



JOINT ACTION PLAN FOR CLEAN WATER INFRASTRUCTURE AND SERVICES IN THE GREAT LAKES REGION

*A Product of the Great Lakes Commission Clean Water Infrastructure and
Services Working Group*

*Endorsed by the Great Lakes Commission through an adopted resolution at
the 2017 Great Lakes Commission Annual Meeting*

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EXECUTIVE SUMMARY

The Great Lakes region is facing a water infrastructure crisis that affects the physical assets that move and deliver water, as well as the people and places that work together to ensure that water is clean, safe, reliable, and affordable. Water infrastructure allows for delivery of quality drinking water and the management of wastewater and stormwater to protect lakes, rivers, and streams that are also the source of drinking water for many. The lack of long-term planning and investments to maintain and improve water infrastructure systems are key factors that have led to this crisis. Many Great Lakes communities have outdated water infrastructure that is now between 50 and 150 years old. These communities are challenged to ensure reliable access to clean water services in a region that holds 20 percent of the earth's fresh surface water.

This crisis also poses a threat to the 9.1 million jobs across the Great Lakes states and provinces that are in economic sectors that depend on clean water infrastructure and services for their daily operations.

The current price tag for addressing all maintenance, upgrade, and replacement needs for water infrastructure assets across the eight states and two provinces in the binational Great Lakes region is estimated at \$13.6 billion (USD) annually over 20 years. However, due to the lack of a comprehensive inventory of the region's water infrastructure assets, the actual needs are likely much greater. These needs grow significantly with each year that investments are deferred.

Ensuring drinking water is safe, that our rivers and lakes are clean, and that storms do not leave communities drowning in polluted water is a shared responsibility at all levels of government. This Joint Action Plan recommends a suite of actions that can be pursued at different levels of government to move the region toward a more sustainable water infrastructure system. The following statements summarize recommendations for states and provinces that are part of a suite of 17 recommended actions to be pursued by multiple entities at multiple scales.

1. Embrace an integrated planning, or "one water" approach through creating offices, positions, or other opportunities to prioritize CWIS investments, assist with evaluating CWIS needs, and better coordinate the delivery of programmatic, technical, and financial services.
2. Create policies and guidelines supporting water infrastructure asset inventories and asset management plans to better inform strategic investments, and consider a regional effort to track and report on clean water infrastructure and services investments and outcomes.
3. Promote the development of regional water authorities and the consolidation and integration of utilities.
4. Explore the strengths and weaknesses of private-public partnerships (P3s) as a potential source of private sector investment in clean water infrastructure and services.
5. Increase state and provincial-level funding allocations and economic incentives for CWIS improvement projects.
6. Create enabling conditions for local utilities to implement measures that address affordability.

Joint Action Plan for Clean Water Infrastructure and Services in the Great Lakes Region

Contents

Executive Summary.....	3
Introduction	5
Goal of this Action Plan.....	5
Regional Clean Water Infrastructure and Services Status and Needs.....	7
Drinking Water	7
Wastewater.....	7
Stormwater	8
Needs Across All Clean Water Service Sectors	9
State and Provincial Clean Water Infrastructure and Services Needs.....	12
Illinois	12
Indiana	13
Michigan.....	13
Minnesota	14
New York.....	14
Ohio.....	14
Ontario	15
Pennsylvania	16
Québec.....	16
Wisconsin	17
Recommended Actions to Achieve 21 st Century Water Services.....	17
What Does a 21 st Century Great Lakes Water Services Approach Look Like?.....	17
State and Provincial Actions	18
Other Actions	20
Federal Actions	20
Local/Municipal Actions.....	21

Introduction

Water infrastructure is more than pipes, pumps, and treatment plants. It includes all the places, people, and things that deliver clean water from rivers and lakes to homes and businesses, as well as those people, places, and things that treat sewage and other water after it is used and before it goes back into our rivers and lakes.

Goal of this Action Plan

The Great Lakes region is facing a water infrastructure crisis. It is a crisis that affects the pumps and pipes that move and deliver water, as well as the people and places that work together to ensure that water is clean, safe, reliable, and affordable. Collectively, this infrastructure and associated services include drinking, waste, and stormwater. Failure to maintain this infrastructure and deliver these services manifests in the flooding of homes, streets, and businesses, and associated losses of property and economic activity. It is a crisis that closes beaches in a region that boasts the longest coastline in the U.S., and it is a crisis where more and more communities cannot ensure access to safe, reliable, and affordable drinking water in a region that holds 20 percent of the earth's fresh surface water.

On the U.S. side of the Great Lakes, this crisis arose from several factors including a lack of long-term planning to address the inevitable maintenance needs of systems that were intended to last for several decades, and failure to adapt at the state and local level to a fundamental shift since the late 1970s in how water infrastructure is funded. Historically, a greater portion of water infrastructure needs were directly funded by the federal government, but federal spending has diminished, shifting more responsibility to states and local governments that face declining revenues and escalating maintenance and repair costs. Consequently, needed improvements are delayed while the condition of these systems further deteriorates, and the backlog of maintenance and repair needs continues to grow.

Impetus for this Action Plan

In late 2016, the Great Lakes Commission adopted a resolution, "providing and maintaining clean water infrastructure and services in the Great Lakes Basin" acknowledging the challenges associated with providing safe and sustainable water infrastructure due to aging water infrastructure and lack of maintenance and investment. In two related resolutions (July, 2016 and September, 2015), the Great Lakes Commission further recognized the need to better integrate drinking water, wastewater, and stormwater, including green, infrastructure, and to increase strategic water infrastructure funding across all levels of government. In response to these resolutions, the GLC Clean Water Infrastructure and Services (CWIS) Working Group was established to advance shared objectives, needs and actions for improving and maintaining the region's water infrastructure and related services. Launched in early 2017 and composed of representatives from Michigan, Illinois, Ohio, Pennsylvania, and Ontario, the CWIS Working Group was charged to identify programs, policies, and actions that can be enhanced or modified to ensure that federal, state/provincial, and local water infrastructure investments are strategically prioritized based on regional risks and needs, and provide adequate flexibility and authority to states, provinces and cities to address drinking, waste, and stormwater management challenges and increase operational efficiencies.

Final

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The citizens of the Great Lakes region and the governments that represent them share the collective goal of fostering *a healthy and prosperous Great Lakes region that provides all its residents with affordable, clean, and safe water for drinking, recreating, and supporting economic activities*. This Joint Action Plan identifies specific actions to achieve a sustainable infrastructure system by leveraging existing roles and capacities at federal, state/provincial, and local levels. The joint actions presented herein highlight promising solutions and propose new approaches and partnerships to address the growing regional water infrastructure crisis. This Action Plan aims to spark further actions and consultations to address water infrastructure needs over the next 2-5 years.

Clean Water Infrastructure and Services (CWIS) comprise the entirety of the physical and administrative assets that support drinking, storm, and wastewater management treatment and delivery systems.

Total 20-Year Binational Needs: \$271.1 Billion

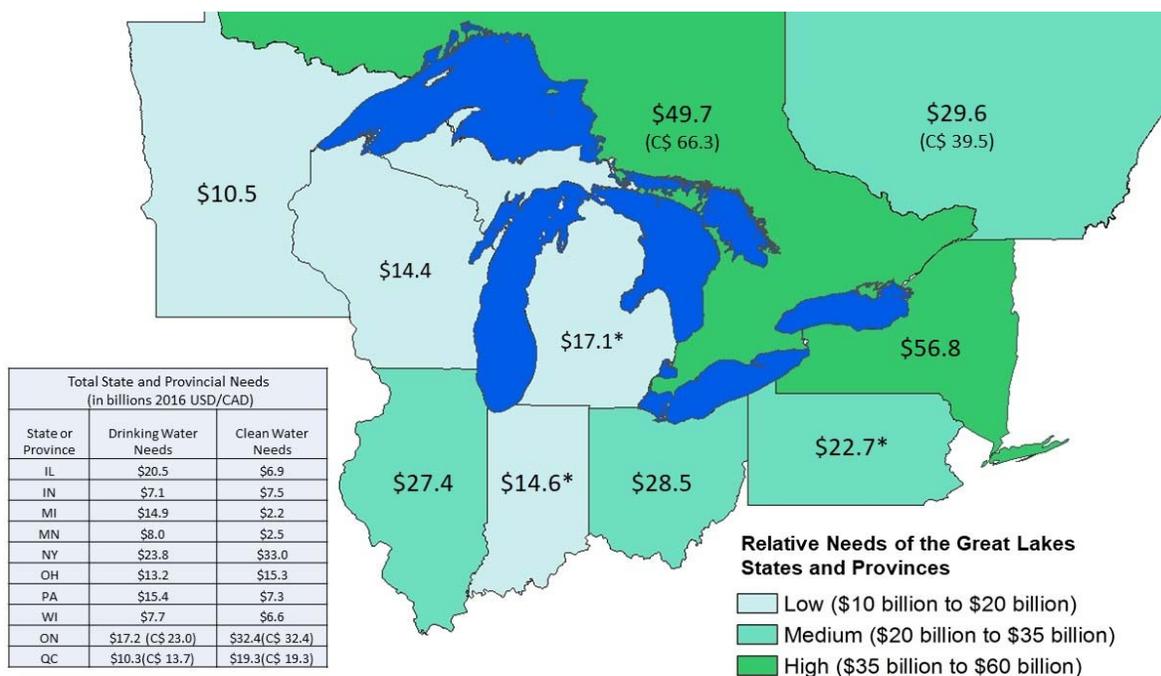


Figure 1: Total 20-Year Regional Clean Water Infrastructure and Service Needs (in Billions of USD and CAD) for the Great Lakes States and Provinces¹.

¹ The methods for estimating Canadian infrastructure needs differ from statewide needs estimated by U.S. EPA. (See [Appendix A: Action Plan References and Data Sources](#) and [Appendix B: Methods for Figures and Data](#))

* Indicates that states undertook separate CWIS needs surveys. The findings of these surveys are discussed in state sections below.

Regional Clean Water Infrastructure and Services Status and Needs

A significant priority of the states, provinces, and local governments in Great Lakes region is better understanding the state of our water infrastructure and the true needs to achieve a 21st century system. The recommendations contained within this Action Plan help to address this fundamental priority. The regional-scale summary offers a starting point for describing needs across the binational Great Lakes region and is followed by brief summaries for each state and province.

Data Deficiencies for CWIS Needs

The needs estimates depicted in Figure 1 are based on the best available data and provide a basis for developing recommendations for CWIS improvements. However, deficiencies in the U.S. EPA's data collection process mean that these values significantly underestimate the actual CWIS needs of the Great Lakes states. On the Canadian side, data estimates may slightly overstate Canada's CWIS needs. This report highlights the necessity for improving the accuracy of these estimates.

Drinking Water

Ensuring safe and reliable supplies of drinking water is fundamental to the health of our communities and the strength of our regional economy. The Great Lakes hold 90 percent of the U.S. supply of fresh surface water and more than 48 million Americans and Canadians depend on the Great Lakes and St. Lawrence River for drinking water. Upgrading and maintaining aging drinking water infrastructure is a costly challenge for many communities, and includes addressing newer threats to drinking water, such as those from lead in water lines and contamination of source water from toxins in harmful algal blooms. The lead contamination of drinking water in the City of Flint, Michigan, and the 2014 closure of the drinking water system in the City of Toledo, Ohio due to toxic algae in Lake Erie dramatically illustrate the magnitude and severity of these challenges. An estimated minimum of \$6.9 billion U.S. (\$9.2 billion CAD) annually over the next 20 years is needed to maintain, upgrade, and replace drinking water infrastructure in the binational Great Lakes region (Figure 1)². The eight U.S. Great Lakes states alone need more than \$110 billion (\$5.5 billion annually) over that time, which represents more than a quarter of the U.S. national need (\$20.3 billion annually).

Wastewater

Outdated and aging wastewater infrastructure remains prevalent in many Great Lakes cities and municipalities where most of the region's wastewater systems are between 50 and 150 years old. These systems treat water used in homes and

The Lick Run Greenway in Cincinnati, Ohio, Combines Elements of Traditional and Green Infrastructure to Prevent CSOs in Mill Creek

Scheduled for completion in fall of 2019, this project aims to eliminate nearly 400 million gallons of CSOs annually and ensure that 88% of rain and snow runoff during a typical year will either reach the local treatment plant or flow into Mill Creek without being mixed with untreated wastewater. This will be accomplished via the installation of new storm sewers, bio swales, stream restoration best practices, stormwater detention basins, bio infiltration gardens, and the creation of a mile-long waterway intended to mimic a natural stream. The CWSRF is providing over \$122 million in financial assistance for this project.

² Calculated using data from U.S. EPA 2011 Drinking Water Infrastructure Needs Survey. Converted to 2016 US dollars (See [Appendix B](#)).

Final

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businesses before it goes back into rivers and lakes which are the primary source of drinking water in the Great Lakes region. Approximately 68 percent of the residents in the Great Lakes basin live in areas that separate wastewater from homes and businesses (sanitary sewers) from the stormwater that falls on the ground, roofs, or roads, while 32 percent of the Great Lakes basin population is still served by systems that combine sanitary and storm sewers³. To properly manage peak flow volumes of sanitary and stormwater, these systems either need to be very large to handle the largest of storms (which are becoming more frequent), or separated to reduce the risk of untreated sewage entering rivers and lakes. Unfortunately, even separated systems sometimes overflow, and overflows from both systems release polluted water into rivers and lakes. Construction of combined sewer systems was considered normal 50 to 100 years ago, but is today understood to pose unnecessary risks to human health and the environment. For this reason, new construction should focus on building separated systems. In the last several decades the primary financial responsibility to maintain and improve wastewater systems has fallen to municipalities, which are unable to meet rising costs to maintain and upgrade them. According to the U.S. EPA estimates, in the U.S. portion of the Great Lakes region, \$1.1 billion annually is needed over the next 20 years (\$21.7 billion total) for combined sewer overflow (CSO) correction alone. In total, \$5.69 billion annually is needed for the next 20 years to maintain, upgrade and replace all wastewater infrastructure, including CSO corrections (including separation and increased capacity for combined systems), in the binational Great Lakes region. The eight U.S. Great Lakes states alone need approximately \$76 billion total over the next 20 years, which represents more than a third of the U.S. national need (\$257 billion).

Stormwater

Water that falls during storms increasingly falls onto impermeable surfaces such as roads, rooftops, and parking lots, and managing it is a growing challenge. Whether separated or combined with sanitary sewers, most stormwater systems were designed to function under historical climate conditions. However, the climate is changing and larger, more frequent storms with heavier rains are the new normal. Also, these systems are serving more people, and as communities grow, so does the amount of land that is covered by roads and rooftops, which prevents stormwater from naturally seeping back into the earth. Historic practices to straighten, bury, or otherwise modify rivers and streams further exacerbates stormwater problems, and reduce their ability to mitigate intense storms or flooding events. These compounding factors lead to increased runoff that often overwhelm stormwater systems and cause flooding, sewer overflows, and nutrient runoff that creates harmful algae blooms. Green infrastructure can mitigate sudden flooding; however when combined stormwater and sanitary sewer systems overflow, untreated sewage gets released into the region's rivers and lakes which are also a source of drinking water. In 2014, 22 billion gallons of untreated sewage and stormwater were released from CSOs into the Great Lakes¹. Discharging untreated sewage endangers public health, degrades water quality, and damages local economies by closing beaches and discouraging recreation in rivers and lakes. Tourism and recreation alone in the Great Lakes region generates

³ Estimated using database provided through the 2012 Clean Watersheds Needs Survey (see [Appendix B](#)).

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\$47 billion in annual wages⁴. In 2013, Great Lakes beaches had the highest rate of E. coli bacteria of any coastal region (compared to others sampled) across the U.S.ⁱⁱ and nearly a quarter of beaches in Michigan suffered closures in 2015. A single Great Lakes beach closure means economic losses as high as \$37,000 per dayⁱⁱⁱ. In total, \$960 million annually is needed over the next 20 years to maintain, upgrade, and replace stormwater infrastructure in the binational Great Lakes region (not including CSO corrections noted above). The U.S. eight Great Lakes states alone need an estimated minimum of \$5 billion over the next 20 years, which represents nearly a quarter of the U.S. national need (\$20.1 billion).

Needs Across All Clean Water Service Sectors

The total monetary need for addressing all clean water infrastructure and services across the drinking, wastewater, and storm water sectors for the binational Great Lakes region is \$13.6 billion annually over 20 years. When expressed as the per-capita needs of each of the Great Lakes

Table 1: Thousands of Jobs in Water Dependent Industries and percentage of all jobs in the Great Lakes States and Provinces

Jurisdiction	Total Jobs in Water Dependent Industries	% of Total Employment
Illinois	910	15%
Indiana	769	24%
Michigan	961	21%
Minnesota	453	16%
New York	848	9%
Ohio	1,063	19%
Ontario	1,480	21%
Pennsylvania	933	15%
Quebec	1,117	27%
Wisconsin	611	20%
TOTAL	9,144	18%

states and provinces, values range from \$1,731 to \$3,551 (C\$2,311 to C\$4,740) per resident annually⁵. \$9.6 billion of that total annual need (which accounts for 28 percent of the total U.S. need) falls within the eight U.S. Great Lakes states. This need is substantiated by the fact that 27 percent of the total U.S. population lives in these states which contribute 27 percent of the U.S. national GDP⁶.

Maintaining these vital assets is critical not only to the regional economy, but to the national economies of the U.S. and Canada. **9.1 million jobs across the binational Great Lakes region are in economic sectors that are dependent on clean water infrastructure and services for their daily operations, and these jobs provide \$447 billion in annual wages** (Figure 2). Approximately a quarter of all jobs in the Great Lakes provinces fall into these sectors (Table 1).

⁴ Data sourced from the U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages and from Occupational Employment Statistics (see [Appendices A and B](#)).

⁵ Values for state needs taken from U.S. EPA Clean Watersheds Needs Survey (2012) and Drinking Water Needs Survey (2016). Values for provincial needs were extrapolated from Canada’s national needs assessment based on the proportion of the population residing in each province (See [Appendix B](#) for more information).

⁶ Retrieved from the U.S. Department of Commerce Bureau of Economic Analysis Regional GDP Online Database (2017) (see Additional Online Data Sources and Tools in [Appendix A](#)).

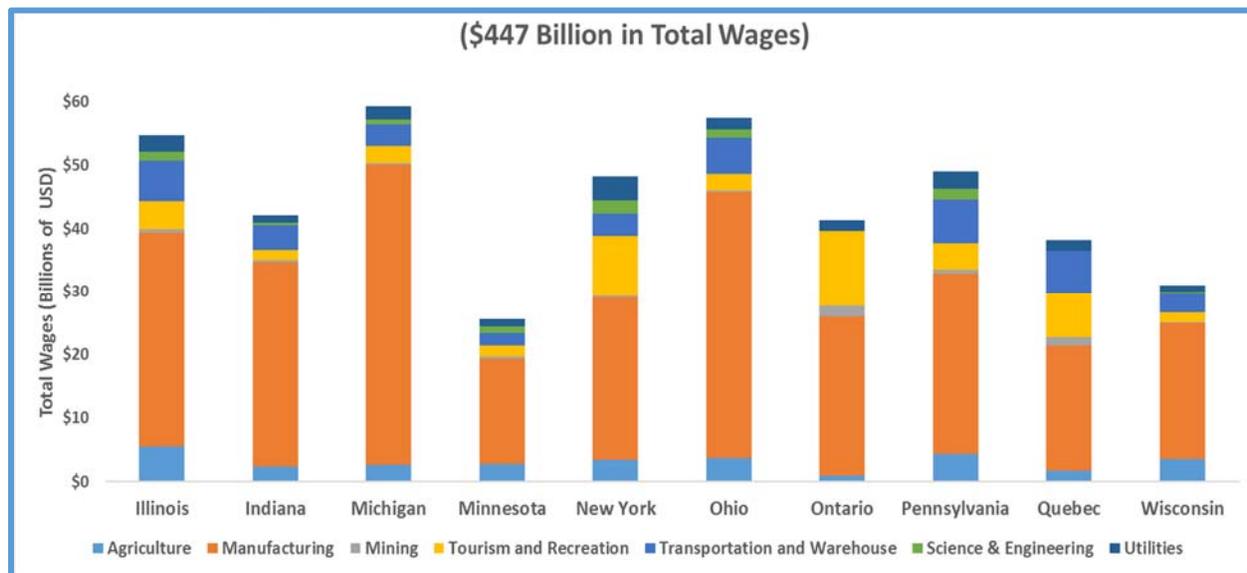


Figure 2: Annual Wages from Water Dependent Industries in the Great Lakes States and Provinces⁷

The needs and funding allocations presented in this Action Plan were derived from the best available data that is consistent on a regional scale and demonstrate the magnitude of the infrastructure needs within the Great Lakes region. However, it is almost certain that the actual needs are grossly underreported. The U.S. EPA’s estimates for drinking water needs, for example, are extrapolated from a subset of data voluntarily collected for select systems. In addition, the U.S. EPA estimates do not account for population growth, dam maintenance, lead service line replacement, or fire suppression infrastructure. Nor are private well and septic systems included. On the wastewater side, there are at least \$947 million in additional needs for the Great Lakes region that are not included in the final values reported in the 2016 U.S. EPA Clean Water Needs Survey (CWNS)⁸. Additionally, many

CWIS Funding in the U.S. and Canada

United States

The U.S. federal role in clean water infrastructure and services is primarily through capitalizing State Revolving Funds (SRFs) for drinking water (DWSRF) (pursuant to the U.S. Safe Drinking Water Act) or for clean/wastewater (CWSRF) (pursuant to the U.S. Clean Water Act). Each state uses a variety of programs and sources to procure matching funds that bolster federal SRF grants and loans.

Canada

The Clean Water and Wastewater Fund (CWWF) is jointly administered by Infrastructure Canada and the Ministry of Infrastructure. CWWF is designed to accelerate short-term CWIS projects by funding for up to 50 percent of the cost for eligible projects aimed at maintaining and improving municipal water and wastewater systems. This includes a base allocation of \$50 million CAD to each province, with additional funds awarded to the provinces on a per-capita basis.

⁷ Data calculated from U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages and from Occupational Employment Statistics (see [Appendix B](#)).

⁸ Estimate is the sum of “unofficial costs” identified in the 2016 U.S. EPA Clean Water Needs Survey.

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regions have not fully documented their infrastructure assets and the costs associated with properly maintaining these assets, which impedes the ability to take effective action. Furthermore, due to the absence of a comprehensive database or tracking system, the funding levels presented herein do not account for potential additional allocations from state, local, and private loans and grants, as well as loan repayment and interest dollars from SRF disbursements. Despite these caveats, it offers a starting point for understanding needs and funding levels on a regional scale. Where more specific and accurate needs data is available, it is presented in the individual state and provincial summary sections below.

Population growth and demographic shifts have important implications for financing and maintaining CWIS. In many communities on the U.S. side of the Great Lakes, population growth is stagnant or declining, which means there are fewer ratepayers to generate the revenue that drinking water and wastewater utilities depend on. A seemingly obvious response is to increase rates, but this can also be problematic, especially in low-income households and communities where people may not be able to afford such increases. Absent other sources of funding to address these needs, without rate increases, utilities are unable to generate enough revenue to maintain and improve their water treatment and delivery systems. Conversely, population growth on the Canadian side of the basin is projected to continue, putting even greater pressures on those water systems to generate revenue necessary to expand and upgrade.

In the U.S., federal investments in water infrastructure have decreased since the late 1970s^{iv}, leaving state and local governments with a greater share of the costs to ensure clean safe water. The current investment gap is the manifestation of the fact that many communities lack the financial resources, long-term planning strategies, and/or the political will to fill the void left by diminished federal assistance. In addition, federally-capitalized SRFs⁹ can be unattractive to communities that already have a high debt load, since increased borrowing could create unaffordable user rates. These communities often seek grant funds, as opposed to loans. In some cases, SRF interest rates may not be significantly lower than municipal bond rates which have less administrative and reporting requirements compared to SRF loans, and are therefore more appealing to municipalities. Meanwhile, costs continue to grow as investments are delayed (Figure 3).

In addition, water and sewer rates do not always reflect the full cost of providing water and sewer service. This unintentionally undermines economic efficiency and the financial sustainability of those systems. In some cases, local general funds (usually financed largely by property taxes rather than user fees) are used to subsidize water rates, meaning that rate revenues are not sufficient to support capital and operating costs. This General Fund subsidization is unsustainable, making underinvestment and risk of failure of water infrastructure more likely.

⁹ Unless specified otherwise, the use of "SRF" in this Action Plan refers to combined funding received from both the DWSRF and CWSRF. Other federal sources of funding have been through USDA-Rural Development, USHUD-Community Development Block Grant, Appalachian Regional Commission, and U.S. Corps of Engineers.

In contrast to the U.S. states, the Canadian provinces have benefited from increased funding for addressing clean water infrastructure and service needs since 2007^v. While estimated clean water infrastructure needs for Canada are higher than those of the U.S., Canada has been more proactive with their infrastructure investments. A recent report from the McKinsey Global Institute projects that Canada is on track to eliminate their infrastructure investment gap by 2030^{vi}. An additional 2016 Report on Canadian infrastructure found much of Canada’s water infrastructure to be in “good” or “very good condition”. Furthermore, Ontario actively collaborates with First Nations communities and the federal government to support the elimination of long-term drinking water advisories, build local capacity, and ensure the long-term sustainability of drinking water on reserves. This is significant, as aboriginal communities on both sides of the border are often those located in rural areas who have the greatest CWIS needs, and the least available resources to address them.

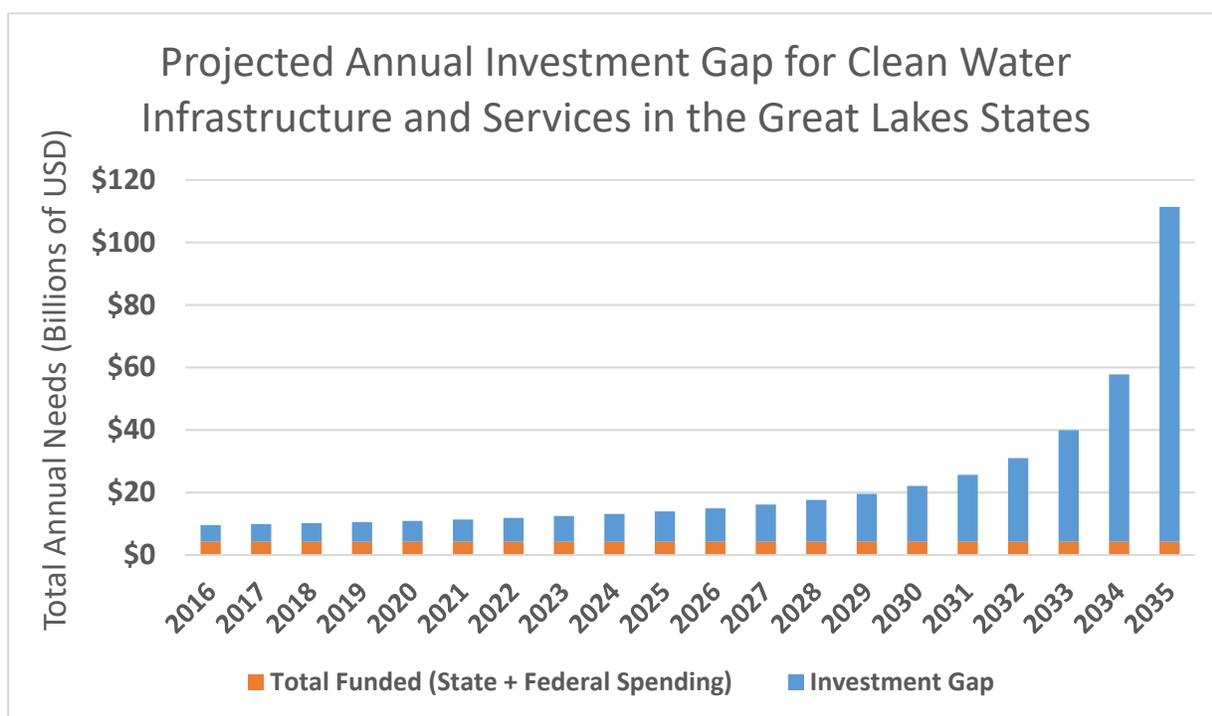


Figure 3: Projected Annual Investment Gap for Clean Water Infrastructure and Services in the Great Lakes States Based on 20-Year Needs Estimates and 2016 Funding Levels¹⁰

State and Provincial Clean Water Infrastructure and Services Needs

Illinois

The U.S. EPA reports that Illinois faces a total annual clean water infrastructure investment need of approximately \$1.4 billion. A 2012 report on the State of Illinois Infrastructure concluded that 90-95% of water supply systems and 95% of major wastewater dischargers throughout Illinois

¹⁰ Annual needs are calculated as a function of remaining 20-year needs not met through current funding---Used 2011/2012 dollars, converted to 2016 Dollars, and then projected out 20 years from 2016 (See [Appendix B](#)).

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were meeting regulatory requirements^{vii}. However, this inventory did not address aging stormwater infrastructure, and the report noted that the state lacks a comprehensive database for infrastructure condition and needs. A 2009 initiative known as Illinois Jobs Now! sought to increase state sources of funding to match federal SRF dollars, but the effort was eventually discontinued when the state could not procure the necessary funds. The Illinois EPA currently has several other programs aimed at strategically administering SRF funding and increasing state match. In the 2018 Fiscal Year, the Illinois EPA plans to fund \$500 million for wastewater projects, and \$400 million for Drinking Water Projects. In addition, recent efforts to improve the Chicago River Corridor have inspired significant private sector investment, making a strong case for the potential economic rewards of increasing the level of clean water infrastructure investments.

Indiana

Improving CWIS is especially important for Indiana's economy, where nearly 1 in 4 jobs are in industries that are directly dependent on an uninterrupted supply of clean water services, more than any other Great Lakes state. In 2016, the Indiana Finance Authority (IFA) spearheaded an effort to administer a comprehensive water infrastructure needs survey for community water systems. Replacing leaky drinking water main lines was identified as the top statewide priority. The survey found a short-term statewide need for \$2.3 billion in clean water infrastructure and service investments, followed by \$815 million in annual additional funding. The IFA's conclusion exceeds previous needs estimates, including those published by the U.S. EPA who reported a total statewide annual need of \$730 million. Regardless of this discrepancy, the \$62.8 million in federal SRF and state match funding that was made available to Indiana for water infrastructure projects in 2016 falls short of both estimates. While the IFA's assessment is a step in the right direction, significant work remains to close Indiana's investment gap and protect the local economy.

Michigan

Located in the heart of the Great Lakes, Michigan is perhaps richer in freshwater than any other state in the country. Businesses that rely directly on clean water for their daily operations provide 21% of jobs in Michigan and have an annual economic impact of nearly \$60 billion in wages¹¹. Despite the

Integrated Planning Unlocks Diversified Sources of Funding for Infrastructure Improvements in Tawas, Michigan

In Tawas, Michigan, a City Development Plan was created that included the installation of a stormwater collection system in conjunction with improvements to the city's downtown district. The multi-objective plan enabled the city to access diverse sources of funding for infrastructure financing, thus increasing the project's affordability. Funding sources included a Waterfront Redevelopment Grant from the Michigan Department of Environmental Quality and a Michigan Natural Resources Trust Fund grant supplied by the Michigan Department of Natural Resources. In addition to protecting local water quality, the improved waterfront serves to better connect residents to Lake Huron.

¹¹ Based on estimates developed by the GLC Working Group (see [Appendix B](#)).

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importance of clean water services to the state's economy, outdated storm and wastewater infrastructure and failing septic systems threaten source water quality, while some municipalities lose up to 50% of their treated potable supply through leaky distribution pipes. A 2016 state infrastructure analysis estimated that Michigan requires an additional \$500 million annually to maintain and improve their wastewater infrastructure. Michigan is under a pilot program to more accurately determine drinking, waste, and stormwater needs through an asset management initiative. The investment levels and current spending for certain types of water infrastructure remains unknown based on the lack of accurate data. Acquiring this additional information, and filling this investment gap would help to bolster the reliability of clean water services that are closely linked to Michigan's economic prosperity.

Minnesota

Minnesota's Wastewater Infrastructure Funding program (WIF) provides eligible projects with up to \$4 million to match federal CWSRF allocations and USDA Rural Development program loans. As of 2016, 79 WIF-eligible projects faced a \$97.8 million funding deficit. In that same year, 1,350 wastewater infrastructure projects with a total cost of over \$4.2 billion were identified through the Minnesota Pollution Control Agency's effort to complete a comprehensive survey. The difference in these figures demonstrates the challenge faced by low-income communities with small populations who often have the greatest needs but may lack the resources to apply for the WIF or other funding sources. The U.S. EPA estimates that federal SRF and state match dollars provide 8% of the over \$523 million that is required annually to address statewide clean water infrastructure and service needs.

New York

New York has some of the oldest infrastructure in the United States. Shifting demographics across the state's long history have led to both localized supply shortages and diminished customer bases that are unable to cover operating expenses of oversized drinking and wastewater systems. In addition, up to 600 water main breaks occur each year and exacerbate the loss of treated supplies that can exceed 50% under normal conditions for some municipal systems. In some communities, the threat of water scarcity and insufficient sewage systems have led to temporary moratoriums on additional development. The U.S. EPA estimate for the annual investment required to fully update New York's clean water infrastructure exceeds \$2.8 billion, and past SRF and state match funding has only covered about 8% of this cost. However, New York's Clean Water Infrastructure Act of 2017 is dedicating an additional \$2.5 billion in state funds over five years for water quality and infrastructure projects across the state. This investment is a significant step towards meeting the needs of current residents and preparing the state for future growth and development.

Ohio

Ohio requires an estimated investment of \$1.4 billion annually (\$28.5 billion over 20 years) to improve clean water infrastructure and services throughout the state. CSOs account for a significant component of these needs, and Ohio has one of the largest investment gaps in the U.S. for CSO correction. These CSO communities include most of the larger metropolitan areas,

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each of which has an urban core that is currently experiencing affordability issues with respect to climbing rates for water and wastewater services. Rural communities with small rate-payer populations also face significant CSO correction needs and challenges to affordability. The ongoing effort to prevent and mitigate harmful algal blooms like the one that occurred in the Western Lake Erie Basin in 2014, costs drinking water suppliers \$3 million annually. Overall, allocations from federal SRF and state match funds cover approximately 9% of the U.S. EPA's estimate for total statewide needs. In addition to public health and quality of life benefits, further investment in Ohio's water infrastructure presents a significant opportunity for economic growth and prosperity. Projects that combine infrastructure improvements with brownfield redevelopment contribute \$1.4 billion annually to Ohio's economy and increase job security for over one million people working in industries that directly depend on uninterrupted clean water services.

Ontario

Ontario faces upwards of \$2.25 billion in annual replacement costs for clean water infrastructure assets that are rated as being in "poor, very poor, or fair" condition over the next 20 years. By contrast, much of Canada's drinking, storm, and wastewater infrastructure is rated as being in "fair or better" condition. As of 2017, Ontario invests over \$828 million each year in water infrastructure through the federal CWWF and matching provincial funding distributed via the Ontario Community Infrastructure Fund (OCIF). Together, these two funding sources provide the bulk of Ontario's contribution to achieving the national target of maintaining a 1% annual infrastructure replacement rate. A 2017 report completed by multiple provincial stakeholders concluded that allocating a greater portion of available funds

Federal, Provincial, and Municipal Governments Partner to Fund Drinking Water Infrastructure Upgrades in the Region of Halton, Ontario

In 2017, over \$52 million CAD was appropriated for water infrastructure upgrades including the construction of a new feeder main that better connects a treatment plant to its source water in the Washburn Reservoir, and multiple distribution mainlines that will deliver treated supplies to area residents. Canada's CWWF will provide \$26.5 million CAD to cover 50% of the costs, while the Province of Ontario and the Regional Municipality of Halton will each cover half of the remaining balance. Approximately 10% of this funding will also be used for 18 smaller drinking and wastewater upgrade projects in five surrounding communities. Not only will these investments ensure that these communities continue to have a dependable source of clean drinking water, they will also lay the foundation for economic growth and strengthen the middle class across Ontario.

towards stormwater management assistance, especially for municipalities with populations under 50,000, would improve the overall outcomes of CWIS investments^{viii}. Ontario's ongoing efforts to close the investment gap will lead to significant savings in avoided costs, including the approximately \$4 million CAD that treatment plants spend each year to filter out toxins related to harmful algal blooms.

Pennsylvania

The U.S. EPA estimates that Pennsylvania has an annual need of \$1.1 billion (\$22.7 billion over 20 years) for addressing the needs of all clean water infrastructure and service systems across the state. In addition, a 2015 study by the Pennsylvania Department of Environmental Protection (PDEP) reported an annual investment gap of over \$1.8 billion to address drinking and wastewater systems alone, without accounting for stormwater infrastructure^{ix}. Since Pennsylvania has the greatest number of CSO permits of any state in the US, these additional needs may be significant. In 1988, the Pennsylvania Infrastructure Investment Authority (PENNVEST) was established to provide funding for CWIS projects. PENNVEST currently oversees funding distribution of approximately \$421 million in annual loans and grants for eligible projects through state and federal funding sources. However, this funding falls short of the needs estimates of both the U.S. EPA and PDEP. Due to low utility rates, many public systems can't generate enough revenue to cover the costs of critical maintenance and upgrades. Increasing funding and utility rates would enable Pennsylvania to provide enough funding for communities into the foreseeable future.

Québec

In its 2017-2027 Infrastructure plan, the government of Québec designated nearly \$10.6 billion CAD specifically for the elimination of the \$17.6 billion asset maintenance deficit that it currently faces across all public infrastructure segments. An example of Québec's progress came in 2016 with the signing of the Canada- Québec Agreement on the Public Transit Infrastructure Fund and the Clean Water and Wastewater Fund. As per this agreement, \$664 million CAD will be provided for 36 projects across 30 municipalities in the province's Chaudière-Appalaches region through 2018. Funding sources include Canada's Clean Water and Wastewater Fund, the New Building Canada Fund Québec -Small Communities Fund, and the municipalities themselves. Massive increases in government investment and a commitment to maintaining an up-to-date inventory of infrastructure needs exemplify Québec's contribution to projections that Canada's \$31 billion CAD national investment gap for Clean Water Infrastructure and Services is on course to be non-existent by 2030.

Wisconsin

The U.S. EPA estimates that Wisconsin will require \$718 million annually to address its clean water infrastructure and service needs. In 2016, \$68 million in federal SRF and state-match dollars, coupled with SRF loan repayments and interest earnings, allowed the state to allocate nearly \$240 million to CWIS improvement projects in FY 2016, covering about one third of the estimated need. In addition, rural municipalities in Wisconsin have received additional funding for infrastructure projects from the USDA Rural Development program that began in 2015. With the launching of Madison's Lead Pipe Replacement Program in 2001, Wisconsin emerged as a national leader in proactively replacing outdated drinking water infrastructure and has since procured \$15.5 million in federal, state, and local funds to replace 8,000 lead distribution pipes. Milwaukee has undertaken similar efforts for the 70,000 lead pipe service lines that provide drinking water to its residents, with an estimated price tag of up to \$756 million. In FY2017 and FY2018, the state will allocate over \$26 million to replace lead service lines, and use principal forgiveness to allocate federal DWSRF funds to projects on private property in disadvantaged municipalities. Principal forgiveness means that no debt is incurred on behalf of the municipalities that receive these funds. The state faces additional water quality issues, particularly in Lake Michigan's Green Bay where nutrient input from outdated storm and wastewater systems creates a seasonal dead zone, posing an additional threat to Wisconsin's residents and economy.

[Diverse Coalition Supports Innovative Storm Water Management Techniques in the Yahara Watershed, Wisconsin](#)

The Clean Lakes Alliance in Madison, Wisconsin, brings together local businesses, county governments, municipal agencies, other NGOs, and landowners to raise awareness and procure funding for research and initiatives aimed at reducing stormwater runoff pollution within the Yahara Watershed. These partnerships facilitate actions across diverse land uses including manure composting in rural areas, and effective urban leaf management. As of June 2016, the Clean Lakes Alliance had secured over \$150 thousand in grants from state and local programs, as well as a grant from the Royal Bank of Canada to fund these and other water quality improvement initiatives.

Recommended Actions to Achieve 21st Century Water Services

What Does a 21st Century Great Lakes Water Services Approach Look Like?

A 21st century clean water infrastructure and services plan ensures a safe and sustainable water supply and clean rivers, lakes, and streams for all citizens of the region. The approach recognizes that access to clean safe water is critical for life, and governments at multiple levels share a responsibility to ensure that clean water services are available to citizens, including those who rely on municipal providers and people in rural areas and others who are self-supplied. A 21st century approach recognizes that water infrastructure is every bit as important as roads, bridges, and airports to the health and prosperity of our nations. It values water for the services it provides—not only for drinking—but also as basis of multi-billion-dollar tourism, recreation, agriculture, manufacturing, and other industries that provide over 9.1 million jobs in the Great

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Lakes states and provinces that fuel our economy. It further recognizes that ensuring drinking water is safe, that our rivers and lakes are clean, and that storms do not leave communities drowning in polluted water is a shared responsibility at all levels of government. This Action Plan focuses on clean water infrastructure and service needs at the state/provincial level; however, the following recommendations (not listed in any particular order) seek to elevate each level of government's ability (federal, state/provincial, and local/municipal) to ensure clean and safe water to its residents while recognizing that daily operation of facilities is the purview of local water utilities. The following recommended actions offer a range of possible solutions to address the region's water infrastructure and service needs. It is not suggested that all the actions should be evenly pursued by every jurisdiction. Rather, jurisdictions should consider and pursue those actions based on their individual needs and circumstances.

State and Provincial Actions

1. [Embrace an integrated planning, or "one water", approach by either creating a state/provincial office or position\(s\) or otherwise creating opportunities to better coordinate the delivery of programmatic, technical and financial services to prioritize CWIS investments and assist with evaluating CWIS needs.](#)

A "one water" approach to CWIS management would focus on improving coordination and financial assistance among the local, state, provincial, and federal assistance programs (e.g., SRF and WIFIA in the US), and between traditionally siloed CWIS sectors and agencies. This would increase the ability to leverage SRF and WIFIA funds to generate additional public and private capital to finance CWIS needs by uniting multiple related needs into a single project (e.g., environmental impact bonds, other bonds, etc.). Specific positions or an office with this dedicated purpose could also work towards improving coordination between smaller urban and rural communities to aggregate their needs into larger regional asks that are more likely to receive federal funding.

2. [Create policies and guidelines supporting water infrastructure asset inventories and asset management plans and maintain an up to date comprehensive state or provincial-wide inventory of the status and needs of CWIS assets to better inform strategic investments and consider a regional effort to track and report on clean water infrastructure and services investments and outcomes.](#)

Asset management is a fundamental first step towards identifying actual water infrastructure needs. Development of this Action Plan uncovered large knowledge gaps for infrastructure, where many regions have not fully documented their infrastructure assets and the costs associated with properly maintaining them. Without proper documentation of investments, it is difficult if not impossible to measure progress toward clean water infrastructure and service goals. Better documentation, including fully documenting needs throughout the life-cycle, will allow for more impactful investments and safer delivery of clean water services. This inventory can also facilitate coordination with other infrastructure sectors to maximize efficiency, decrease costs, and improve service to residents. For example, when a road is being worked on, it's an opportunity to also perform capital projects or maintenance on any underground utilities such

Final

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as water, sewer, storm, electric, gas, or communications. As of summer, 2017, Ontario proposed a regulation requiring asset management plans for water, wastewater, road and bridge infrastructure.

3. Promote the development of regional water authorities and the consolidation and integration of utilities through legislation or incentive programs.

Utility consolidation expands the population of rate payers supporting utility services and provides greater funding for investing in CWIS improvements. Consolidation provides for better overall system management, and more efficient treatment of water and wastewater. This also creates the ability to have economies of scale while factoring in equity concerns without undermining revenues to pay for clean water services. Scranton, Pennsylvania is an example of a municipality that has successfully consolidated water and wastewater rates.

4. Encourage exploration of strengths and weaknesses of private-public partnerships (P3s) as a potential source of private sector investment in clean water infrastructure and services.

Many states in the US authorize P3s, but few are specific to water. P3s provide additional financing that allow cash-strapped municipalities to invest in infrastructure improvements. Multiple forms of P3s exist, and allow companies to assume both the risk and financial burden of infrastructure assets. P3s are particularly appealing for smaller communities that don't have sufficient credit ratings to obtain federal funding for infrastructure improvements. Private sector investment can allow utilities to meet their needs in the face of diminishing federal and state investment; however, such investors also seek a return on investment. These seemingly incongruous objectives may both be satisfied is when private investors are able to meet customer needs with greater efficiency than the public sector, and therefore can profit without raising utility rates to a burdensome degree.

5. Increase state and provincial-level funding allocations and economic incentives for CWIS improvement projects.

While the individual contributions of state match dollars for federal SRF program allocations varies from state to state each year, increasing state match dollars is a necessary step to meeting CWIS needs. The Ontario Community Fund in Canada increased funding for CWIS within Ontario, and allocating a greater percentage of state and provincial budgets toward investing in the regular maintenance and upgrading of CWIS systems will support additional economic and development activity, and will save a significant amount of money by helping to avoid the high costs of catastrophic system failures.

6. Create enabling conditions (policies and incentives) that encourage local utilities to consider and implement measures to address affordability in how they provide clean water and infrastructure services.

State and provincial agencies can take the lead in ensuring that all residents across municipal boundaries have access to a steady water supply, regardless of income. Many options are available including: credits and discounts, adjusted billing frequency, budget billing, emergency

Final

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grants, free water audits home conservation programs, and various combinations of these methods.

Other Actions

Clean Water Infrastructure is a shared responsibility by all levels of government with potential roles also for the private sector. In addition to the state and provincial actions listed above, the following actions are offered for consideration by federal, local and private entities to fulfill our shared responsibilities toward ***a healthy and prosperous Great Lakes region that provides all its residents with affordable, clean, and safe water for drinking, recreating, and supporting economic activities.***

Federal Actions

1. Promote a policy of equitable distribution of federal CWSRF and DWSRF funding between the Great Lakes region and other regions in the U.S., and expand community accessibility to Water Infrastructure Finance and Innovation Act (WIFIA) funds.

Communities with significant CWIS needs are often located in rural areas that lack sufficient staff, political will, and/or financial resources to take advantage of federal SRF programs, or may have needs that do not surpass the \$5 million minimum threshold for WIFIA funding. Equitable distribution of federal funding can be achieved by considering the proportional (per-capita) CWIS needs and ability to pay of communities across diverse geographic regions and socioeconomic profiles.

2. Fully appropriate the approved funding for programs that support CWIS improvement projects including the CWSRF, DWSRF, and WIFIA in the U.S., and the CWWF and SCF in Canada for FY2018, and increase funding levels in future budgets.

A significant portion of Great Lakes needs remain unmet by current levels of federal, state and provincial funding. In the past, the state revolving funds were the most affordable source of funding for communities. Combining WIFIA and SRF funding presents an opportunity to further support critical projects and initiatives. Increased funding for these programs will enable states to meet more of their clean water infrastructure and service needs.

3. Promote regulatory reforms that will increase the pace of CWIS investing and expand access to existing funding programs.

Look for opportunities to streamline permitting processes for CWIS improvement projects and simplify loan and grant applications, to diminish the burden of navigating regulations and administrative requirements on small, rural, and low-income communities who are currently unable to access available funds and opportunities for funding.

4. Increase public funding and private sector incentives for research aimed at improving CWIS and water quality and advancing clean water technology.

The Great Lakes states and provinces are home to many of the nation's top universities and industries. Supporting research aimed at improving water efficiency and water quality could

Final

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provide opportunities for innovation in clean water infrastructure and services. The advancement of new technologies, systems, and materials that lengthen the service life of infrastructure assets and reduce operations and maintenance costs could significantly increase the return on investment for future projects.

5. Explore the potential benefits and feasibility of establishing a Low-Income Water Assistance Program that provides affordable water services to households that are unable to pay their utility bills.

Many low-income households are at risk of having their water shut off because they cannot afford to pay their water bills. A program that assists these households ensures a steady water supply for all Americans and Canadians. This could follow a similar structure to the current Low Income Home Energy Assistance Program (LIHEAP), where federal funds are distributed to states, who then oversee the administration of funds to qualifying low-income households.

6. Promote and defend policies and strategies that protect source water and reduce costs for water treatment downstream.

As demonstrated by the Toledo water crisis, there are severe consequences for water utilities when excess nutrients result in harmful algal blooms. Protection of source water quality not only has the potential to reduce treatment costs for the utility, but also provides a safer more reliable drinking water source for all who rely upon it. Source water protection is already implemented in Ontario through a well-developed framework within the Province's Clean Water Act.

7. Enhance USDA-Rural Development Infrastructure funding programs and coordinate such programs to with SRF to optimize clean water infrastructure and services in rural areas.

Rural municipalities across the Great Lakes region benefit greatly from the USDA-RD funding for infrastructure. While there are differences between USDA and EPA-SRF programs, the programs are complementary and increased funding for rural communities would help alleviate some of the financial pressures on SRF and related state programs to assist rural municipalities.

Local/Municipal Actions

1. Expand the use of green infrastructure to improve storm and wastewater management.

Numerous municipalities across the Great Lakes region are pursuing green infrastructure projects as an alternative to traditional infrastructure to reduce stormwater runoff and system overflows. Green infrastructure can be a cost-effective practice that provides recreational and aesthetic benefits in addition to flood abatement and stormwater reductions. Utilities can also consider special tax-increment financing (TIF) districts for green infrastructure as well as stormwater offsets (e.g., trading). Appropriate operation and maintenance costs must be considered so that the practices installed continue to perform at an optimal level.

2. Explore the creation of a water fund and other innovative ways to increase coordination between public and private entities that have a stake in the management of clean water resources, and procure funding for CWIS projects from business leaders.

When forest fires led to the contamination of the Rio Grande river in 2011, this primary source of drinking water for the city of Albuquerque was cut off for 40 days. In the wake of the impacts that this had on the local community and economy, the Rio Grande Water Fund was established to prevent a repeat of this disaster. This program comprises over 50 stakeholders from the public, private, and non-profit sectors to procure and strategically distribute funds for critical infrastructure projects. Recent turmoil related to deficiencies in CWIS investments in Toledo and Flint present an opportunity for the Great Lakes region to take a similar proactive approach to investing in source water protection efforts that ease the downstream burden on CWIS assets. In early 2017, Canada passed legislation to create a national Infrastructure Bank intended to attract private sector investment into revenue-generating infrastructure. The Infrastructure Bank will aid in better decision making through collecting and sharing data on infrastructure projects.

3. Consider innovative approaches to enhance revenue streams supporting CWIS, such as having new large investments bidding on a project to contribute to a “public benefits fund” that helps pay for CWIS.

Innovative ideas and approaches used by other municipalities should be evaluated to see if they can be transferred and applied in the Great Lakes region. The City of San Francisco, for example, successfully implemented the strategy of leveraging land use planning and zoning processes to finance, develop, and implement critical projects identified through community needs assessments. Creating a public benefits fund is an innovative method of procuring funding from private sector developers for projects that benefit local communities, include those associated with CWIS.

4. Consider adopting fiscally sustainable water, sewer, and stormwater pricing models that promote more efficient use of water without destabilizing utility revenues.

Explore the potential benefits and feasibility of adopting rate structures that reflect full costs of capital, operation, maintenance, and replacement expenditures based on up-to-date asset management plans. Reducing water usage eases the physical and administrative burden on all clean water service and infrastructure sectors. However, municipal water suppliers are challenged with balancing those benefits when coupled rate structures mean that decreased water sales also reduce revenue that are necessary for operations and maintenance. Enterprise budgeting manages water service budgets separately from general funds is one approach that can support more stable water service pricing and budgeting. Fixed rates for water use whereby rates are not based on the volume of water sold is an approach that municipal water suppliers can use without undermining revenues needed to support their operating budget. Additionally, eliminating declining block rates for water-use, where users pay less as they consume greater amounts of water, reduces incentives for excessive water use. These approaches should be implemented in concert with mechanisms that provide financial assistance to ratepayers with a demonstrated financial need (see related recommendation #1 for local and municipal actions).

Final

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ⁱ U.S. EPA, 2016. Report to Congress on Combined Sewer Overflow to the Great Lakes Basin.

ⁱⁱ Natural Resources Defense Council, 2013. Testing the Waters

ⁱⁱⁱ Natural Resources Defense Council, 2011. Swimming in the Great Lakes.

^{iv} US Water Alliance, 2017. The Economic Benefits of Investing in Water Infrastructure

^v Canada Infrastructure, 2016. Canadian Infrastructure Report Card: Informing the Future

^{vi} McKinsey Global Institute, 2016. Bridging Global Infrastructure Gap.

^{vii} The Institute for Illinois' Fiscal Sustainability, 2012. The State of Illinois Infrastructure.

^{viii} Ontario Society of Professional Engineers, Residential and Civil Construction Alliance of Ontario, Ontario Sewer and Watermain Construction Association 2017. Weathering the Storms: Municipalities Pleas for Stormwater Infrastructure Funding

^{ix} Pennsylvania Department of Environmental Protection, 2015. The Pennsylvania Water and Wastewater Gap Study