

Environment Committee

Meeting date: October 25, 2016

For the Metropolitan Council meeting of November 9, 2016

Subject: 2016 Inflow & Infiltration Task Force Report

District(s), Member(s): All Districts

Policy/Legal Reference: Water Resources Policy Plan

Staff Prepared/Presented: Jeannine Clancy, (651) 602-1210; Marcus Bush, (651) 602-1166

Division/Department: MCES c/o Leisa Thompson, 651-602-8101

Proposed Action

That the Metropolitan Council accepts the 2016 Inflow and Infiltration Task Force Report (Attachment A) and authorize MCES to implement the recommendations of the Report for the Ongoing Inflow and Infiltration (I/I) Program.

Background

Inflow and Infiltration (I/I) are terms that describe clear water that enters wastewater systems and consumes capacity, which can result in public and environmental health concerns, reduced groundwater recharge, and increased operations and maintenance costs. The intent of the Task Force was to provide recommendations to MCES that support the efforts of regional communities to mitigate I/I in the metropolitan area.

The Task Force was chaired by Council Member Sandy Rummel and included staff from Metro Cities, and representatives from 19 communities with public works, wastewater utility, finance, or city manager experience. The membership was diverse in terms of community size, geographic location, and experience with the Council's I/I program. The Metropolitan Council has previously convened task forces to work with regional communities to address inflow and infiltration.

The Task Force met five times in 2016 and concurred with the findings of the Report. In summary, the Task Force recommended that MCES:

1. Continue the regional planning policy of balancing regional standards with the needs of local communities to tailor programs to their individual circumstances.
2. Develop a robust public outreach program that would include proper maintenance of wastewater collection systems, ownership of sanitary sewer service laterals, and impacts of excessive I/I during wet weather events.
3. Support efforts to secure funding for public and private I/I mitigation projects including State Bond and Clean Water Legacy Funds. Consider the provision of financial assistance through regional sources, such as a portion of the wastewater fee, to provide assistance to communities for private property I/I mitigation
4. Develop a model ordinance for a private property service lateral inspection program in conjunction with the League of Minnesota Cities, Metro Cities, and local communities.
5. Develop best practices for a private property service lateral inspection program in conjunction with the League of Minnesota Cities, Metro Cities, and local communities

6. Investigate the ability to develop master contracts held by MCES that could be used by communities for private property I/I inspections and service lateral repairs.
7. Design and implement a private property I/I mitigation demonstration project that would provide additional opportunity for measurement of impact on wastewater base and peak flows.
8. Review the peak hour factors used to develop I/I goals at the time that the 2050 Water Resources Policy Plan is prepared.

Rationale

While the regional and local I/I mitigation efforts to public infrastructure are having a positive impact on peak wastewater flows, continued efforts are needed. It is recognized that private property infrastructure represents a significant portion of the regional wastewater system and contributes an unquantified and unresolved share of the excessive flows associated with I/I. The recommendations of the Task Force provide local communities with support in addressing the technical and financial challenges related to private property I/I mitigation programs. Some of the major challenges in the region associated with excessive flows attributable to public and private I/I include:

- I/I can result in public and environmental health concerns.
 - When the combined amount of wastewater and clear water exceed the system capacity, untreated wastewater can back up into the basements of buildings or discharge into lakes, streams, wetlands, or other areas.
- I/I is costly to communities and utility ratepayers.
 - The large regional pipes (interceptors) and wastewater treatment plants are designed for the wastewater needs of the region. Excessive I/I limits the available system capacity intended to accommodate the growth of the region and increases the wastewater treatment costs, charged to local communities.
- I/I wastes the region's valuable water resource.
 - Clear water discharged to the wastewater system is removed from the natural hydrologic cycle and reduces groundwater recharge potential.

Funding

Funding to support the I/I program is available in the MCES operating and capital budgets.

Known Support / Opposition

The Task Force approved the Report on October 14, 2016 with no known opposition. Attached is a letter from Metro Cities supporting the adoption of the report (Attachment B).

The business item will be jointly presented by Chad Millner, Engineering Director for the City of Edina, and MCES staff.

2016 INFLOW & INFILTRATION TASK FORCE REPORT



The vision of Metropolitan Council Environmental Services is to be a valued leader and partner in water sustainability

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The Metropolitan Council is the regional planning organization for the seven-county Twin Cities area. The Council operates the regional bus and rail system, collects and treats wastewater, coordinates regional water resources, plans and helps fund regional parks, and administers federal funds that provide housing opportunities for low- and moderate-income individuals and families. The 17-member Council board is appointed by and serves at the pleasure of the governor.

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Executive Summary

In early 2016, the Metropolitan Council appointed a Task Force of local community representatives to discuss and identify areas of improvement for the existing Metropolitan Council Environmental Services (MCES) Ongoing Inflow and Infiltration Program (Ongoing I/I Program) and the potential for future inflow and infiltration mitigation strategies for both public and private infrastructure. This Task Force, representing public works directors, city engineers, utility managers, finance directors, and city managers, met during the 2016 calendar year. This *2016 Inflow and Infiltration Task Force Report (Report)* is a summary of the discussions and recommendations made to the Metropolitan Council.

The Task Force focused its discussion around three assignments made by the Metropolitan Council (Council). The first assignment included review of the existing program, key elements of the program, mitigation activities undertaken in the regional, local and private wastewater collection systems, and system responses to wet weather.

The second assignment was to identify and discuss challenges of addressing private property inflow and infiltration sources. The Council's *Thrive 2040 Water Resources Policy Plan (Plan)* states that the Council will not provide additional capacity within its interceptor system for excessive I/I. The *Plan* requires that all communities served by the regional wastewater system include an I/I mitigation component, including a program for private property I/I mitigation, in their comprehensive wastewater plans, which are due in 2018. The Task Force recognized that very few communities in the Twin Cities metropolitan region have implemented a private property I/I mitigation program. The Task Force further recognized that public opposition, lack of public outreach and messaging, and inconsistent grant funding contribute to the difficulty of implementing private property I/I mitigation programs; strategies selected to address private property I/I will need to be tailored to the community and consider age and condition of service laterals, ownership and maintenance responsibilities, etc.

The third assignment was to identify and discuss options and opportunities for private property I/I mitigation. Based on challenges discussed and program strategies underway in the region or in other areas of the country, the Task Force identified some specific strategies to address the technical and financial challenges of private property I/I mitigation.

In summary, the Task Force recommended that MCES:

1. Continue the regional planning policy of balancing regional standards with the needs of local communities to tailor programs to their individual circumstances.
2. Develop a robust public outreach program that would include proper maintenance of wastewater collection systems, ownership of sanitary sewer service laterals, and impacts of excessive I/I during wet weather events.
3. Support efforts to secure funding for public and private I/I mitigation projects including State Bond and Clean Water Legacy Funds. Consider the provision of financial assistance through regional sources, such as a portion of the wastewater fee, to provide assistance to communities for private property I/I mitigation
4. Develop a model ordinance for a private property service lateral inspection program in conjunction with the League of Minnesota Cities, Metro Cities, and local communities.
5. Develop best practices for a private property service lateral inspection program in conjunction with the League of Minnesota Cities, Metro Cities, and local communities
6. Investigate the ability to develop master contracts held by MCES that could be used by communities for private property I/I inspections and service lateral repairs.
7. Design and implement a private property I/I mitigation demonstration project that would provide additional opportunity for measurement of impact on wastewater base and peak flows.
8. Review the peak hour factors used to develop I/I Goals at the time that the *2050 Water Resources Policy Plan* is prepared.

Introduction

Inflow and Infiltration (I/I) are terms that describe clear water, including stormwater and groundwater that enters wastewater collection systems. Inflow is typically stormwater that enters the wastewater system at point sources such as manhole covers, rain leaders, sump pumps, or foundation drains. The largest amount of inflow occurs during and shortly after rainfall events. Infiltration is typically groundwater that seeps into cracked or broken wastewater sewer mains or service laterals. Infiltration increases the base flow in the wastewater collection systems. Some of the major challenges in the region associated with I/I are shown below:

- I/I can result in public and environmental health concerns.
 - When the combined amount of wastewater and clear water exceed the system capacity, untreated wastewater can back up into the basements of buildings or discharge into lakes, streams, wetlands, or other areas. Often these outcomes are a result of limited system capacity at the local level.
- I/I is costly to communities and utility ratepayers.
 - The large regional pipes (interceptors) and wastewater treatment plants are designed for the wastewater needs of the region. Excessive I/I limits the available system capacity intended to accommodate the growth of the region and increases the wastewater treatment costs, charged to local communities.
- I/I wastes the region's valuable water resource
 - Clear water discharged to the wastewater system is removed from the natural hydrologic cycle and reduces groundwater recharge potential.

The Task Force met in 2016 to discuss the following assignments:

- Review the Metropolitan Council Ongoing I/I Program.
 - Discuss work accomplished by MCES and communities and observed wastewater flows. Identify opportunities for improving the Ongoing I/I Program to assist communities in mitigation of excessive I/I.
- Identify and discuss challenges of addressing private property I/I sources.
- Identify and discuss options and opportunities for private property I/I mitigation.

The Task Force discussion and recommendations were focused by utilization of the problem statement, as defined below:

The addition of excessive clear water (inflow and infiltration) into local and regional wastewater collection systems can create multiple problems for these systems, including basement backups, wastewater spills, and the excessive utilization of remaining pipe capacity reserved for future growth. Problems occur on both publicly owned as well as privately owned infrastructure, and metro governments are required to resolve local I/I problems. Operators of publicly owned systems typically have programs in place to provide ongoing inspections, repairs, and replacement of the public system. Private sewer service laterals represent a significant portion of the overall collection system but are often not part of public system inspection, replacement, or I/I mitigation programs. These service laterals tend to represent an unquantified and unresolved share of the I/I problem.

Formation of Task Force

The 2016 I/I Task Force was comprised of city officials and chaired by Metropolitan Council Member Sandy Rummel. The Task Force members included representatives with public works, wastewater utility, finance, or city manager experience, solicited with assistance of Metro Cities. The membership was diverse in terms of community size, geographic coverage, and experience with the I/I Program. The Task Force members were:

Task Force Chair

- **Sandy Rummel**, Council Member, District 11, Metropolitan Council

Task Force Members

- **Matt Saam**, Public Works Director, Apple Valley
- **Bob Cockriel**, Utilities Superintendent, Bloomington
- **Jesse Struve**, City Engineer, Brooklyn Park
- **Paul Oehme**, Director of Public Works, Chanhassen
- **Kory Jorgensen**, Utility Operations Supervisor, Coon Rapids
- **Russ Matthys**, Public Works Director, Eagan
- **Chad Millner**, Engineering Director, Edina
- **Bert Tracy**, Public Works Maintenance Manager, Golden Valley
- **Brian Wagstrom**, Director of Public Works, Minnetonka
- **Eric Hoversten**, City Manager, Mound
- **Lisa Cerney**, Director of Surface Water and Sewers, Minneapolis
 - *Represented by Katrina Kessler, Kelly Moriarity, Kelly MacIntyre*
- **Bruce Hanson**, Public Works Superintendent, Newport
- **Jason Ziemer**, City Manager, North St. Paul
- **Luke Fischer**, Administrative Services Director, Plymouth
- **Bruce Elder**, Sewer Utility Manager, Saint Paul
- **Mark Maloney**, Director of Public Works, Shoreview
- **Shelly Rueckert**, Finance Director, St. Anthony
- **Ross Beckwith**, Public Works Director, West St. Paul
 - *Represented by Darin Rezac*
- **Patricia Nauman**, Executive Director, Metro Cities

Metropolitan Council Representatives

- **Bryce Pickart**, Assistant General Manager, Technical Services
- **Jeannine Clancy**, Manager, Community Programs
- **Kyle Colvin**, Assistant Manager, Engineering Planning
- **Marcus Bush**, Principal Engineer, Community Programs
- **Angela Mazur**, Senior Administrative Specialist

Background, History, and Milestones

Metropolitan Council Environmental Services (MCES) serves roughly three million residents in 109 communities. These communities discharge wastewater to the infrastructure owned and operated by MCES known as the Metropolitan Disposal System (MDS) shown in Figure 1. The MDS conveys wastewater from communities to one of the eight MCES treatment plants. The largest system conveys wastewater flow to the Metro Wastewater Treatment Plant (WWTP) and serves 65 communities. Smaller systems convey flow to plants in Shakopee (Blue Lake), Eagan (Seneca), Empire, Stillwater (St. Croix Valley), Hastings, Eagles Point, and East Bethel. Figure 1 shows the September 2016 condition rating of MCES interceptors, as described later in this report. Unrated portions shown on Figure 1 are typically pressurized, recently rehabilitated, or recently constructed sections of piping.

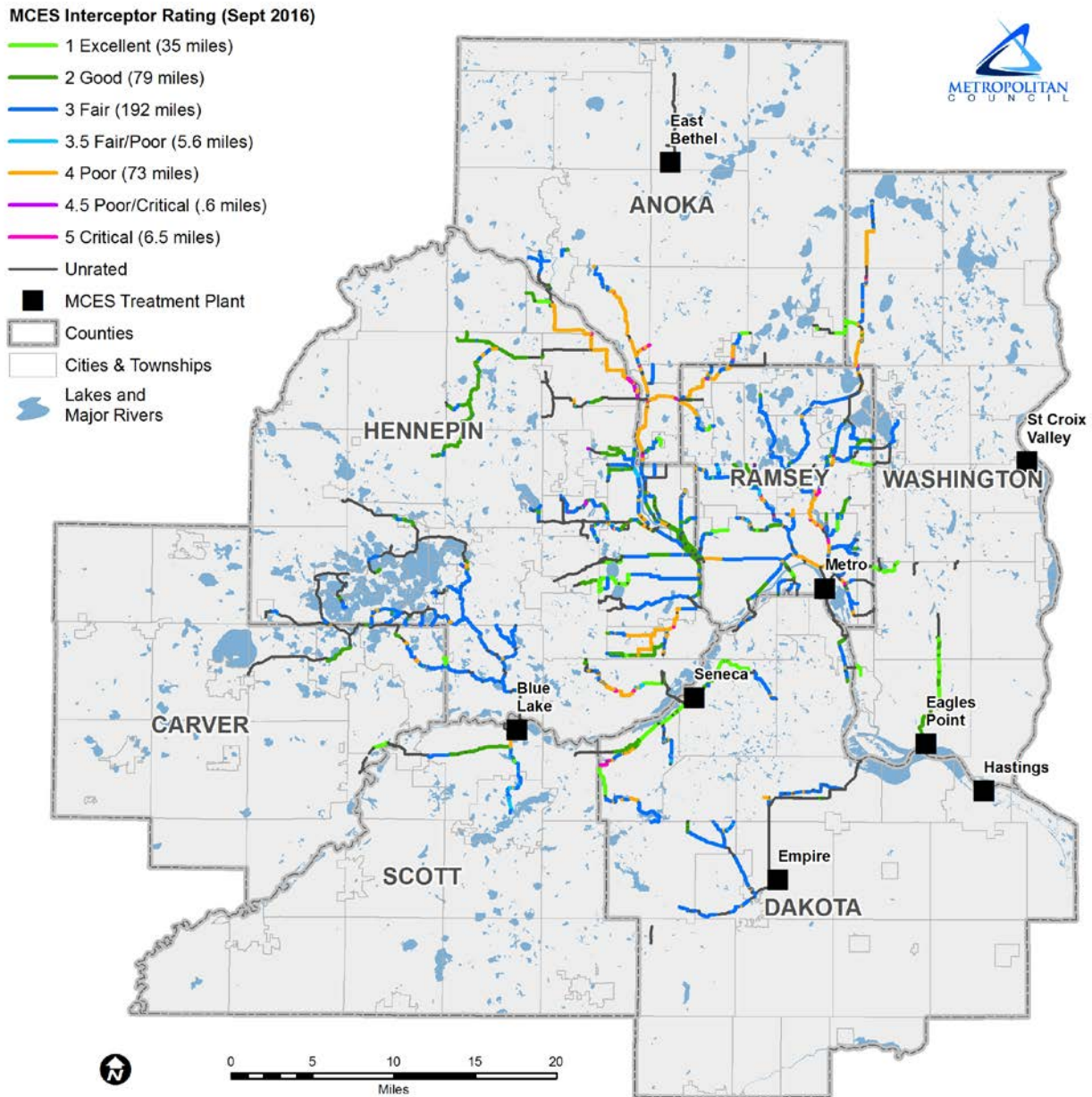


Figure 1: MCES Interceptor Rating

Communities own and operate local wastewater collection systems that connect to the MDS through local sewers, which extend wastewater service to end users such as residents, commercial establishments, industry, and public agencies. MCES is a wholesaler of the regional services that bills each community for wastewater flow into the MDS. The communities charge the end users, or ratepayers, for the wastewater service through fees typically based on metered wastewater use.

To preserve the reliability and sustainability of the regional wastewater system, continuous maintenance of the infrastructure is required on the MDS and the upstream municipal infrastructure. The I/I Program was developed and adapted over time to capacity and fiscal constraints, federal and state regulations, regional needs, community feedback, task force discussions, and economic conditions. Table 1 identifies milestones in the I/I Program history.

Table 1: Program History

Date	Milestone
2000-2002	MCES Interceptor Master Plan developed; Capacity constraints of interceptors due to high flow volumes of I/I identified in hydraulic model
2003-2004	I/I Task Force 1: Established I/I Surcharge Program
May 2005	I/I Mitigation Program included in <i>2030 Water Resources Management Policy Plan</i>
Fall 2005	47 communities exceeded I/I goals during a significant rain event
2007	First year of community I/I work plan assignments
2009-2010	I/I Task Force 2: Established Ongoing I/I Program
April-June 2014	42 communities exceeded I/I goals during a significant rain event
2015	I/I Mitigation Program included in <i>2040 Water Resources Policy Plan</i>
2016	I/I Task Force 3

Interceptor Master Plan

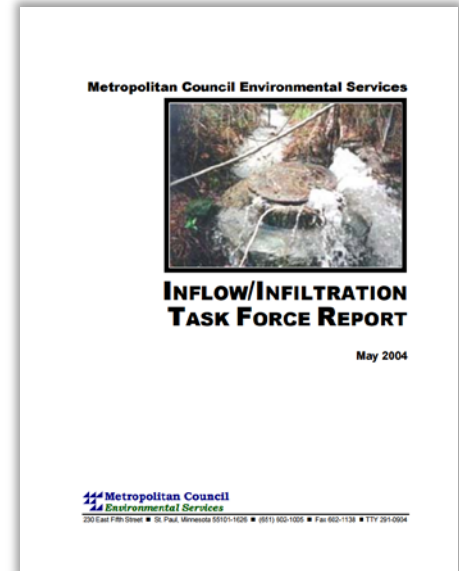
MCES completed a comprehensive master planning study for the interceptor system in December 2002. One of the significant findings of the study was that groundwater and rainfall runoff entered wastewater collection systems at rates that consumed wastewater system capacity intended to serve future development and growth.

The master planning study provided an opportunity to examine the long-range implications of continuing to tolerate the current levels of I/I with projected development in the region. The study identified practical limitations to expanding the system, including the high cost of relief sewers, larger pump stations, and larger treatment facilities. The study led staff to conclude that the most viable option for long-term service to the region was to mitigate I/I sources that contribute to excessive flows. Staff suggested the formation of the first I/I Task Force, representing the communities served, to evaluate and recommend a course of action to mitigate I/I sources.

Task Force 1 – Inflow/Infiltration Task Force

Based on the recommendations of the Interceptor Master Plan, the first I/I Task Force of community public works directors, city engineers, city managers, and finance directors met in 2003 and 2004. The 2004 Task Force concluded that:

- The capacity of regional wastewater conveyance and treatment facilities is exceeded during significant rainfalls because of excessive I/I.
- Overloaded wastewater conveyance and treatment facilities result in unacceptable conditions such as private property damage, spills, and sanitary sewer overflows.
- MCES, as the regional wastewater utility and National Pollutant Discharge Elimination System (NPDES) permittee, must take action to reduce the risk of overloading the regional wastewater facilities.
- It is not feasible to enlarge MCES facilities to accommodate all of the I/I from tributary communities.
- MCES has a fiduciary responsibility to not expend funds to convey and treat clear water from illegal connections associated with private property sources such as sump pumps and rain leaders.
- The MCES design allowance (based on the Ten State Standards) for I/I in the interceptor system is reasonable as many local communities meet this standard.



Based on the Task Force conclusions, MCES developed an I/I Mitigation Program. A summary of this program, referred to as the Surcharge Program, is included in Appendix B.

In fall 2005, a significant rain event occurred in the region that resulted in 47 communities exceeding their I/I Goal peak flows. Based on the program guidelines, these communities were given the option of working on I/I mitigation activities or paying a surcharge that could be used for I/I mitigation within the surcharged community. With one exception, all local communities chose to perform I/I mitigation work. Council staff worked with the surcharged community, which identified and mitigated the I/I source, allowing funds to be returned to the community upon completion of the work.

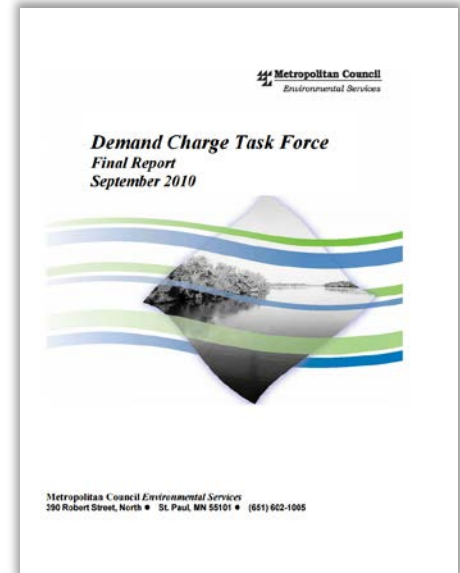
Task Force 2 – Demand Charge Task Force

The Council's *2030 Water Resources Management Policy Plan* called for the implementation of a wastewater demand charge in 2013 for communities with excessive I/I. The intent of the demand charge was to help fund the cost of providing storage of excessive I/I to avoid overloading downstream facilities. In 2009, the Council appointed a Demand Charge Task Force to develop recommendations for the program, including specific features and a 2013 implementation date. The Task Force sought a balanced approach to foster continued progress for I/I mitigation and recommendations for the next phase of the program, including implementing an ongoing program rather than a demand charge. As a result, MCES developed an Ongoing I/I Program, with the following goals:

- Effective in achieving I/I policy goals
- Equitable among served communities
- Defensible using measured flow data
- Fiscally responsible: consistent with cost of service and other policies, accounts for regional economics
- Reasonable, uniform rules and procedures
- Flexible, to deal with uncertainties and change
- Understandable

Based on the Task Force conclusions, MCES developed an Ongoing I/I Program. A summary of this program is included in Appendix B. *The Program Year 2018 Ongoing Inflow and Infiltration Program Procedure Manual* is included in Appendix C.

In spring 2014, much higher than normal rainfall resulted in saturated soils and elevated surface water features. Those factors, combined with the precipitation received in June 2014, resulted in 46 communities exceeding their I/I Goal peak flows and subsequently participating in work plans. Communities had four years to complete work plan assignments.



2016 Inflow & Infiltration Task Force

Ongoing I/I Program Review

The 2016 Task Force reviewed information regarding I/I mitigation work performed and regional flow observations since the implementation of the I/I Program. Typical I/I sources from public and private infrastructure are shown on Figure 2.

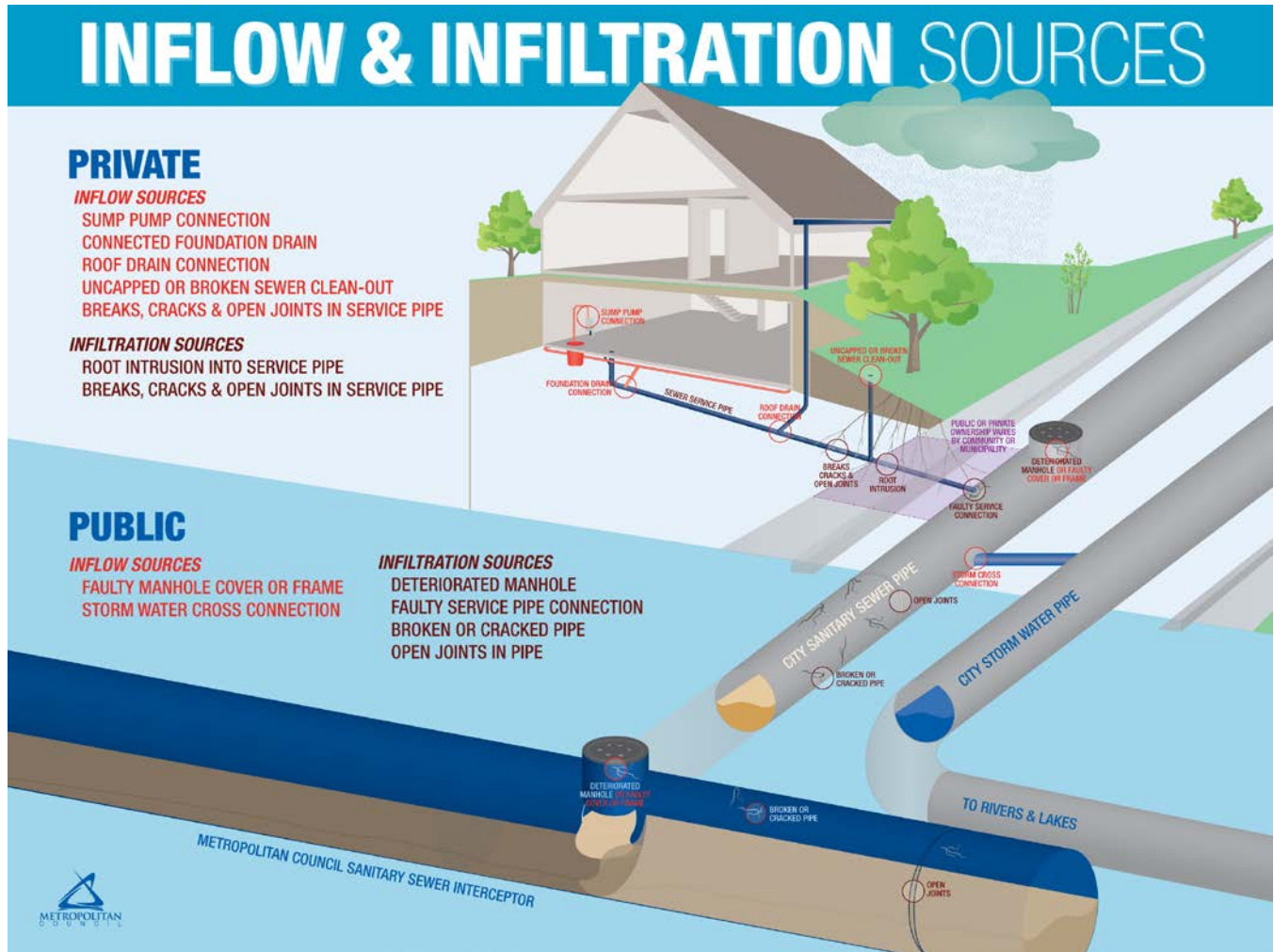


Figure 2: Inflow and Infiltration Sources

Mitigation of I/I in Municipal Systems

Each municipal wastewater system served by the MDS collects wastewater from homes and businesses and conveys it to the MCES interceptors or treatment plants. In total, there are an estimated 5,000 miles of local sewer mains operated and maintained by the local communities of the region. Municipal sewer systems are susceptible to inflow through leaking manhole covers and to infiltration through cracks and joints in the laterals, and may require repair or replacement.

Each community may choose projects that vary in approach, type, and cost to mitigate I/I. Mitigation projects are eligible for work plan credits if they meet the requirements of the following four types of work, as described in Appendix C: I/I Study, Public Facility Improvement, Private Property Improvement, or Public Staff Cost.

Table 2: Community Credits

Year	Total I/I Credits
2007	\$ 37,850,500
2008	\$ 12,651,600
2009	\$ 33,370,700
2010	\$ 11,190,400
2011	\$ 9,460,500
2012	\$ 7,133,800
2013	\$ 12,931,900
2014	\$ 20,888,800
2015	\$ 11,036,200
TOTAL	\$ 156,514,400

The initial I/I Program began in program year 2007 based on flow data collected from 2004 through 2006. Since that time, 49 communities have participated in work plan assignments, with a combined total of \$157 million of reported local I/I mitigation work, as shown on Table 2.

Metro Cities advocated for state bond funds to assist with public infrastructure grants for I/I mitigation. A total of \$9 million in grants was secured between 2010 and 2015 and administered by MCES. Seventy-seven communities in the region that reached or exceeded 80% of their respective I/I Goals were eligible to receive grants up to 50 percent of the cost of qualifying I/I mitigation activities related to the municipal wastewater collection systems.

Mitigation of I/I in MCES Interceptors

The MCES wastewater collection system includes 610 miles of interceptors, 60 lift stations, 200 flow meters, and over 7,000 manholes. The interceptor system collects and transports wastewater from each metershed connected to the MDS to one of eight treatment facilities. The MDS handles roughly 250 million gallons of wastewater daily and has an asset value of approximately \$6.7 billion.

Similar to the municipal systems, the MDS infrastructure is susceptible to I/I and may require repair or replacement to ensure reliable service to the region now and in the future. To mitigate I/I in the regional systems, MCES initiated the following capital and maintenance initiatives:

- Routine inspections completed to rate the condition of all gravity interceptors in accordance with the Pipeline Assessment and Certification Program (PACP) and the National Association of Sewer Service Companies (NASSCO). Figure 1 includes the PACP condition rating for the MCES Interceptor System.
- Between 2007 and 2015, MCES completed \$205 million in maintenance projects to reduce inflow and infiltration into the system. The I/I mitigation portion of these capital projects would be roughly \$88 million.
- Dedicated ongoing MCES resources to I/I mitigation in the interceptor system, including repair of manholes or replacement of manhole covers. The MCES Capital Improvement Program (CIP) includes \$100 million in interceptor-related investments through year 2030.

Results and Trends: Regional Flow Observations

Success of the I/I Program can be measured in reduced base flow from less infiltration and reduced peak flow from less inflow.

Since the inception of the I/I Program, total volume of wastewater treated by the regional system has decreased while precipitation has increased and growth in the region has continued. Figure 3 shows the yearly wastewater flow calculated by MCES for the regional Municipal Wastewater Charges (MWC) and the yearly rainfall data recorded by the National Oceanic and Atmospheric Administration (NOAA) for Hennepin County for monitoring years 2005 through 2016.

The total amount of wastewater flow reduced from 95 billion gallons per year (BGY) in 2005 to 86 BGY in 2015. The trend line for regional flows indicates an average annual reduction of 615 million gallons of wastewater per year (MGY). Over the same period, annual rainfall and regional population increased. This flow reduction can be attributed to I/I mitigation and water conservation.

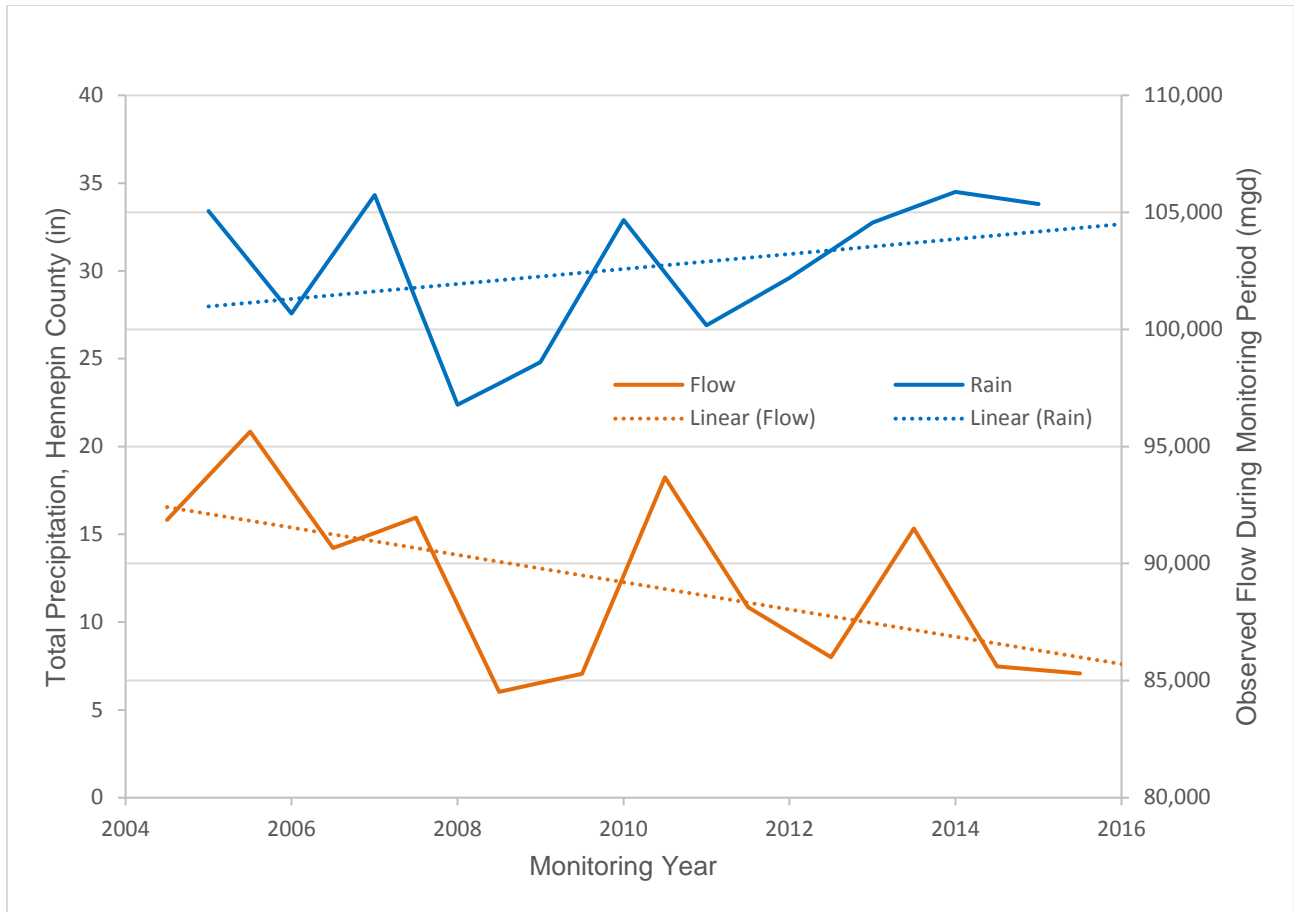


Figure 3: Regional Flow and Rainfall

The majority of work plan assignments of the I/I Program resulted from two wet weather events. These events occurred in October 2005 and June 2014. No two storms are identical and soil moisture can vary due to preceding rainfall events, referred to as antecedent conditions. However, these events illustrate the reduction in flow volumes prior to and after implementation of I/I work plans in 2007. Table 3 indicates that the 2014 rainfall event was of greater precipitation amount and was preceded by higher antecedent conditions, yet the wastewater treatment plants received lower peak flow volumes than the 2005 rainfall event.

Table 3: Wet Weather Flow Reduction

	2005	2014	Difference
Regional Precipitation (in) ¹	6.6	10.8	+62%
Annual Precipitation (in) ²	32.2	37.7	+17%
Metersheds Goals Exceeded	50	49	< 1%
<i>Peak Daily Flow³</i>			
Metropolitan Plant (St Paul)	449.6	420.9	-6%
Blue Lake (Shakopee)	92.8	70.9	-24%
<i>Peak Hourly Flow^{3,4}</i>			
Metropolitan Plant (St Paul)	633.4	559.9	-12%

1 Average total rainfall over the region that occurred September 19- October 4, 2005 and June 1- June 19, 2014.

2 Average total rainfall over the region that occurred in the 12 months preceding the event.

3 Flow in million gallons per day (mgd)

4 Peak Hourly Flow during events exceeded the capacity of Blue Lake Plant meters.

Ongoing I/I Program Changes

The Task Force reviewed two proposed modifications to the Ongoing I/I Program and concurred with recommended changes to the program schedule and I/I Goal calculation.

Schedule

For program year 2019 and beyond, the flow-monitoring period will change to be consistent with the period used for flow allocation to compute the municipal wastewater charges. Adjustments to key dates and deadlines are included in Table 4 below:

Table 4: Ongoing Program Schedule Changes

Procedure	2017 Program Date/Deadline	2018 Program Date/Deadline	2019 Program Date/Deadline
MCES sends I/I Goal to each Community.	June 30, 2015	June 30, 2016	Oct 31, 2016
MCES monitors flow volumes from each metershed and notifies each Community of flows great than 80% of I/I Goal.	July 1, 2015 – Jun 30, 2016	July 1, 2016 – Dec 31, 2016	2017 Calendar Year
MCES sends Work Plan assignments to each Community.	July 30, 2016	Mar 1, 2017	Mar 1, 2018
Community sends I/I Program Community Response Form or appeals to MCES.	Sep 30, 2015	Sep 30, 2018	Sep 30, 2018
MCES accepts Program Community Response Form for each Community.	Nov 30, 2015	Nov 30, 2018	Nov 30, 2018
Community completes mitigation work or chooses surcharge.	2017 – 2020 Calendar Years	2018 – 2021 Calendar Years	2019 – 2022 Calendar Years
Community sends Reduction Work Verification Form to MCES.	March 31, Annually	March 31, Annually	March 31, Annually

Peak Hour Factor and I/I Goal Calculation

The interceptor system and treatment facilities that comprise the MDS are designed to convey generated wastewater flow, including daily and seasonal variations and an acceptable level of I/I. The wastewater flow variations are accounted for in sewer design by the peak hour factor. A basis for the design includes an average residential, commercial, and industrial flow estimated at 100 gallons per capita per day. Regional data indicate that actual average flow is approximately 85 gallons per capita per day. To account for the lower regional average flow per capita, the design flow variation factors were adjusted upward (divided by 0.85), which reflects available capacity for I/I. The updated peak hour factors are included in Appendix A of the *2040 Water Resources Policy Plan*. The Task force recommended further evaluation of that the peak hour factors during the preparation of the *2050 Water Resources Policy Plan*.

Since the updated peaking factors account for water conservation, the Task Force recognized the need to revise the formula used to determine each metershed I/I Goal to eliminate a credit for water conservation. The I/I Goal is the maximum peak hourly flow each metershed may discharge to the regional wastewater system. The I/I Goal is calculated each program year based on metershed population growth, average flow data from the previous 10 years, and the peak hour factor. Exceedance of the I/I Goal peak flow results in a work plan assignment, expressed in dollars, which is estimated by MCES for communities to mitigate excessive I/I from the local collection system.

Private Property I/I Mitigation in the Region

Upstream of the regional and local systems, there is an estimated 7,500 miles of private service laterals connected to roughly one million private properties. As with the public infrastructure, private service laterals are susceptible to I/I and may require repair or replacement. Sumps pumps and drains are also point sources of clear water that enter the wastewater collection system. Based on information from the Water Environment Foundation, one sump pump can add up to 7,200 gallons of clear water into the wastewater collection system in 24 hours – the equivalent of 40 homes.

Characteristics of Buildings and Development

Table 5: Age of Structures in the Region

According to the 2016 County Parcel data sets received by the Council, the region contains roughly 400,000 structures built before 1970, of which roughly 300,000 were built before 1960. Increased infiltration is more likely in older infrastructure, especially private service laterals constructed from clay pipe. Nearly one-third of all structures connected to the MDS, and the associated private service laterals, are over 50 years old. The number of structures built before the start of each year are shown in Table 5.

Developed Before	Number of Structures
1960	293,000
1970	380,000
1980	483,000
1990	612,000
2000	732,000
2010	848,000
2016	917,000

Increased inflow during storm events can be directly associated with roof drains and foundation drains that are connected to local sewer mains. Subsoil drains are also a source for infiltration during and after rainfall events. The State Board of Health adopted the Minnesota Plumbing Code in 1933. The 1969 revision to the plumbing code included a provision that storm water shall not be drained into sewers intended for sanitary sewer. The revision required that roof drains discharge to a separate storm water or a combined sewer system. The subsequent 2015 revision to the plumbing code required that subsoil perimeter drains discharge to a storm drain, approved watercourse, or street curb or gutter. In some communities and for some property owners, efforts to separate stormwater from wastewater collection systems predated the rule change in 2015. Even though the plumbing code requires that stormwater from private property be discharged elsewhere, there may be instances in which roof drains, area drains, sump pumps, and other point sources are illicitly connected to local sewer mains.

Existing Policies and Statutes

The Task Force discussed several policies and statutes related to private property I/I, including:

- Minnesota Statute 471.342 gives authority to cities to establish an I/I prevention program and provide loans and grants to property owners to assist the owners in financing the cost of abating inflow and infiltration from their properties. Furthermore, cities are authorized to finance the program with federal, state, private, or city funds, including sanitary or storm sewer utility funds, fees, and charges.
- Minnesota Department of Labor and Industry Rules 7560.050 requires that after December 31, 2005, an operator of a sewage or water facility, at a minimum, shall locate that portion of the service lateral within a public right-of-way installed after that date up to the point where the service lateral first leaves the public right-of-way.
- Ownership of private sewer service laterals is generally defined by city ordinances in each community. In some communities, private property owners own and maintain the service lateral from the building connection point to the sanitary sewer service main. Other communities assign the ownership of the lateral from the building connection point to the right of way line. There does not appear to be a community in the region in which the entire service lateral is considered public property.

Existing Private Property Mitigation

The Task Force discussed existing private property I/I mitigation programs within the region. These included programs in Eagan, Golden Valley, Minneapolis, St. Anthony, Saint Paul, and West St. Paul. Each community developed a program based on evaluation of its collection system and intends to remove I/I sources including private service laterals, sump pumps, foundation drains, roof drains, and area drains.

The Task Force shared information about public outreach including flyers in utility bills, community newsletter stories, website content, public meetings, newspaper articles, press releases, appearances on community television programs, and meetings with real estate agents about point-of-sale programs. Emphasis on the environmental and long-term cost importance of the work was used in the public outreach programs to create buy-in from the public. Some cities also combined their I/I inspections with other municipal program such as water meter replacement. Members whose communities had implemented community outreach for private property I/I mitigation indicated it was successful, but recognized a continued objection from some property owners for a variety of reasons. Other problems encountered included homeowners reconnecting sump pumps after inspection.

Task Force members recognized the need for better public outreach, as well as enforcement strategies for private property I/I mitigation. Members also noted the frustration of not being able to resolve I/I solely with investment in the public system.

Task force members noted a number of potential challenges associated with private property I/I mitigation, including:

- **Existing Conditions** – A high rate of defective sewer laterals, including excessive tree root intrusion, cracked pipe, and drain tile connections.
- **Messaging and Public outreach** – Lack of public outreach connecting the relationship of excessive I/I to negative outcomes, such as sewer backups into private property or release of wastewater into rivers, lakes, and streams. Property owners may not recognize that they own their service laterals, let alone that they are responsible for maintaining them (out of sight, out of mind). Property owners who contribute to excessive I/I do not necessarily experience a direct impact or may not understand the impacts at a regional level.
- **Equity** – private property I/I mitigation programs need to be tailored to the conditions that exist in each community, therefore the approach will vary across the region, raising the question of fairness.
- **Staff Intensive** – Private property I/I mitigation programs are often staff intensive to administer, and require ongoing efforts to address recurrent risks, such as sump pump inspections.
- **Lack of consistent funding to assist property owners** – Securing adequate state funding to help private property owners with I/I mitigation activities is an ongoing effort. Consistent funding is important to help resolve the problem of private property I/I in communities across the metro area.
- **Opposition** – Objections to point-of-sale programs or others programs that require entry into a private property for inspection.
- **Measurement** – The impact of I/I mitigation efforts is generally realized over time. The measurement of I/I mitigation projects requires taking into account antecedent conditions at the time the wet weather event took place. Strategies to measure the results of for private property I/I mitigation have not been developed across the region.

Funding

Grant funding administered by MCES for private property I/I mitigation activities has been limited to a total of \$1.8 million over two funding cycles in the past. Eligible private property I/I mitigation activities included sewer lateral repair or replacement and/or disconnection of foundation drains. MCES administered the programs to assist private property owners, which included grants for a portion of the actual cost (up to a maximum grant of \$2,000) that was provided through communities to property owners.

Case Study

The Task Force received presentations and discussed materials related to private property I/I mitigation strategies and programs initiated in other regions and cities in the United States. A recent private property I/I mitigation program established in Milwaukee was a case study provided to the Task Force. The presentation was titled: "Milwaukee Municipal Sewage District (MMSD) PPII Program Story - Early Returns and Lessons Learned" and was presented by Brown & Caldwell. MMSD is a state-chartered, governmental agency providing regional wastewater conveyance, treatment, and disposal for 28 municipalities within a 411-square-mile planning area, located in five counties, with a service population of about 1 million residents. The MMSD private property I/I mitigation program presentation is included in Appendix D. A result of the Task Force discussions is a recommendation to conduct a demonstration project somewhere in the region.

Task Force Discussion

Given the challenges listed above, the Task Force discussed solutions to respond to specific challenges. Minutes from the Task Force meetings are included in Appendix E.

Topic: Policy to Establish a Private Property I/I Mitigation Program

Task Force members and MCES staff reviewed the following documents that cite requirements for a private property I/I mitigation program:

2040 Water Resources Policy Plan, adopted May 2015

All communities served by the regional wastewater system will include an I/I mitigation program in their comprehensive sewer plans, including a program to mitigate sources of I/I from private property

Local Planning Handbook, September 2015

The Metropolitan Land Planning Act requires that all incorporated cities, counties, and townships in the seven-county metropolitan region prepare a comprehensive plan and update that plan every ten years. MCES publishes the *Local Planning Handbook (Handbook)* to assist communities with meeting the requirements of the *Water Resources Policy Plan (Plan)*. The *Handbook* has established minimum requirements relative to private property I/I as part of the wastewater portion of the comprehensive plan update. Task Force members discussed the requirements of the *Plan, Handbook*, and the Waste Discharge Rules. They concluded that:

- The *Plan* clearly establishes the requirements for a private property I/I mitigation program.
- After reviewing the Waste Discharge Rules, Task Force members did not identify a need to revise the rules as they relate to I/I.
- A discussion should take place with MCES and local communities to further understand the minimum standards that will be required to be compliant with the *Handbook* as it relates to private property I/I mitigation. Task Force members recommended that this discussion take place in late 2016.

Topic: Financial Resources for Private Property I/I Mitigation

Private property owners, who are often unaware of their ownership of the service lateral, object to programs in which they are required to repair or replace the lateral. Many communities lack the financial resources to assist private property owners with repair costs.

Task Force members discussed the financial challenges associated with repair or replacement of sewer laterals and disconnection of foundation drains and sump pumps. Repair or replacement of sewer laterals typically costs around \$5,000 to \$7,000. However, in some situations, where the sewer lateral connects to the MCES interceptor system and is exceptionally deep, or when the service lateral is unusually long, costs of the repair can triple.

Reflecting on past private property grant programs, some Task Force members discussed the problems associated with a lack of consistent funding. Based on these discussion points, Task Force members made the following recommendations:

- Consider the provision of financial assistance through regional sources, such as a portion of the wastewater fee, to provide assistance to communities for private property I/I mitigation. See Minnesota Statute 471.342, which provides this authority to cities.
- Convene a work group consisting of community representatives, Metro Cities, and the League of Minnesota Cities to develop a program for use by communities that would allow property owners to assess the costs for replacement of sewer service laterals to property taxes. Investigate a funding model that would establish a source of revenue for future private property service lateral repairs.
- Support ongoing efforts by Metro Cities to seek private property I/I mitigation grants from the Clean Water Legacy Fund, and MCES staff should assist with the efforts of Metro Cities.
- The Task Force discussed setting aside a portion of the MWC on an annual basis that would be available for private property I/I mitigation. While members agreed to keep the idea on the list, some had reservations or were opposed to the idea. If this idea advances, design of the grant program would include input from local communities.

Topic: Technical Support for Private Property I/I Mitigation

The Task Force discussed ideas for technical support to help local communities develop private property I/I mitigation programs. The Task Force recommended that MCES:

- Develop a model ordinance for a private property sewer service lateral inspection program in conjunction with Metro Cities, the League of Minnesota Cities, and local communities. Model ordinances provide a reference point for communities, which can tailor the ordinance to fit their own circumstances.
- Develop a best practices toolkit for private property I/I inspection programs.
- Investigate the ability to develop master contracts held by MCES that could be used by communities for private property I/I inspections and service lateral repairs. Communities would have the option of using the inspection service on a fee basis. Community would be required to schedule the inspection and keep records of the inspection results.
- Provide technical assistance to communities on sub-metershed flow metering. These results will help in identifying strategy for private property I/I mitigation and public outreach.
- Develop a public outreach toolkit on the subject of private property I/I. The toolkit could be customized by the community for its own use and would include:
 - Why I/I is a public and environmental health, financial, and long-term capacity concern.
 - What property owners need to know to determine if their property has the potential for contributing to excessive I/I.
 - What options property owners have for repairing their sewer service lateral.

Task Force Recommendations

The Task Force recommended that MCES continue to work with local communities to:

1. Continue the regional planning policy of balancing regional standards with the needs of local communities to tailor programs to their individual circumstances.
2. Develop a robust public outreach program for I/I and wastewater system maintenance that would include target audiences such as elected officials, the real estate community, public works professionals, and the public. Topics would include proper maintenance of wastewater collection systems, ownership of sanitary sewer service laterals, and impacts of excessive I/I during wet weather events. Public information toolkits would be developed that could be customized for use by local communities.
3. Pursue consistent funding sources for public and private I/I projects.
 - a. Continue to advocate on behalf of metropolitan communities for State Bond Fund allocation for I/I mitigation in the local collection system.
 - b. Assist Metro Cities in advocating for funds from Clean Water Legacy or other state sources for private property I/I mitigation.
 - c. Consider the provision of financial assistance through regional sources, such as a portion of the wastewater fee, to provide assistance to communities for private property I/I mitigation
4. Develop a model ordinance for a private property sewer service lateral inspection program in conjunction with the League of Minnesota Cities, Metro Cities, and local communities.
5. Develop best practices for a private property I/I inspection program in conjunction with representatives from local communities and Metro Cities. The best practices toolkit would include inspection standards and training for community personnel using methods such as record keeping and performance standards for repair and rehabilitation of private service laterals.
6. Investigate the ability to develop master contracts held by MCES that could be used by communities for private property I/I inspections and service lateral repairs. Communities would have the option of using the inspection service on a fee basis. Community would be required to schedule the inspection and keep records of the inspection results.
7. Provide technical assistance to communities on sub-metershed flow metering to better quantify the impact of private property I/I mitigation. Design and implement a private property I/I mitigation demonstration project that would provide additional opportunity for measurement of impact on wastewater base and peak flows. These results will help in identifying strategy for private property I/I mitigation and public outreach.
8. Review the exceedance peak hour factors used to develop I/I goals currently in place at the time that the *2050 Water Resources Policy Plan* is prepared.

The Task Force approved this Report on October 14, 2016.

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METRO CITIES

Association of Metropolitan Municipalities

October 13, 2016

Dear Chair Duinick and Metropolitan Council Members:

Metro Cities' staff was pleased to participate in the recent Inflow-Infiltration (I/I) Task Force that included MCES officials, and city staff from throughout the region. The purpose of the task force, to identify the challenges associated with private property I/I mitigation and possible tools and resources for addressing them, was supported by Metro Cities. Metro Cities' policies recognize the importance of addressing I/I at the local level, and the organization has worked with MCES staff on a variety of issues associated with I/I over the years, as well as worked to secure state funding assistance for local communities to address I/I on public and private infrastructure.


Metro Cities supports the recommendations in the task force report, namely in continuing an approach to I/I that aims to balance regional standards with local circumstances, continued evaluation of peaking factors, the development of technical tools and resource and a public outreach toolkit, and consideration of regional sources to assist with private I/I mitigation. The task force had some discussion on this idea and the various policy and funding challenges associated with addressing private I/I mitigation in particular.

The task force recommendation to consider regional resources to address private property I/I reflects support for considering this idea, as well as the need for further analysis before a plan to use regional resources would be developed. For Metro Cities, additional information and vetting of this issue by our membership will be necessary to assist the organization in responding to any proposal or action that would seek to use a regional funding source.

Once the task force report is finalized, Metro Cities looks forward to working with and assisting MCES staff and city officials to develop practices, ordinances and other tools identified in the report, as well as continue discussions on additional resources to address private property I/I work.

We look forward to working with you and your staff on this important work.

Sincerely,


Patricia Nauman
Executive Director