Reducing Combined Sewer Overflows in the Great Lakes:

Why Investing in Infrastructure is Critical to Improving Water Quality

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Why Investing in Infrastructure is Critical to Improving Water Quality

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Photo: Olga Lyandres

Executive Summary

The Great Lakes were sullied in 2011 by 18.7 billion gallons of combined sewage and storm runoff, a foul cocktail released into the waters by seven of the basin's largest dischargers. It is a scenario repeated year after year as billions of gallons of raw sewage, trash and personal hygiene products — along with industrial wastewater, household chemicals, urban runoff, herbicides and pesticides — flow into the Great Lakes after heavy rains. Bacteria, viruses and other pathogens in untreated sewage pose a significant health risk and are one of the causes of Great Lakes beach closings and swimming advisories each summer, with swimmers at many beaches facing multiple closings a year. Trash can float in the water and pollute shorelines for miles, and boaters can find themselves traversing waters littered with an offensive blend of garbage and sewage. These beach closures come at a cost: Studies have found that the value of a beach trip is between $20-$36 per person per day — revenue which may be lost to local economies when beaches are closed. It's worth noting that these recurring insults to the Great Lakes — widely recognized as the world's largest surface freshwater system — continue nearly 40 years after the federal Clean Water Act of 1972 was enacted to protect the nation's waters.

Fortunately, these sewer overflows can be vastly reduced. Indeed, many municipalities have plans for sewer system improvements that will significantly cut combined sewer overflows (CSOs). But these plans are costly, and local governments often struggle to finance them. The Clean Water State Revolving Fund (CWSRF) provides low-interest loans and flexible financing options to help local governments carry out much-needed wastewater management projects, including innovative green infrastructure. *The CWSRF is not a federal giveaway.* For every federal dollar appropriated, states contribute 20 cents. Principal repayment, interest earnings and proceeds from leveraging the loans allow the funds to "revolve" and increase their financing capacity over time. Rochester, N.Y. and Grand Rapids, Mich. are examples of two communities that have succeeded in reducing sewage overflows by millions of gallons a year. These projects have benefitted not only the communities themselves, but surrounding communities that at one time were on the receiving end of sewage discharges. In terms of community affordability, allocation of scarce public financial resources, disruption of multi-year capital improvement programs and other impacts, one cannot overlook the significance of the $340 million capital program the Buffalo Sewer Authority (BSA) is embarking on, almost a third of which will be dedicated to green infrastructure (GI). This GI capital program is the largest in the Great Lakes.

The BSA calls on the federal and state governments to do their part by providing some grant, or grant-equivalent, funding toward the authority's implementation of the recommended plan. This funding support can readily come from the State Revolving Fund program or federal grant funding to help minimize financial burdens on BSA's ratepayers.

The ability to finance such projects is critical to reducing the massive volumes of CSOs that flow into the Great Lakes every spring and summer. Moreover, cleaning up the Great Lakes today will pay dividends tomorrow. A study by the Brookings Institution found that every $1 invested in Great Lakes restoration leads to at least $2 in economic return through the creation of jobs, tourism and development. The CWSRF is a critical tool that must be sustained and allowed to grow over time to ensure cities have all the options they need to solve this vexing problem.

Photo: Lloyd DeGrane

Background

Across the Great Lakes, treatment facilities discharge significant sewage pollution every year because of insufficient capacity, aging infrastructure and outmoded approaches to water management. Many communities on the Great Lakes shoreline have infrastructure more than a century old that combines sanitary sewage and stormwater runoff into a single system. Unfortunately, in heavy rainfall these combined sewage systems take in a volume of wastewater that overwhelms the treatment plant and its storage system. The excess flow is then diverted to outfalls into public waters. These combined sewer overflows (CSOs) discharge pollutants – including raw sewage, floatables such as trash and personal hygiene products, toxic industrial waste, nutrients and other contaminants in the stormwater — directly into the waterways.

Each year tens of billions of gallons of combined untreated sewage and stormwater are dumped into the Great Lakes. Sewage overflows from aging sanitary and combined sewer systems, leaking sewage pipes, and malfunctioning sewage treatment plants and pump stations cause beach closings and swimming advisories at beaches throughout the Great Lakes. In 2010, polluted runoff and stormwater — which can carry a cocktail of pollutants from urban centers and agricultural areas — caused 351 closing/advisory days, while sewage spills and overflows caused 64 closing/advisory days at Great Lakes beaches.[1]

In addition to being detrimental to the environment, aging infrastructure is an economic liability for communities of all sizes in the region. Studies have found that the value of a beach trip is between $20-$36 per person per day — revenue that may be lost to local economies when beaches are closed.[2] Improvements in infrastructure can lead to long-term economic growth by attracting new residents and businesses to the area, as well as tourists who can enjoy parks and beaches along shorelines free of sewage. A study by the Brookings Institution found that every $1 invested in Great Lakes restoration leads to at least $2 in economic return through the creation of jobs, tourism and development.[3]

1 Testing The Waters: A Guide to Water Quality at Vacation Beaches, NRDC 2011 report. In 2010, the source of pollution for 83% of advisories/closures was classified as "unknown," so the actual number of beach closings related to CSOs may be higher than the cited numbers known to have been caused by CSOs

2 "Local Great Lakes Restoration Financing and Policy: A Resource Guide for Identifying and Measuring Economic Benefits," Sabina L. Shaikh, University of Chicago, Senior Research Economist, RCF Economic and Financial Consulting, for Alliance for the Great Lakes, July 25, 2008

3 "America's North Coast: A Benefit-Cost Analysis of a Program to Protect and Restore the Great Lakes," John C. Austin, Soren Anderson, Paul N. Courant and Robert E. Litan, September 2007

National CSO Control Policy

To expedite compliance with the Clean Water Act, the U.S. Environmental Protection Agency (EPA) issued a national CSO control policy in 1994 and Congress amended the Clean Water Act to incorporate this policy into federal law in 2000. In addition to taking immediate action to reduce overflows, the CSO control policy requires municipalities to develop a Long-Term Control Plan (LTCP) to manage and eliminate CSOs. Such plans may include improvements in "gray" infrastructure, such as adding treatment capacity and building storage tunnels or retention basins, as well as "green" infrastructure projects, such as green roofs, rain gardens, bioswales[4] and permeable surfaces. Sewage infrastructure projects often carry significant costs that municipalities can have difficulty financing, even over many years. Green infrastructure can alleviate some of the sewage system's storage needs by soaking up stormwater and pollution before it enters a combined sewer system and providing natural "treatment," thus reducing the total flow entering the treatment plant. Green infrastructure is often cheaper than gray, but often must be combined with gray to address extreme volumes of rainfall.

Clean Water State Revolving Fund

The CWSRF provides loans — not grants — for the construction of municipal wastewater facilities, implementation of nonpoint source pollution[5] control and estuary management projects. Congress established the fund in 1987. For every federal dollar appropriated, states contribute 20 cents. Principal repayment, interest earnings and proceeds from leveraging the loans allow the funds to "revolve" and increase their financing capacity.

While still at a higher level than much of the 2000s, the annual federal capitalization funds for the CWSRF program have decreased since 2011 and another cut is proposed for 2013. Increased funding for the CWSRF is needed to help Great Lakes cities complete essential infrastructure projects that reduce CSOs. This funding is the key source of low-interest loans and flexible financing options to local governments to carry out costly wastewater capital improvement projects. A 2010 report by the Healing Our Waters–Great Lakes Coalition highlighted how CWSRF can aid municipalities in undertaking massive infrastructure projects, especially during hard economic times, and how the decline in federal funding levels prevents more projects from being financed.[6]

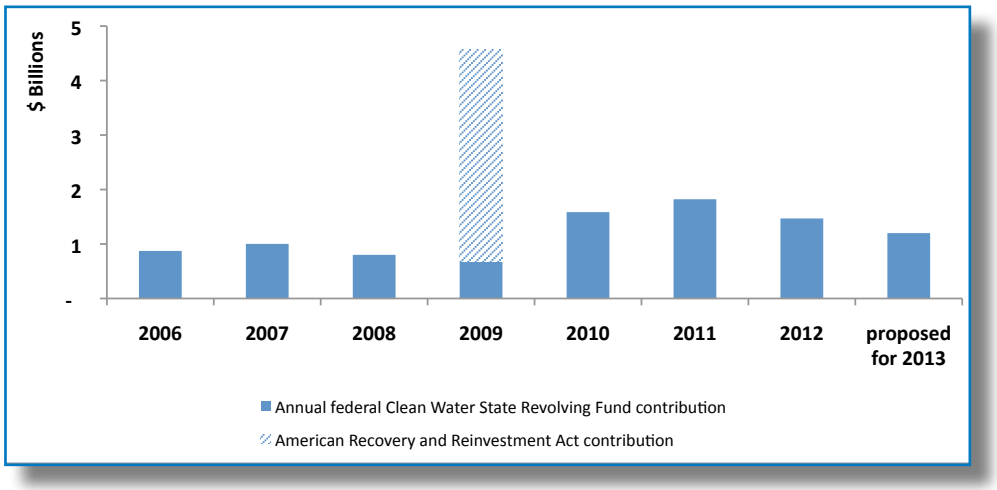

Figure 1. Annual federal contributions to the Clean Water State Revolving Fund[7]

4 Bioswales are landscape elements designed to remove silt and pollution from surface runoff water

5 Nonpoint source pollution is pollution from diffuse sources, such as agricultural or urban stormwater runoff, as opposed to discharges coming from a pipe

6 Turning the Tide: Investing in Wastewater Infrastructure to Create Jobs and Solve the Sewage Crisis in the Great Lakes, a Report by the Healing Our Waters®-Great Lakes Coalition, August 2010

7 National Information Management System Reports Index, National summary report (*http://water.epa.gov/grants_funding/cwsrf/cwnims_index.cfm#IndividualStateReports*)

As of 2011, the federal government had invested $33.5 billion into the CWSRF, with corresponding state contributions of $6.2 billion. Since its inception, CWSRF has actually provided $89.5 billion in assistance because of the revolving nature of the fund.[8] The loans provided by the fund each year are a sum of federal grants, state matching funds and repayments from previous loans. The state agency compiles a list of projects that agencies have applied for loans to support, ranks them based on a variety of factors, and allocates available resources to projects at the top of that list. The allocated amount is dedicated to fund clean water projects across the state. This amount is referred to as the "binding commitment." The amount that the state agency actually disburses during that year is typically different from the committed amount. It may be greater because the state is continuing to fund ongoing projects to which funding was committed in previous fiscal years, or less if the disbursement for a particular project hasn't began yet because construction will start at a later date.

State	$ Committed 2011	$ Disbursed 2011	$ Committed, 2007-2011	$ Disbursed, 2007-2011
OH	$541,411,765	$334,095,813	$1,849,309,395	$1,457,935,797
WI	$121,503,873	$140,110,239	$711,502,489	$575,396,279
MI	$46,675,000	$197,157,318	$1,356,255,000	$1,042,817,327
NY	$512,162,265	$786,564,749	$3,431,541,878	$2,866,289,194
IL	$269,823,453	$422,832,289	$1,211,047,541	$1,060,396,416
IN	$128,114,800	$178,279,918	$860,355,873	$1,070,178,482
MN	$157,070,909	$230,710,930	$972,163,428	$879,174,015
PA	$173,887,534	$172,377,950	$949,590,763	$825,119,273

Table 1. Clean Water State Revolving Fund amount committed to funding projects (includes federal and state contributions) and actual amount disbursed for FY 2011, and during the last five years, in the Great Lakes states.

Federal contributions as well as states' committed and disbursed funds in 2011 and over the last five years are summarized in Table 1 to demonstrate how much water infrastructure projects cost, and how much assistance states in the Great Lakes Basin provide to communities.[9] The low cost and flexibility of CWSRF financing has helped the program serve communities of all sizes.

Because the CWSRF is well-established in terms of its financial capacity after 25 years in operation, the states have developed mechanisms to generate state match funds, including: the issuance of state match bonds, the allocation of direct state appropriations, and the set-aside of a percentage of loan repayments to cover the state match contribution. The largest challenge to quickly moving CWSRF dollars to where they need to be may be the ability to develop plans and complete reviews for the numerous loan-eligible projects in a timely manner, given limited staff resources at state agencies and the hesitation of local governments to take on more debt.[10]

8 See footnote 7

9 CWSRF Individual State Reports

10 Conversation between Olga Lyandres and program managers at MDEQ (Sonya Butler) and IEPA (Geoff Andres) on April 26, 2012 and April 23, 2012, respectively.

Photo: Butch Jorgenson

Great Lakes CSO Pollution Sources

The largest sources of combined sewer overflow pollution into the Great Lakes by volume come from the region's largest municipalities and the wastewater treatment facilities they operate. These include Detroit, Cleveland and Milwaukee. Chicago contributes a significant amount during extreme storm events when the Chicago River system cannot handle all of the flow. Several much smaller municipalities, for example Buffalo, N.Y., Hammond, Ind. and Toledo, Ohio, also experience significant overflows. On the other hand, cities such as Rochester, N.Y. and Grand Rapids, Mich. have developed and implemented plans that have achieved significant reductions in CSO volumes — showing that success is possible. Indeed, Michigan's CWSRF program helped finance the separation of sewers in Grand Rapids in the 1990s.

The graph below shows CSO volumes discharged by these municipalities. This report outlines needed infrastructure improvements that will help reduce CSOs and protect Great Lakes water quality, but depend on federal investments to finance the projects. There is no escaping the reality that solving sewage overflows into the Great Lakes requires cold, hard cash.

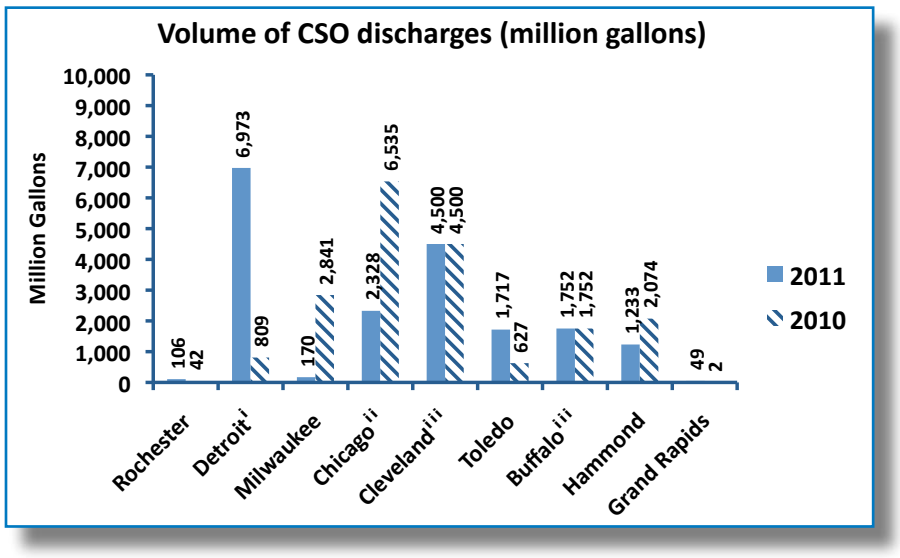

Figure 2. CSO discharge volumes for 2010, 2011.
[i]Includes only raw sewage discharge volume (partially treated discharges — those discharges undergoing primary treatment and, in some cases, disinfection — from Detroit were 49,634 million gallons in 2011, and 13,554 million gallons in 2010).
[ii]Includes only discharges to Lake Michigan ; the volume includes flow from the Chicago Area Waterways as a result of gate reversals.
[iii]Volume estimated by modeling typical annual rainfall.

Detroit, Michigan – Detroit Water and Sewerage Department

The Detroit Water and Sewerage Department is a significant discharger of untreated combined sewage into the Great Lakes. In 2011, Detroit dumped 7 billion gallons of untreated sewage and stormwater into the Detroit and Rouge Rivers, which flow into Lake Erie.[11] Detroit has been taking steps to decrease CSO discharges and has succeeded in reducing them by more than 80 percent from the pre-1995 levels. Storage basins started coming online in 1998 and provided capacity of 36 million gallons for the Rouge River and 30.3 million gallons for the Detroit River. Additional primary treatment capacity of 360 million gallons per day was added in 2004. Implementation of the deep tunnel project to further reduce sewage overflows was halted by the city in 2009 because of a lack of funds, however. Having spent nearly $800 million on the infrastructure, Detroit now faces some of the biggest financial challenges in the region. Detroit residents — who have among the lowest per capita incomes in the basin — have footed the bill for the majority of the costs required to address CSOs, having paid for 83 percent of the construction expenditures.

Detroit has proposed a new group of projects that will eliminate all under-treated sewage discharges to the Rouge River, including raw sewage discharges from 28 CSO outfalls and under-treated discharges from the treatment facility when maximum capacity is reached. Without stable federal help, however, building the necessary funding portfolio will continue to be a challenge.

The revised LTCP includes:[12]

- Construction of nine first flush capture basins with screening nets and in-pipe disinfection system for Rouge River outfalls (more than $425 million, pilot by 2015, completed by 2035).
- Construction of a secondary outfall to the Rouge River that will provide disinfection and dechlorination ($130 million, online October 2018).
- Implementation of green infrastructure projects to reduce CSO volumes by 10 percent to 20 percent ($50 million, completed by 2029).

The total costs are estimated to be $555 million for gray infrastructure projects and $50 million for green infrastructure initiatives. Wastewater infrastructure improvements in Detroit have utilized low-interest CWSRF loans extensively — to date, $539.5 million went to CSO correction projects. For fiscal year 2012, Michigan's project priority list contains two more CSO projects in Detroit with a binding commitment of $255 million.[13]

Milwaukee, Wisconsin – Milwaukee Metropolitan Sewerage District

The Milwaukee Metropolitan Sewerage District (MMSD) comprises two facilities, the South Shore and Jones Island plants. Milwaukee-area combined sewer outfalls discharge combined sewage into Lake Michigan and its tributaries. An underground tunnel, which saw its first full year of operation in 1994, stores 405 million gallons and has reduced the volume of Milwaukee's combined sewer overflows by 75 percent to 80 percent. Despite this and other innovative green infrastructure efforts, combined sewer discharges still foul Lake Michigan in extreme rain events. For instance, powerful storms sent nearly 4

11 DWSD Response to Great Lakes CSO Report, from Samuel Smalley, PE, Assistant Director, Wastewater Operations Group, June 15, 2012

12 PUBLIC INFORMATION MEETING Re: Proposed NPDES Permit Modification for the Detroit Water & Sewerage Department, Feb. 23, 2011

13 State Revolving Fund Strategic Water Quality Initiatives Fund Final Intended Use Plan - Fiscal Year 2012

billion gallons of untreated sewage and stormwater into Lake Michigan in 2008 and 2.8 billion gallons in 2010.[14]

MMSD has laudably continued to implement gray and green infrastructure projects that will reduce the frequency and volume of sewage overflows by providing additional capacity and optimizing the system. As of 2010, MMSD had completed the construction of an additional 89-million-gallon storage tunnel and conducted numerous facility upgrades and sewer maintenance, costing the district $1 billion. The third phase of the tunnel project added 27 million gallons of storage. These projects, together with innovative green infrastructure initiatives, will help the district achieve its goal of completely eliminating CSO discharges by 2035.

The major components of the district's updated CSO LTCP are: [15]

- Increase pump station capacity to 180 million gallon per day and analyze hydraulic capacity of the Jones Island Wastewater Treatment Plant.
- Maintain models to analyze and simulate the hydraulics of the conveyance system; improve the real-time control system to optimize operation of the storage tunnel.

MMSD has already invested $4 billion in its gray infrastructure projects, but building additional tunnels is financially unsustainable. The district hopes to capture up to 500 million gallons of stormwater with green infrastructure.[16] The district in fiscal year 2012 has submitted applications for numerous projects to Wisconsin's Clean Water Fund Program. The program has committed to loan $105 million to the district, which includes $43 million for environmentally innovative projects as well as $16 million for overflow pump station upgrade.[17]

Chicago, Illinois – Metropolitan Water Reclamation District of Greater Chicago

The Metropolitan Water Reclamation District of Greater Chicago (MWRD) is one of the largest sewerage districts in the world, composed of seven facilities. The three plants handling most of the flow are the Stickney, Calumet and North Side facilities. Within MWRD's boundaries, 57 communities are served by combined sewer systems that send their wastewater to the district's facilities for treatment. These communities are responsible for the maintenance of their conveyance infrastructure; in cases where communities have not maintained infrastructure, extra loading and strain is put on MWRD's system. The district's CSO outfalls routinely discharge into the network of rivers and canals flowing into the Mississippi River Basin; when storage capacity is exceeded, the excess flow is diverted into Lake Michigan. In one such instance, reported in 2010, MWRD dumped 6.5 billion gallons of untreated sewage and stormwater into the lake (volume includes flow from the Chicago Area Waterways as a result of gate reversals, not just end-of-pipe discharge volume).[18]

14 *http://v3.mmsd.com/Overflow.aspx*

15 MMSD 2020 Facilities Plan Appendix 10A, CSO Long–Term Control Plan

16 "Weaving Milwaukee's Green & Grey Infrastructure into a Sustainable Future," Karen Sands, AICP, Manager of Sustainability, MMSD, March 31, 2011

17 Wisconsin Clean Water Fund Program State Revolving Fund Intended Use Plan for FISCAL YEAR 2012

18 Summary of Lake Michigan reversals (*http://www.mwrd.org/irj/portal/anonymous/overview*)

The district developed the Tunnel and Reservoir Project (TARP) in 1972, and Illinois EPA approved it as the district's LTCP in 1995. TARP is intended to provide more than 17 billion gallons of storage capacity during rain events and eliminate overflows to Lake Michigan except during the most extreme storms. Deadlines have been pushed back repeatedly, with the current date for total completion of TARP in 2029 — 17 years from now.

The following list outlines the status of various construction projects and storage capacities included in the plan:[19]

- Construction of the Majewski Reservoir (0.35 billion gallons) and all tunnels (2.3 billion gallons) has been completed ($3 billion spent).
- Thornton Composite Reservoir is scheduled to be online in 2015 (7.9 billion gallons total, comprising 4.8 billion gallons for CSOs and 3.1 billion gallons for surface floodwaters). The McCook Reservoir is scheduled to commence operation of Stage 1 (3.5 billion gallons) in 2017 and of Stage 2 (6.5 billion gallons) in 2029.
- Development of green infrastructure projects to capture 10 million gallons per storm event in 15 years; and implementation of a rain barrel project within five years to capture 825,000 gallons of water.

With $3 billion already spent, the total projected costs for these gray infrastructure projects have not yet been determined. Illinois' Water Pollution Control Loan Program in fiscal year 2012 has committed to $85.5 million in loans to projects in the MWRD's service area.[20]

Timely completion of the tunnels and reservoirs will prevent billions of gallons of sewage and stormwater from being dumped into Lake Michigan and Chicago-area rivers.

Cleveland, Ohio – Northeast Ohio Regional Sewer District

The Northeast Ohio Regional Sewer District (NEORSD) is composed of three wastewater treatment facilities — Southerly, Westerly and Easterly — and maintains 126 permitted outfalls that discharge into Lake Erie and nearby rivers. According to the NEORSD models, annual discharges from the district typically equal to 4.5 billion gallons of untreated combined sewage each year.

Several proposed projects, when completed in 2035, will reduce the total volume of discharges from 4.5 billion gallons to under half a billion gallons annually. More than 98 percent of the volume of wet weather flows from the combined sewer system will be receiving treatment.[21]

A court-ordered consent decree, entered in July 2011, outlines the LTCP and corresponding additional storage capacities for the district: [22]

- Construction of storage tunnels and tanks (314 million gallons), the first of which — the Euclid Creek CSO Tunnel now under construction — is expected to be operational in 2015.
- Increase in secondary treatment capacity at the Easterly facility (to be operational by 2016) and the Southerly facility (contingent upon completion of a pilot study by 2015, operational by 2019); increase in overall capacity at the Westerly Combined Sewer Overflow treatment facility (contingent

19 MWRD draft consent decree, 2011, Appendix A

20 State of Illinois Water Pollution Control Loan Program Draft Intended Use Plan FY 2012

21 *http://neorsd.org/projectcleanlake.php*

22 NEORSD consent decree, 2011

upon completion of a pilot study by 2016, operational by 2020).

- Development of green infrastructure to capture an additional 44 million gallons of annual combined sewer overflow, beyond the level of CSO capture from the gray infrastructure program (construction scheduled for 2019, with full operation — including demonstration of compliance — in 2023).

Implementation of the gray infrastructure projects will cost an estimated $3 billion, while the minimum green infrastructure investment of $42 million is mandatory to meet the requirements of the consent decree. For fiscal year 2012, Ohio's Water Pollution Control Loan fund committed to funding $161 million worth of projects with $9.5 million going specifically to CSO abatement.[23]

Buffalo, New York – Buffalo Sewer Authority

The Buffalo Sewer Authority (BSA) maintains and operates the wastewater collection system and the Bird Island wastewater treatment plant. BSA modeling shows that approximately 1.75 billion gallons of stormwater and sewage per year are discharged into Niagara River, Buffalo River, Black Rock Canal, Scajaquada Creek and several other creeks through 52 permitted outfalls.[24] BSA has been developing its long-term plan for controlling CSOs since 2000, but Buffalo's ongoing fiscal crisis has prevented timely action to reduce these overflows. An updated draft LTCP was submitted to EPA for approval in April 2012. While the draft LTCP analyzes several options, BSA recommends a 19-year plan — the only one with a green infrastructure component.

Implementation of the LTCP in Buffalo will reduce sewage discharges, capturing an estimated 97.4 percent of wet weather flows; significantly improve water quality in the Buffalo River and eastern basin of Lake Erie; reduce residential flooding and allow the city to revitalize its waterfront. Financial assistance will be critical to Buffalo's ability to move forward. BSA has already invested $50 million to collect data, develop a model for and map the system, and conduct a series of sewer separation and storage projects — including a 5-million-gallon storage basin for the Hamburg Drain, a critical CSO at the terminus of the Erie Canal in Buffalo's inner harbor.

The recommended plan to reduce sewage overflows will include the following projects:[25]

- Implementation of North interceptor relief sewer to convey additional flows to Bird Island WWTP ($36 million, completed in 2023).
- Construction of supplemental capacity totaling 19.1 million gallons across the BSA operating area ($71.3 million to be completed over 19 years).
- Implementation of a significant green infrastructure program, including rain gardens, pervious pavements on public streets and parking lots, downspout disconnections/rain barrels, and modification of 1,620 acres of publicly owned lots — currently vacant — to store and infiltrate stormwater runoff ($96.2 million, to be completed over 19 years). The BSA currently has two demonstration projects under construction, a green streets project and a downspout disconnection project, and expects to invest $10 million in the next five years on pilot programs.

23 State of Ohio Water Pollution Control Loan Fund 2012 Program Management Plan

24 Buffalo Sewer Authority, Draft 2012 LTCP

25 Buffalo Sewer Authority Draft 2012 LTCP, Executive Summary

The price tag for the projects detailed in the 2012 draft LTCP is estimated to reach $350 million over a 20-year period. CWSRF loans for CSO work by the Buffalo Sewer Authority include $18 million for an ongoing project on the Hamburg Drain as well as $3.9 million to fund projects completed in 2004.[26]

Toledo, Ohio – City of Toledo Division of Water Reclamation

Toledo is served by Bay View Treatment Plant and has 33 permitted CSO discharge locations that send untreated sewage combined with stormwater to the Maumee River, Ottawa River and Swan Creek — tributaries to Lake Erie. In an effort to reduce CSOs, the city of Toledo started developing its LTCP in 2002. After prolonged negotiations, the revised plan was finally signed in May 2010. The completion date is set for August 2020.

Implementation of the LTCP is long overdue in Toledo. In 2011, Toledo discharged 1.7 billion gallons of combined sewage and stormwater into Lake Erie tributaries. The LTCP includes the following components: [27]

- Separation, transport and storage projects to reduce overflow volume by 99 percent to 1 million gallons for the Ottawa River
- Construction of storage to reduce overflow for the east side of the Maumee River; construction of storage for currently uncontrolled outfalls, tunnel modification, and the addition of a tunnel disinfection system for the west side of the Maumee River; 92 percent overall reduction in overflow volume to 73.9 million gallons.
- Tunnel optimization to reduce discharge volume, and the addition of a tunnel disinfection system to achieve overflow reduction by 93 percent to 68.9 million gallons of untreated overflows per year for Swan Creek.

The projects outlined in the LTCP are estimated to cost $315.7 million and provide an additional storage capacity of 53.2 million gallons. Toledo has relied on a variety of funding sources to finance infrastructure projects, including low-interest loans from Ohio's Water Pollution Control Loan Fund. Through fall 2010, Toledo received more than $265 million in low-interest loans. For fiscal year 2012, Ohio's Water Pollution Control Loan fund committed to funding $64 million worth of projects with $44 million going specifically to CSO abatement.[28]

Once implemented, Toledo's long-term plan will result in significant water quality improvements in the rivers feeding into the western basin of Lake Erie and a reduction in pathogen and nutrient loadings to the lake.

Hammond, Indiana – Hammond Sanitary District

The Hammond Sanitary District services the municipalities of Hammond, Munster, Griffith, Whiting and Highland, Ind. It serves 150,000 people and is responsible for maintaining 400 miles of sewers.

Despite serving a relatively small community, the volumes of CSO discharges from Hammond Sanitary District are on par with larger municipalities such as Cleveland, Milwaukee and Detroit. In 2010, for example, Hammond dumped more than 2 billion gallons of untreated sewage and stormwater

26 Personal communication with James Starnes, NYS Environmental Facilities Corporation

27 Toledo Waterways Initiative, Long Term Control Plan Report - Addendum Final LTCP, April 2009

28 State of Ohio Water Pollution Control Loan Fund 2012 Program Management Plan

into the Grand Calumet and Little Calumet rivers — which flow into Lake Michigan.[29] Hammond Sanitary District's LTCP has yet to be approved by U.S. EPA. A consent decree between the government and Hammond was entered in 1999, and attempts to renegotiate the conditions of the consent decree fell apart in the summer of 2011 after 20 months of negotiations. The requirements for CSO abatement (to be operational by May 2010) included in the 1999 consent decree were:[30]

- Construct a catch basin near the treatment facility (25 million gallons) to eliminate discharges to the Grand Calumet River.
- Implement improvements in the operation of the plant through necessary pump maintenance and downspout disconnections.
- Conduct pump station and sewer interceptor improvements, as well as sewer separation where appropriate.

According to cost estimates from Hammond Sanitary District updated in August 2011, all the CSO reduction projects combined will have a price tag of $166 million. Although the district and regulatory agencies have yet to reach agreement on an acceptable plan, the district is moving ahead with the reservoir construction that should eliminate discharges to the Grand Calumet River. The catch basin is to be operational by the end of 2013. Hammond Sanitary District has relied on State Revolving Fund loans in the past — the last loan Hammond Sanitary District closed on was on May 30, 2007 for $17.2 million.[31] Currently the district has three projects on the project priority list with a total projected cost of $66 million.[32]

29 Monthly Discharge Monitoring Reports submitted by HSD to Indiana Department of Environmental Management

30 Hammond Consent Decree, 1999

31 Personal communication with Shelley L. Love, Wastewater Program Administrator, State Revolving Fund Loan Program, Indiana Finance Authority

32 Indiana Clean Water State Revolving Fund Loan Program Intended Use Plan for Fiscal Year 2012

Clean Water State Revolving Fund Success Stories

The CWSRF has allowed many municipalities to finance major upgrades and improvements to their sewage systems to reduce combined sewer overflows into the Great Lakes. Notably, some Great Lakes communities have been able to almost completely eliminate their CSO pollution through infrastructure enhancements supported by CWSRF funding. Rochester, N.Y. and Grand Rapids, Mich. are both examples of communities that have taken advantage of CWSRF funding to reduce their CSOs.

Rochester designs and implements a CSO Abatement Program that significantly reduced the frequency and volume of overflows

Rochester, New York – Rochester Pure Waters District

Rochester's metropolitan area is served by the Frank E. VanLare wastewater treatment plant. Prior to the national CSO policy issued by EPA in 1994, the district developed and implemented a CSO Abatement Program consisting of a network of deep storage tunnels having a capacity of 175 million gallons. The construction began in 1975 and cost approximately $550 million.[33] The tunnel system was completed in 1993. Since the major portion of planning and construction took place before the establishment of the CWSRF program in 1987, funding came from both state and federal sources. The CWSRF was also utilized toward the end of the process. It provided a $17.2 million loan to finance parts of the construction.[34] The district continues to implement the nine minimum controls as described in the CSO policy. Discharges into the Genesee River and Irondequoit Bay, tributaries to Lake Ontario, have been minimized to 41.8 million gallons in 2010, and 106.1 million gallons in 2011.[35]

33 Rochester New York Pure Waters District Combined Sewer Overflow Abatement Program (CSOAP) Document (Document submitted to the Great Lakes and St. Lawrence Cities Initiative by Monroe Co Department of Environmental Services)

34 Personal communication with Carrie VanDerhoof, environmental project engineer, Division of Engineering and Program Management, New York Environmental Facilities Corporation

35 Personal communication with Thomas Tieppo, Chief Pollution Control Operator, Monroe County, New York (information on volume of CSO discharges for 2010/11)

- According to the CSO Best Management Practices 2011 Annual Report, the district is partnering with the city of Rochester to implement a variety of green infrastructure projects (via a $2.4 million grant). These include green roofs, installation of large tree boxes and porous pavements. One of the green roofs installed over the Civic Center garage is estimated to provide 150,000 gallons of stormwater retention capacity.[36]

Rochester Pure Waters District successfully implemented the CSO Abatement Program by adding 175 million gallons of storage capacity and implementing best management practices to effectively maintain their collection system and the wastewater treatment facility.

Separation of sewers in Grand Rapids results in reduced pollution loading to the Grand River and protection of beaches along Lake Michigan's eastern shoreline

Photo: NOAA

Grand Rapids, Michigan – Grand Rapids Wastewater Treatment Plant

The city of Grand Rapids operates the wastewater treatment facilities and maintains combined sewers that were commonly built before the turn of the 20th century. The receiving body of water for combined sewage overflows is the Grand River, a tributary to Lake Michigan and one of the largest rivers in the basin. Prior to the city's concerted effort to eliminate overflows in the 1980s, CSO discharge volumes ranged from 6 billion to 12 billion gallons of combined sewage and stormwater per year. The city's CSO long-term control program — developed in 1988 before the federal CSO policy was issued — set the goal to completely eliminate CSOs by separating the combined portion of the sewers and eliminating CSO outfalls by 2019.[37] In 2011, 49 million gallons of CSOs were discharged into the Grand River, which corresponds to more than a 99 percent reduction in CSO discharges from levels before work to eliminate CSOs. The plan's main milestones are:

- Separation of the west subsystem combined sewers: Completed during 1991 to 1999 ($160 million)
- Separation of the east subsystem combined sewers: Ongoing ($150 million)
- Elimination of all remaining outfalls: By the end of 2019 ($60 million)

The city of Grand Rapids has succeeded in virtually eliminating CSOs in their system and significantly reducing pollution loading to the Grand River. The infrastructure updates in the long-term control program were funded in part by low-interest loans provided by Michigan's CWSRF ($68 million for west subsystem separation projects).[38] The beaches in Grand Haven, and others near the mouth of the Grand River on the eastern shoreline of Lake Michigan, benefit from improved water quality and reduced pollution loads to Lake Michigan.

36 CSO Best Management Practices 2011 Annual Report

37 City of Grand Rapids Combined Sewer Overflow Elimination Status & History, updated June 2011 (*http://grcity.us/enterprise-services/Environment-Services/Pages/Combined-Sewer-Overflow.aspx)*

38 Fiscal Year 2011 Annual Report of Michigan's State Revolving Fund and Strategic Water Quality Initiatives Fund

Photo: Lloyd DeGrane

Conclusions

Combined sewers systems are relics of the 19th century and overflows of these systems have historically jeopardized public health, severely degraded water quality and prevented communities from enjoying irreplaceable freshwater assets. Most are in dire need of repair, renovation and replacement. Capital improvement projects to eliminate the threat of sewage discharges are costly and time-intensive, however. With increased and reliable federal appropriations to the CWSRF, Great Lakes municipalities can continue to get the assistance they need to finance construction projects. Such projects have myriad environmental benefits, reducing pollution discharges into local waterways and protecting the health of the broader Great Lakes ecosystem and the health of those living in the basin. This progress ultimately results in an investment that will lead to long-term economic development of the communities across the region. Most importantly, the CWSRF is a key to helping communities retool the decaying infrastructure of the previous century as they establish a firm foundation for the century ahead.

List of Abbreviations:

CSO – Combined Sewer Overflow
EPA – Environmental Protection Agency
LTCP – Long-Term Control Plan
CWSRF – Clean Water State Revolving Fund
MMSD – Milwaukee Metropolitan Sewerage District
TARP – Tunnel and Reservoir Project
GI – Green Infrastructure
NEORSD – Northeast Ohio Regional Sewer District
MWRDGC – Metropolitan Water Reclamation District of Greater Chicago
BSA – Buffalo Sewer Authority
NYSDEC – New York State Department of Environmental Conservation

About the Authors

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ALLIANCE FOR THE GREAT LAKES

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About Alliance for the Great Lakes

Alliance for the Great Lakes serves as the voice of the 40 million people who rely on Great Lakes water for drinking, recreation and commerce. Formed in 1970, it is the oldest independent Great Lakes protection organization in North America. Its mission is to conserve and restore the world's largest freshwater resource using policy, education and local efforts, ensuring a healthy Great Lakes and clean water for generations of people and wildlife. Its headquarters are in Chicago, with offices in Buffalo, Cleveland, Detroit, Grand Haven and Milwaukee.

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