------|-------------------|
| 22 | WQ0015931 | Point On Norman | Point On Norman-Village Pt | Active | 25,000 | 11/16/2004 |
| 23 | WQ0016222 | City of Raleigh | Raleigh City-Pud Reuse | Active | | 1/16/2004 |
| 24 | WQ0016816 | Town of Macclesfield | Macclesfield Town-Sant Sewer | Active | 4,200 | 12/20/2002 |
| 25 | | | North Cary WRF Bulk Reclaimed | | | |
| | WQ0017064 | Town of Cary | Water Distribution Program | Expired | | 5/14/2001 |
| 26 | | Ginguite Woods Wtr Reclamation | | | | |
| | WQ0017224 | Assoc Inc | Ginguite Woods | In draft | 32,500 | |
| 27 | WQ0017507 | Heilig William | Heilig William-Heilig | In review | | |
| 28 | WQ0017634 | City of New Bern | New Bern City-Martin Mariett | In review | | |
| 29 | | | Goldsboro WRF Reclaimed Water | | | |
| | WQ0017791 | City of Goldsboro | Project | Active | 30,495,500 | 8/19/2003 |
| 30 | | | North Cary WRF Reclaimed Water | | | |
| | WQ0017923 | Town of Cary | Distribution System/Program | In review | | |
| 31 | WQ0018146 | Bluegreen Carolina Lands LLC | The Preserve at Jordan Lake | Active | 194,000 | 10/31/2003 |
| 32 | WQ0018174 | Delphin Properties LLC | Mahler's Glen | Active | 104,900 | 7/26/2002 |
| 33 | | | South Cary WRF Bulk Reclaimed | | | |
| | WQ0018379 | Town of Cary | Water Distribution Program | Active | 100,000 | 8/4/2000 |
| 34 | | | South Cary WRF Reclaimed Water | | | |
| | WQ0018489 | Town of Cary | Distribution System/Program | In review | | |
| 35 | | | Wilson Reclaimed Water Distribution | | | |
| | WQ0018709 | City of Wilson | System | In review | 4,100,000 | |
| 36 | WQ0018755 | R L Blanton & Co Inc | Castle Bay WWTF | Active | 100,000 | 7/2/2001 |
| 37 | WQ0018857 | Town of Macclesfield | Macclesfield Town-1999 Sew | In review | | |
| 38 | WQ0019179 | City of Washington | Washington City | Active | 5,200 | 11/16/2001 |
| 39 | WQ0019229 | Town Of Warsaw | Warsaw Conjunctive Use Irrigation | Active | 10,959 | 2/12/2001 |
| 40 | WQ0019331 | NC DENR | NC DENR-Aquarium Pine Knoll | Active | 25,000 | 12/19/2003 |
| 41 | | | Carolina Beach Conjunctive Use | | | |
| | WQ0019336 | Town of Carolina Beach | Spray Irrigation | Active | 30,000 | 4/26/2001 |
| 42 | WQ0019390 | The Tillery Tradition Inc | Tillery Tradition Incorporated-Golf | Active | 50,000 | 1/10/2002 |

| | Permit Number | Owner Organization Name | Facility Name | Permit Status | Permitted Flow (GPD) | Issue Date |
|----|----------------------|-----------------------------------|-------------------------------------|----------------------|-----------------------------|-------------------|
| 43 | WQ0019471 | Town of West Jefferson | West Jefferson Town- | Active | 380 | 1/12/2001 |
| 44 | | Colvard Farms Development | | | | |
| | WQ0019569 | Company L L C | Colvard Farms | Active | 39,770 | 2/20/2004 |
| 45 | WQ0019631 | Johnston County | Johnston County Landfill | In review | 266,918 | |
| 46 | | | Johnston County Reclaimed Water | | | |
| | WQ0019632 | Johnston County | Distribution System | Active | 266,918 | 6/13/2003 |
| 47 | WQ0019664 | Town of Erwin | Erwin Town-Water Reclamatio6 | In review | | |
| 48 | | | Northeast Brunswick Conjunctive Use | | | |
| | WQ0019702 | Brunswick County | Reuse | In review | | |
| 49 | WQ0019908 | Johnston Co Country Club | Johnston Co Country Club | Active | 243,500 | 6/19/2002 |
| 50 | WQ0019962 | City of Hendersonville | Hendersonville City | Active | 39,185 | 9/28/2001 |
| 51 | WQ0019992 | Town of Louisburg | Louisburg Town-Golf Reuse | Active | 13,200 | 6/12/2002 |
| 52 | WQ0020248 | City of Sanford | Golf Course Irrigation-Sanford | Active | 220,350 | 2/13/2002 |
| 53 | | | Water Reclamation Plant Effluent | | | |
| | WQ0020302 | Green Hill Country Club | Reuse | In review | 13,200 | |
| 54 | WQ0020409 | Town of Zebulon | Zebulon-Spray Irrigation Improv. | In review | 10,500 | |
| 55 | WQ0020410 | Town of Zebulon | Zebulon-Spray Irrigation Improv. | Active | 250,000 | 12/11/2002 |
| 56 | WQ0020500 | Town Of Morehead City | Morehead City WWTP | Active | 7,300 | 12/20/2002 |
| 57 | WQ0020627 | Johnston County | Directional Drill Under Holts Lake | Active | | 3/28/2002 |
| 58 | WQ0020808 | 3M Company Inc | Pittsboro, NC Plant | Active | 5,900 | 5/7/2002 |
| 59 | | | Farmville Golf & Country Club | | | |
| | WQ0020809 | Farmville Golf & Country Club Inc | Reclaimed Water System | Active | 180,000 | 2/13/2003 |
| 60 | WQ0021530 | Anson County | Anson County DPU | Active | 11,090 | 12/11/2002 |
| 61 | WQ0021731 | Town of Jefferson | Wastewater Reuse System | Active | 32,000 | 12/19/2002 |
| 62 | | Charlotte Mecklenburg Utility | | | | |
| | WQ0021734 | Department | Franklin WTP | Active | | 10/23/2002 |
| 63 | | | Town of Apex Reclaimed Water | | | |
| | WQ0021863 | Town of Apex | System | Active | 100,000 | 5/21/2003 |

| | Permit Number | Owner Organization Name | Facility Name | Permit Status | Permitted Flow (GPD) | Issue Date |
|----|----------------------|--------------------------------|--|----------------------|-----------------------------|-------------------|
| 64 | WQ0022052 | Henderson Farms LLC | Henderson Farms WWTF | Active | 23,640 | 7/21/2003 |
| 65 | WQ0022056 | Anson County | Anson County Regional WWTP | Active | 11,090 | 12/11/2002 |
| 66 | WQ0022120 | Town of Jefferson | Jefferson WWTP | Active | 32,000 | 12/19/2002 |
| 67 | WQ0022156 | Town Of Morehead City | Morehead City WWTP | Active | 30,000 | 12/20/2002 |
| 68 | WQ0022224 | Town of Clayton | Little Creek WWTP | In review | 432,000 | |
| 69 | WQ0022228 | Town of Farmville | Farmville WWTP | Active | 120,000 | 2/13/2003 |
| 70 | | | Town of Benson Reclaimed Water System | | | |
| | WQ0022501 | Town of Benson | System | Active | 23,240 | 6/10/2004 |
| 71 | WQ0022697 | Town of Scotland Neck | Scotland Neck WWTP | Active | 48,000 | 10/22/2003 |
| 72 | WQ0022711 | Macon County | Macon County Irrigation Site | In review | | |
| 73 | WQ0022725 | Slash Creek LLC | Slash Condominiums | Active | 18,000 | 1/16/2004 |
| 74 | WQ0022870 | Heater Utilities Inc | Buck Mountain Development | In review | 270,000 | |
| 75 | | | Coastal Carolina Country Club Golf Course | | | |
| | WQ0023193 | Coastal Carolina Country Club | Course | In review | | |
| 76 | | | Lexington Golf Course - Wastewater Reuse System | | | |
| | WQ0023213 | City of Lexington | Reuse System | Active | 0 | 4/28/2004 |
| 77 | WQ0023261 | Town of Swansboro | Swansboro WWTP | In review | 0 | |
| 78 | WQ0023420 | Town Of Burgaw | Burgaw WWTP | In review | | |
| 79 | WQ0023693 | Brunswick County | West Regional WWTF | In review | 1,838,500 | |
| 80 | | | Pikeville Wastewater Treatment Facility | | | |
| | WQ0023934 | Town of Pikeville | Facility | Active | 140,000 | 7/15/2004 |
| 81 | WQ0024023 | BLE LLC | West Bay | Active | | 9/24/2004 |
| 82 | WQ0024223 | Town of Clayton | Little Creek WWTP | In review | | |
| 83 | WQ0024320 | | Rockbridge Subdivision | In review | | |
| 84 | | | North Cary WRF Reclaimed Water Distribution System/Program | | | |
| | WQ0024332 | Town of Cary | Distribution System/Program | In draft | 0 | |

STATE WATER INFRASTRUCTURE COMMISSION

Resolution

In Support of Appropriate and Responsible Use of Water

Whereas, the population of North Carolina is projected to increase from over 9,000,000 in 2008 to over 12,000,000 by 2030 and the demand for water resources and services will substantially increase; and

Whereas, limited drinking water supplies are currently used for many non-potable water services, including toilet and urinal flushing, landscape irrigation, industrial processing, cleaning, and cooling; and

Whereas, limited drinking water supplies will become increasingly valuable as the population increases, should be conserved for drinking and other potable uses, and other sources of water should be developed to provide for non-potable services; and

Whereas, although drinking water is undervalued and under priced in many communities, many communities will raise water rates and implement tiered or conservation pricing to fund capital and operating costs, and the economics of using treated wastewater and stormwater will improve; and

Whereas, many of North Carolina's rivers, lakes, drinking water supplies, and estuaries are nutrient sensitive and impaired and future discharges of treated wastewater and stormwater into surface waters are likely to be capped and reduced; and

Whereas, many of North Carolina's systems have increased the quality and efficiency of their treatment facilities, via both technological and operational improvements and advances, and as a result of significant investments, are producing high quality effluents; and

Whereas, treated wastewater or reclaimed water and stormwater, can be used for many non-potable services, including toilet and urinal flushing, landscape irrigation, vehicle washing, power washing, street cleaning, industrial processing, boiler make up, cooling, dust control, and fire fighting; and

Whereas, these uses of reclaimed water and stormwater are protective of both public health and the environment; and

Whereas, increasing the use of reclaimed water and stormwater will increase the quantity of water available, extend the life of drinking water systems, reduce the capital costs of developing and constructing new drinking water supplies and treatment works, reduce the costs of treating drinking water, improve water quality, and make communities more resilient to both droughts and floods; and

Whereas, technical, financial, regulatory, legal, and public perception barriers have slowed use of reclaimed water and stormwater for non-potable services in North Carolina; and

Whereas, the General Assembly of North Carolina established the State Water Infrastructure Commission to identify the State's water infrastructure needs and to recommend changes in policies to meet those needs.

NOW, THEREFORE BE IT RESOLVED BY THE MEMBERS OF THE STATE WATER INFRASTRUCTURE COMMISSION MEETING AT THE ALBERT COATES CENTER IN RALEIGH ON TUESDAY, JUNE 10, 2008:

Protection of public health and the environment is the State's top priority in providing water services.

Reclaimed water and stormwater are potential new supplies to meet the increasing demands for non-potable uses of water, to stretch existing supplies of drinking water, and to reduce water pollution.

The State Water Infrastructure Commission will carefully evaluate the technical, financial, regulatory, legal, and perception barriers to the use of reclaimed water and stormwater and recommend removal of barriers to appropriate agencies, where appropriate. The State Water Infrastructure Commission will evaluate whether the considering reclaimed water as a "waste" water as defined in GS 143-213(18) is a barrier to increasing the use of reclaimed water.

The State Water Infrastructure Commission supports local and regional planning to identify the most cost-effective locations for use of reclaimed water and stormwater and urges funding agencies to provide incentives to local governments who develop and adopt plans.

The State Water Infrastructure Commission encourages municipalities and counties to require reclaimed water and stormwater infrastructure for new development and redevelopment where local plans indicate it is cost effective in order to avoid costly retrofits and urges funding agencies to provide incentives to local governments who implement these policies.

This Resolution adopted this 10th day of June, 2008.

Bill Holman, Chairman