

North Carolina has documented a funding need in excess of \$3.4 billion over the next five years with over \$4 billion of additional wastewater infrastructure investment needs through year 2030. These funds are needed to replace aging facilities, comply with mandated Clean Water Act (CWA) regulations and provide, as well as keep pace, with economic development. As the state experiences unprecedented population growth we are also challenged to address water quality degradation. This degradation, which had led to fish kills and closing of sections of our waterways within certain river basins has led to promulgation of specific regulations aimed at further reduction of nutrients being discharged into receiving waters. These specific basin rules are a direct result of fish kills and algae blooms that brought national attention and unfavorable press to North Carolina. We have made significant improvements as the documented wastewater related fish kills and algae blooms are decreasing. The tightened discharge limits, increase treatment cost and, when coupled with aging infrastructure are challenging public utilities' ability to remain compliant. The American Society of Civil Engineers (ASCE) supports an increased state role in the funding of needed wastewater infrastructure. If funding needs are not met, the state risks reversing the improved public health, environmental and economic gains that have been realized over the past 30 years.

A Grade of C- is assigned to this component of the state's infrastructure.

BACKGROUND

The water quality of our streams, creeks, rivers and estuaries is critical for human health, ecological health, and sustaining our economy. As a coastal state, North Carolina has a number of strong and growing business that depend on clean water. The state's seafood industry alone is valued at \$100 million. Water-based recreation, ecotourism, trout and catfish farming and boatbuilding industries continue to attract people and dollars to the state and clean water is integral to these industries.

North Carolina is fortunate that we have a diverse water landscape from fresh water trout streams in the mountains to one of the most complex and large estuary systems in the world. By design, most larger/interceptor sewer systems follow creek beds and the larger pump stations are generally located in flood plains and of course our wastewater plants discharge directly to the aforementioned diverse water landscape. Therefore it is our (public) duty to ensure these facilities are properly funded, maintained, and capable of providing a level of service advantageous to improving water quality.

According to a recent study by the NC Rural Economic Development Center, Inc., North Carolina has over 409 public wastewater systems statewide that provide

approximately 51% of the states's population with wastewater service and the majority of these systems (81%) are owned and operated by incorporated municipalities. Based upon reports from the state's public wastewater system managers, the actual number of people served by public wastewater service statewide is estimated to be over 4.4 million. With the state's rate of population growth expected to bring us to the 8th most populous state by 2010, human demands for adequate wastewater treatment and disposal will continue to drive costs for these systems.

Our state contains a wide range of local government economies that vary in their ability to fund and maintain the public's wastewater systems. For example, smaller rural systems must charge significantly higher rates than larger systems to offset the absence of large economies of scale. The monthly bills for some households on smaller systems often exceed twice that of similar customers of larger systems. Without proper planning needed improvements to these aging wastewater systems in upcoming years will only magnify the disparities. Based upon information from the NC Rural Economic Development Center as part of their Water 2030 initiative, if the cost for near term needed improvements were spread across all the state's wastewater systems customer base, the smallest wastewater system's

monthly bill, based upon 6,000 gallons usage, would grow by an additional \$75 per customer. The larger system's monthly charge would increase by over \$50 per customer.

Unfortunately, the rural and sometimes poverty stricken portions of the state know the harsh reality of paying an average utility bill (wastewater and water service) above the state defined High Unit Cost threshold of 1.5% of local median household income. Reportedly, the EPA's current measure of affordability is a system wide average of 4.5% of

median household income. Therefore, North Carolina defines a target rate significantly lower than those recommended nationally by the EPA. What this means is that North Carolina providers collect smaller amounts for their wastewater service and without state supported funding the required and mandated wastewater improvements within these smaller systems will either go uncompleted or be completed via private funding. This in turn will serve to make wastewater service even less affordable to low-income residents.

CONDITIONS

In 2006, the Water 2030 initiative collected detailed information about North Carolina's 409 wastewater systems to document their current capital improvement budgets and determine future capital improvement needs. This survey concluded that wastewater system owners have identified approximately \$7.52 billion in funding needs over a 25-year period.

Several of the systems have aging wastewater collection systems and treatment plants that are unable to contain peak flows or provide adequate treatment. Additionally, biosolids (the residual solid part of the wastewater treatment process) disposal is becoming more difficult and challenging in the face of tighter application requirements, land use regulations and the pressures of increased development.

Several of our older sewer systems were constructed using mostly vitrified clay pipe (VCP) that was installed over 40 to 50 years ago. VCP standard pipe lengths ranged from 3 to 5 feet long with joint gasket material made of oakum or cotton fiber material. This means that a 400-foot long section of sewer installed with VCP may have over 130 pipe joints, many or all with deteriorated gaskets and cracking at the joints. Such failures in the sewer can allow root intrusion that can cause blockages or infiltration that can lead to problematic over-capacity issues.

That same 400-foot reach as installed today with a plastic or iron pipe material would typically have about 21 pipe joints (1/5th as many) including the connection with the manholes. Similarly, the older concrete pipe material commonly used for larger/interceptor sewer reaches (12-inch and above) and the brick with mortar used to build the older manholes are

deteriorating in the presence of the hydrogen sulfide that is inherent to domestic sewer systems.

The weakening in the integrity of the sewer system can easily lead to problems in the collection system and at the wastewater treatment plant. A root intrusion will catch debris and clog easier, leading to basement flooding or overflow condition. An excessively cracked pipe or manhole will allow inflow or infiltration of groundwater or storm water directly into the sewer system causing an overflow condition. In the case of failed pipe material the wastewater may actually leak directly from the sewer into the groundwater or surface water without the presence of an overflow condition and thereby going unnoticed.

All sewer systems, regardless of material of construction experience some level of infiltration and inflow (I&I). Typically, the older systems installed in areas with a high groundwater table will experience the most infiltration. It is reported that on some of the highest flow days (large rain events), wastewater flows exceed treatment capacity at 40% of the state's 351 wastewater treatment plants. The amount of rain and groundwater entering the sewer lines on these high-flow days (estimated at 158 million gallons) is double the average daily flow of North Carolina's largest wastewater system Charlotte-Mecklenburg. This results in a high percentage of wastewater systems under moratoria and Special Orders of Consent for either exceeding the permitted discharge flow limit or raw sewage overflows from the wastewater collection system. In addition, rural systems report more than twice the volume of infiltration and inflow as urban systems.

POLICY/FUNDING

Historically, several federal and state programs have provided funding to offset the rising and on-going cost of constructing, maintaining and upgrading public wastewater systems. These programs are aimed at addressing differing needs from improving compliance limits at the treatment plant discharge to maintaining and upgrading the collection system to prevent overflows.

These programs are administered in the form of grants, low interest and market rate loans. The level of funding available through these programs has been decreasing in recent years. Additionally, the increasing and ever changing regulations imposed on public wastewater systems can easily and sometimes unexpectedly deplete a system's budget in the absence of governmental assistance. The U.S. EPA is the primary regulating authority over wastewater systems and was once a primary source of funding, but since about 1990 the grant/loan funds are being limited and reduced. The decline in these funding sources coupled with the increased demand for safe, efficient wastewater infrastructure calls into question the role of the State. State contributions to infrastructure financing

are becoming more important. Most recently, the State of North Carolina made available \$800 million of grant and loan funds financed through general obligations bonds. These funds led to remarkable improvements in wastewater systems in 97 of the state's 100 counties. These funds have been exhausted and we now face a period of record low funding for needed wastewater improvements.

Private loans from banks and other private lending institutions have become the largest single source of capital investments for public wastewater construction projects. These loans take several forms, including general obligation bonds, revenue bonds, special obligation bonds, tax increment bonds, and installment or lease-purchase debt. Based upon financial data charted for years 1995 through 2005, private loans accounted for 70% of total financing of water and sewer projects in North Carolina. Conversely, because of poor bond ratings, approximately 60% of N.C. local governments cannot qualify for most private infrastructure lending programs.

GRADE

The overall grade for North Carolina's wastewater system is a C-.

The grade is comprised of the following:

- D for North Carolina's wastewater system's ability to match their required system improvements with available funds.
- C for North Carolina's wastewater system's physical condition and current need to reduce infiltration and inflow thereby reducing wastewater overflows.
- C- for North Carolina's wastewater systems ability to meet their funding needs without state subsidy.

RECOMMENDATIONS

- The North Carolina Section of the American Society of Civil Engineers (ASCE) encourages the Governor, the State Legislature and public to support long-term funding of wastewater infrastructure projects that would enable the state to reduce the individual system's funding gap and assist the state's wastewater systems in continuing to serve the public health and economic development of its customers. This funding should support and enable projects to be planned and constructed in a regional manner that will maintain and/or improve the current levels of service and provide the capacity needed to support a growing economy.
- The overall reduction of infiltration and inflow should be the focus of each utility and customer to reduce the likelihood of wastewater system upsets and decrease the possibility of degradation of surface water quality. A statewide initiative should be implemented to educate and assist utilities with ways to reduce infiltration and inflow and to provide incentives and/or recognition to systems that

expedite and maintain an active infiltration and inflow reduction program and consistently document the reduction of infiltration and inflow into the system.

- Engage the state’s utilities managers in developing sound and equitable rates that are based upon the need for repairs and replacement of capital infrastructure, while at the same time implement a public education campaign to help our state’s citizens recognize and accept rates that can support life cycle asset management funding. Typically, utilities charge at or below the actual cost to collect the wastewater, pump the wastewater, treat at or above discharge limits, dispose of the biosolids, train and competitively pay staff, and have available funds to maintain and upgrade their system. The competition for the state’s limited nutrient discharge and

biosolid disposal allocation will dictate new technology and larger more regional systems. The treatment is becoming more advanced and will require more highly trained staff and additional operating and maintenance funds. The goal for each public wastewater system must be to become self sufficient and versed in adequate rate making and to strive to achieve a “sustainable utility” rate structure. The ASCE supports utility rates that encourage water efficiency, which will not only reduce drinking water consumption and our demand on a limited supply, but will also decrease the volume of wastewater requiring treatment and discharge. This overall reduction will further ensure our continued statewide economic growth through long term conservation to extend the life of our limited water resources.

SOURCES

North Carolina Rural Economic Development Center, Water 2030 Initiative, February 2006

2006 Report Card for Pennsylvania’s Infrastructure
