American Society of Civil Engineers
Ohio Council of Local Sections
May, 2009

2009 Ohio Infrastructure Report Card
Wastewater Fact Sheet
Grade: D+

Much of the burden on funding for municipal wastewater treatment is borne by local government, estimated to be 95% local versus state funded during the period 1991-2005. Aging systems discharge billions of gallons of untreated wastewater into U.S. surface waters each year. Several federal agencies estimate that the nation must invest billions over the next 20 years to update or replace existing wastewater systems and build new ones to meet increasing demand. Preservation and restoration of clean water supplies for the many uses our society expects will require the cooperation and participation of all levels of government to provide necessary funding. ASCE estimates that Ohio has $11.16 billion in wastewater infrastructure needs.

Background

Clean water, both surface waters and drinking water, has been an intrinsic part of our nation's development. The public has come to depend on our government to provide the policies and infrastructure to ensure that clean water is available to support its many uses in our society. The preservation of our clean water supply is a multifaceted effort involving many federal, state, and local government organizations, as well as private firms and individuals. This section of the report card will address the status of a portion of Ohio's infrastructure that contributes to the provision of clean water for the state's residents and visitors.

The Ohio Environmental Protection Agency (OEPA), Division of Surface Waters (DSW) Website lists more than 20 programs associated with clean water that are administered by the DSW.[1] These programs cover a wide range of topics, some of which are beyond the scope of this section. This Wastewater section of the report card focuses on two broad areas: public and private wastewater treatment facilities for municipalities and surface water preservation and restoration. The section will not specifically address privately-owned septic systems serving individual homes, treatment and disposal of industrial wastes stemming from commercial facilities, or solid waste (sludge) disposal. Surface waters are addressed through consideration of wastewater and storm water impacts on water quality and through discussion of non-point source pollution. Drinking water is discussed in a separate section of the report card.

ASCE, in the *2009 Report Card for America's Infrastructure*, indicated that several organizations have released estimates of funding shortfalls associated with the operation, maintenance, repair, upgrade, and/or construction of new wastewater facilities to meet current and projected demand.[2] The U.S. Environmental Protection Agency (EPA) in their 2008 report to Congress

estimated that, as of 2004, nationwide capital investment needs for wastewater pollution control were $202.5 billion. This amount includes $134.4 billion for wastewater treatment and collection systems, $54.8 billion for combined sewer overflow corrections, and $9.0 billion for storm water management. Small communities have documented needs of approximately $17.0 billion. The EPA indicates that the increase in overall national needs is due to a combination of population growth, more protective water quality standards, and aging infrastructure.[3]

In 2002, in response to a joint request from the 106th Congress, the Congressional Budget Office (CBO) estimated that an annual investment between $13.0 billion and $20.9 billion would be needed for wastewater systems during the period 2000-2019. The CBO also estimated that annual operations and maintenance costs for wastewater treatment during the same period, which are not eligible for federal aid under current programs, would average between $21.4 billion and $25.2 billion. The CBO presented estimates for low-cost and high-cost scenarios for both capital investments and operations and maintenance costs for what they consider to be the most likely possibilities. They indicate that this is necessary because of the large uncertainty in the estimates of these future costs.[4]

In 2002, the EPA also released *The Clean Water and Drinking Water Gap Analysis* they conducted to identify whether there was a quantifiable gap between current levels of spending and projected clean water investment needs. The EPA indicated that uncertainty in the methods and assumptions used to generate the estimates warranted the presentation of a lowermost and uppermost extreme. The EPA also included a point estimate that is an average of each possible combination of assumptions. Estimates of capital needs for clean water investments during the period 2000-2019 ranged from $331 billion to $450 billion with a point estimate of $388 billion. Estimates for the capital needs gap for clean water ranged from $0 billion to $177 billion with point estimates ranging from $21 billion to $122 billion depending upon whether the EPA used a revenue-growth or no-growth scenario to estimate the gap. The EPA also compared projected operations and maintenance needs during the period 2000-2019 with current levels of spending and estimated the gap to be between $0 billion and $229 billion with point estimates ranging from $10 billion to $148 billion, depending upon whether the EPA used a revenue-growth or no-growth scenario to estimate the gap.[5]

Regardless of which of these estimates is considered, it is clear that operations, maintenance, and capital investments in wastewater treatment facilities are not keeping up with the decaying infrastructure and the increasing demand placed on these facilities. This is despite significant investments being made by local, state, and federal governments. ASCE indicates that Congress has invested more than $77 billion in the construction of publicly-owned treatment facilities since 1972. ASCE indicates that total nonfederal spending on sewer and water between 1991 and 2005 was $841 billion. ASCE states that the physical condition of many of the nation's 16,000 wastewater treatment systems is poor due to a lack of investment in plants, equipment, and other capital improvements over the years.[1]

A consequence of the investment gap in wastewater infrastructure is that many systems have reached the end of their useful design lives. Older systems that mingle storm and wastewater collection systems are plagued by chronic overflows during major rainstorms and heavy snowmelt, which results in the discharge of raw sewage into surface waters. The EPA estimated that the volume of combined sewer overflows discharged nationwide is 850 billion gallons per year. According to the EPA, sanitary sewer overflows, caused by blocked or broken pipes, result in the release of as much as 10 billion gallons of raw sewage annually.[2]

Much of the burden on funding for municipal wastewater treatment is borne by local government. In their 2007 report *Who Pays for the Water Pipes, Pumps and Treatment Works? - Local Government Expenditures on Sewer and Water – 1991 to 2005,* the U.S. Conference of Mayors cites statistics obtained from the U.S. Census Bureau that indicate that the local government share of funding spent on sewer services (their term for the pipes, pumps and water treatment works that comprise a public-purpose wastewater treatment system) is just over 95%. Table 1 compares local government expenditures to state expenditures for the fiscal years 1991-1992 through 2004-2005. Also included in the table are disaggregated capital outlays for sewer systems which averaged nearly $10 billion per year for the 12 years of data available.[6]

Years	Combined State and Local Government ($ thousands)	Local Government ($ thousands)	State Government ($ thousands)	Percent Local Government (%)	Local Government Capital Outlay for Sewer ($ thousands)
1991-1992	21,008,588	20,100,540	908,048	95.68	Not Available
1992-1993	22,784,883	21,687,866	1,097,017	95.19	9,577,590
1993-1994	21,623,863	20,305,401	1,318,462	93.90	7,214,830
1994-1995	23,583,401	22,121,014	1,462,387	93.80	8,040,030
1995-1996	24,665,007	23,137,770	1,527,237	93.81	8,412,552
1996-1997	25,665,908	24,568,324	1,097,584	95.72	Not Available
1997-1998	25,646,655	24,514,606	1,132,049	95.59	8,422,293
1998-1999	26,979,635	25,851,890	1,127,745	95.82	9,091,174
1999-2000	28,052,470	27,097,840	954,630	96.60	9,689,939
2000-2001	28,061,484	27,074,500	986,984	96.48	8,930,797
2001-2002	31,257,197	30,207,393	1,049,804	96.64	11,169,098
2002-2003	32,539,728	31,536,919	1,002,809	96.92	12,062,056
2003-2004	35,534,720	33,966,273	1,568,447	95.59	13,186,489
2004-2005	36,372,359	35,254,120	1,118,239	96.93	13,616,183

Table 1. Local and State Sewer Expenditures

The Census Bureau data indicate that local government spending has increased approximately 75% during the 14 years presented in Table 1, with a relatively consistent trend of increased spending per year. State spending over this period was relatively flat. Local government capital spending also increased, although the trend was less consistent. Despite the increased spending by local governments, the national statistics cited above indicate that additional operations, maintenance, and capital investment is required.

Ohio Wastewater Facts and Issues

There is a general lack of statewide data for Ohio on which to draw conclusions. A lack of reported statewide data seems to be true nationally, and was alluded to in several of the sources for national data referenced in this section. Other state infrastructure report cards have also cited this as a limitation in preparing a statewide assessment of wastewater infrastructure. For instance, *Colorado's 2008 Infrastructure Report Card* indicated that one of the most critical findings of the research effort for the wastewater section of the report was a lack of findings. The Colorado report indicated that the available information about the existing water infrastructure is scarce, and where it did exist, is limited in description. The report cited the

dearth of existing data documenting the current or future state of Colorado's wastewater infrastructure as a limitation that results in an estimate indirectly founded on defensible data.[7]

The OEPA Website provides information about programs administered in the state and which includes current status and future plans related to Ohio's wastewater programs. Of the over 20 programs included under the DSW, several are cited in the following paragraphs.[1]
The OEPA Storm Water program implements the federal storm water program for both industry and municipalities within the state. Storm water discharges are generated by runoff from land and impervious areas such as paved streets, parking lots, and building rooftops during rainfall and snow events that often contain pollutants in quantities that could adversely affect water quality. Most storm water discharges are considered point sources and require coverage by a National Pollutant Discharge Elimination System (NPDES) permit.[1]

The OEPA Combined Sewer Overflow program addresses the control of municipal and industrial sewer overflows that occur during periods of heavy rainfall. The locations where discharges of untreated combined wastewater occur, as well as the discharge events themselves, are known as combined sewer overflows (CSOs). Combined sewers were built to collect sanitary and industrial wastewater, and storm water runoff, and transport this combined wastewater to treatment facilities. Flows conveyed to the treatment plant are then treated and discharged to a nearby river or stream. Combined sewers are designed to transport all flows to a treatment plant during dry weather and small wet weather events (i.e., rainfall and snowmelt). During larger wet weather events, the volume of storm water entering the combined sewer system may exceed the capacity of the combined sewers or the treatment plant. When this happens, combined sewers are designed to allow a portion of the untreated combined wastewater to overflow into the nearest ditch, stream, river or lake. This prevents pipes rupturing, sewage backing up into basements, and/or streets flooding. Ohio has approximately 1,308 known CSOs in 86 communities as of June 2008, ranging from small, rural villages to large metropolitan areas. OEPA continues to implement CSO controls through provisions included in NPDES permits and using orders and consent agreements when appropriate. The NPDES permits for CSO communities require them to implement the nine minimum control measures. Requirements to develop and implement Long Term Control Plans (LTCPs) are also included where appropriate. In 2007, the U.S. EPA adopted a new definition for the Water Safe for Swimming Measure, which sets goals to address the water quality and human health impacts of CSOs. The new definition sets a goal of incorporating an implementation schedule of approved projects into an appropriate enforceable mechanism, including a permit or enforcement order, with specific dates and milestones for 75% of the nation's CSO communities. As of May 2008, 54 of Ohio's original 89 CSO communities meet this definition. An additional 13 communities are required to meet the definition by October, 2008 to bring Ohio into compliance with U.S. EPA's goal.[1]

A lakes monitoring and assessment program was identified as a key area for development in OEPA's Surface and Ground Water Strategy 2005-2009. OEPA initiated a new Inland Lakes Program on March 1, 2006. This program is an initiative to evaluate the water quality of Ohio's inland lakes and reservoirs and to provide a mechanism to determine attainment of Clean Water Act goals for various uses, including aquatic life, recreation, public water supply, and human health.[1]

OEPA's Lake Erie programs include participation by the DSW in many state and regional Lake Erie and Great Lakes related issues and efforts. The two main programs are: the development

and implementation of Remedial Action Plans (RAPs) for the Maumee, Black, Cuyahoga and Ashtabula river areas of concern and the development of a lake-wide management plan (LaMP) for Lake Erie. Both of these efforts are focused on reducing the loadings of pollutants and restoring all beneficial uses to these water bodies. Both programs are described in the Great Lakes Water Quality Agreement between Canada and the United States, and are mandated under the Great Lakes Critical Programs Act amendment to the Clean Water Act.[1]

The OEPA Total Maximum Daily Load (TMDL) program focuses on identifying and restoring impaired or threatened water bodies. The program was established under Section 303(d) of the Clean Water Act to address polluted rivers, streams, lakes and other surface water bodies. A TMDL is a written, quantitative assessment of water quality problems in a water body and its contributing sources of pollution. It specifies the amount a pollutant needs to be reduced to meet water quality standards, allocates pollutant load reductions, and provides the basis for taking actions needed to restore a water body. The DSW developed a 12-step project-management-based TMDL process to accomplish these assessments. The process builds on existing monitoring, modeling, permitting, and grant programs and works within a "five-year monitoring strategy." The process calls for increased public involvement in problem-solving and decision-making.[1]

The OEPA indicates that the Clean Water Act helped solve many of Ohio's traditional, point source pollution problems. Many of the remaining problems are more challenging because they result from two other sources of pollutants: polluted runoff and physical alterations to a stream or river channel. These are referred to as non-point sources of pollution since they are the result of land use and/or man-made changes to a river rather than flows from a single point of discharge.[1]

Polluted runoff is rain or snowmelt that flows across the land picking up contaminants such as sediment, nutrients, or bacteria. The runoff carries these pollutants to small streams that eventually flow into a larger river. Physical alterations are changes made to a stream channel or stream banks and include activities, such as the conversion of headwater streams into drainage ditches, constructing levees and dams, and straightening a stream to encourage improved drainage. Physical alterations also include activities, such as removing trees along a river bank or installing rock rip-rap on a river bank to prevent erosion.[1]

Provisions of the Clean Water Act call upon states to develop comprehensive plans to manage non-point source pollution in their rivers and streams. Ohio's Non-point Source Management Plan (NSMP) was first completed in 1998 and consisted of more than 600 pages of detailed strategies for addressing water quality impairments. Subsequent revisions to the plan were completed in 1992, 1999 and, most recently, in 2005. The purpose of Ohio's NSMP is to identify strategies implemented by Ohio's NSMP partners to restore and maintain the chemical, physical and biological integrity of surface water bodies in the state. The short-term goal of the plan is for 80% of the Ohio's streams to attain their designated aquatic life-uses by 2010.[1]

The OEPA often relies on local government organizations to implement the plans they develop under the various programs discussed above. One example of a local government program is Project Clean Rivers of the City of Columbus, Department of Public Utilities, Division of Sewerage and Drainage (DOSD). Project Clean Rivers is an umbrella title of the various programs and services that DOSD provides to achieve clean water goals. The following

paragraphs describe several efforts within Project Clean Rivers that illustrate how local governments comply with federal and state policies.[8]

The Wet Weather Management Plan (WWMP) was delivered to the OEPA on July 1, 2005 and OEPA has now issued final approval for the plan. This plan included the System Evaluation and Capacity Assurance Plan (SECAP) and the Combined Sewer Overflow Long Term Control Plan (LTCP), both required by consent orders that Columbus signed in 2002 and 2004 with the state of Ohio. Large-scale capital improvements will be designed under this plan, which are expected to cost $2.5 billion over the next 40 years. When the plan's improvements are implemented, there will be a dramatic decrease in sewer overflows and basement backups that occur in the Columbus service area after rain events and snowmelt. The improvements are in addition to other projects already underway and planned, such as rehabilitation of older sewers and upgrades at the wastewater treatment plants.[1,8]

Construction on the Big Walnut Augmentation/Rickenbacker Interceptor is currently underway. This sewer tunneling capital improvement project that will greatly reduce wet weather sewer overflows on the Scioto River at the Southerly Wastewater Treatment Plant by providing in-pipe storage. Construction of this deep tunnel will also provide additional downstream capacity needed for future improvements on the east side of Columbus. Construction costs are estimated to be $220 million.[8]

The DOSD conducts inflow and infiltration studies to locate sources of storm water and groundwater that enter the sewer system in various ways. Older sewers are being rehabilitated through trenchless technology, such as cured-in-place piping methods. The process helps seal out excess water that contributes to sewer backups and overflows and reinforces the structural integrity of the sewer, preventing collapse. The DOSD also conducts the Capacity Management, Operation and Maintenance Program, the Industrial Waste Pretreatment Program, the Storm Water Management Program, and the Water Quality Management Program under the Clear Rivers Project umbrella.[8]

In the *2009 Report Card for America's Infrastructure*, ASCE indicated that Ohio has $11.16 billion in wastewater infrastructure needs.[2]

Policy Options

The CBO indicates that federal support for water system investment comes from several programs. These include clean water and drinking water State Revolving Funds (SRFs) under the Clean Water Act, which provide capitalization grants through appropriations to EPA, loan and grant programs from the Department of Agriculture's Rural Utilities Service, and Community Development Block Grants administered by the Department of Housing and Urban Development. The federal government also supports water infrastructure through tax preference on municipal debt and qualified private activity bonds.[4]

ASCE indicates that federal funding under SRFs has remained flat for more than a decade. ASCE contends that federal assistance has not kept pace with the needs, and that virtually every authority agrees that funding needs remain very high.[2] However, the CBO contends that increasing federal funding for wastewater system investment can have unintended consequences. The CBO indicates that analysis of the federal wastewater construction grants program concluded that it reduced other contributions to wastewater capital spending by 67 cents on the dollar. They indicate that federal support does not necessarily increase investment

in water infrastructure because the federal support may prompt cuts in state and local spending or the state and local spending to be diverted to other uses. The CBO points out that federal subsidies can redistribute the burden of water costs from some households to others, and that subsidies run the risk of undermining incentives for managers and consumers to take cost-effective actions, thereby retarding change in the water industry and raising total costs to the nation as a whole.[4]

Despite the reservations cited by the CBO and others, ASCE indicates that the case for increased federal investment is compelling. Current and projected funding needs are large and unprecedented. ASCE indicates that in many locations, local sources cannot be expected to meet this challenge alone and, because waters are shared across local and state boundaries, the benefits of federal help will be disseminated throughout the nation. Many other highly important infrastructure programs enjoy sustainable, long-term sources of federal backing, often through the use of dedicated trust funds. Under current policy, water and wastewater infrastructure do not.[2]

Specific ASCE Ohio Council Recommendations

- Increase funding for wastewater infrastructure system improvements and associated operations through a comprehensive program that addresses all aspects of point and non-point source pollution
- Create a national Water Infrastructure Trust Fund to increase funding for the upgrade of state and local infrastructure systems under the Clean Water Act, including storm water management and other projects designed to improve the nation's water quality
- Retain traditional financing mechanisms, such as appropriations from general treasury funds, issuance of revenue bonds and tax exempt financing at state and local levels, public-private partnerships, state infrastructure banks, and user fees on certain consumer products
- Expand innovative financing mechanisms, including broad-based environmental restoration taxes

Sources

[1] Ohio Environmental Protection Agency, Division of Surface Water Website, *http://www.epa.state.oh.us/dsw*

[2] American Society of Civil Engineers, *2009 Report Card for America's Infrastructure*, January, 2009

[3] Environmental Protection Agency, *Clean Watersheds Needs Survey 2004*, Report to Congress, January 2008, http://www.epa.gov/owm/mtb/cwns/2004rtc/toc.htm

[4] Congressional Budget Office, *Future Investment in Drinking Water and Wastewater Infrastructure*, May, 2002, http://www.cbo.gov/ftpdocs/34xx/doc3472/Water.pdf

[5] Environmental Protection Agency, *The Clean Water and Drinking Water Infrastructure Gap Analysis*, September 2002, http://www.epa.gov/OWM/gapreport.pdf

[6] The U.S. Conference of Mayors, *Who Pays for the Water Pipes, Pumps and Treatment Works? - Local Government Expenditures on Sewer and Water – 1991 to 2005*, 2007, http://www.usmayors.org/urbanwater/07expenditures.pdf

[7] Colorado Section, ASCE, *Colorado's 2008 Infrastructure Report Card*, 2008

[8] City of Columbus, Department of Public Utilities, Division of Sewerage and Drainage Website, http://utilities.columbus.gov/