



MINNEAPOLIS COMBINED SEWER OVERFLOW PROGRAM 2006 ANNUAL REPORT

APRIL 25TH, 2007

I hereby certify that this plan, specification, or report, was prepared by me or under my direct Supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

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NPDES/SDS COMBINED SEWER OVERFLOW PERMIT

The 1972 amendments to the ***Federal Water Pollution Control Act*** (also known as the ***Clean Water Act***) provided the statutory basis for the ***National Pollutant Discharge Elimination System*** (NPDES) permit program. The NPDES program is designed to regulate the discharge of pollutants from point sources to waters of the United States. The Minnesota Pollution Control Agency (MPCA) has issued joint NPDES Combined Sewer Overflow (CSO) permits to the City of Minneapolis and Metropolitan Council Environmental Services (MCES) since 1985.

These permits regulate CSOs by defining certain conditions that should be followed if an overflow from the sanitary system occurs, including:

- Keeping detailed records of the number of CSO events
- Maintaining volume data
- Maintaining operation & maintenance data for overflow events and elimination efforts

Cooperation with both joint permittees is also maintained.

A separate inter-agency agreement between the City of Minneapolis and MCES details each permittee's responsibilities with respect to operation of the collection system, and notification in the event of a CSO from the sanitary sewer system.

The most recent CSO permit was issued on February 26, 1997 and expired on June 30, 2001. The City and MCES applied to renew this permit in December of 2000, and began negotiating with the MPCA regarding the terms for a new permit. In the absence of direction from the MPCA, the City has continued to operate under the expired permit requirements, and has developed a plan to control CSOs, including an aggressive approach to eliminating CSO areas based on prioritizing the remaining CSO areas and coordinating with scheduled capital improvement projects in Minneapolis.

COMBINED SEWER SEPARATION HISTORY IN MINNEAPOLIS

The oldest Minneapolis sewers were built in 1870, and were designed to carry both sewage and stormwater. In 1922, construction started for a separate storm drain system around Minneapolis lakes, as well as newly developing areas. Older areas continued to be served by combined sewers. Sewer separation began in earnest in the 1960s, in conjunction with a citywide paving program.

In 1986, the City began an accelerated sewer separation program called ***Minneapolis Combined Sewer Overflow Program - Phase I***. Phase I was supplemented with federal and state funds and was responsible for disconnecting storm infrastructure that contributed more than 4,600 acres of surface area to Minneapolis sanitary sewers. A very small percentage of

the surface area within Minneapolis city limits still requires separation; these areas represent the most difficult & complex areas to separate.

Even though CSOs were greatly reduced by Phase I efforts, overflow events occasionally still occur. As part of its comprehensive planning process in 1999/2000, Minneapolis entered into a Memorandum Of Understanding (MOU) that included both parties funding a joint Infiltration and Inflow (I/I) study. This joint study yielded a report, ***Combined Sewer Overflow Separation Elimination***, published in April, 2002. Inflow, rather than infiltration, was identified as the main contributor to CSOs. Refer to the MCES portion of this report for the current status of these initiatives. This study recommended that Minneapolis:

- Disconnect remaining public sector inflow sources: isolated catch basins (inlets), alley drains, and storm drains
- Disconnect remaining private sector inflow sources: rainleader connections, area drains, or other clean water discharges
- Study and implement storage & conveyance improvements

Based on the recommendations of the I/I study, Phase II of the City's CSO program was developed in 2002 and slated for implementation in 2003 - 2007. The City then submitted a Tier II comprehensive sewer plan to MCES for review and approval. This Tier II Sewer Plan documents the City's implementation plan for Phase II CSO improvements. On January 29th, 2003, MCES approved the City's Tier II Comprehensive Sewer Plan.

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GOALS AND STRATEGIES

The goal of Phase II of the CSO Program is to eliminate CSOs at the eight outfalls/regulators that still have CSOs. The following table shows information about these regulators:

Regulator Site Location	NPDES Permit Number	Responsible Party
39 th Av S & Minnehaha Parkway	M001	MCES
38 th St E & 26 th Av S	M002	MCES
Southwest Meters	M004	MCES
Northwest Meters	M005	MCES
East Meters	M006	MCES
26 th St E & Seabury Av	M007	MCES
Oak St SE & 5 th St SE	M012	City
Portland Av & Washington Av S	M020	MCES

The elimination of overflow structures may not be feasible in every case without causing a public health or safety hazard. Some overflow regulators may need to remain operational for emergency bypasses necessitated by extreme storm or flood events, or to minimize damage due to accidents or system failures. The City's minimum goal is to meet or exceed the EPA's current sewer overflow control policy.

PROGRAM FUNDING

New in 2007 is funding for Inflow & Infiltration (I&I) capital projects. The I&I reduction program is being implement to meet goals established by Metropolitan Council Environmental Services (MCES). Infiltration is the seepage of groundwater into sanitary sewer pipes through cracks and joints. Inflow is typically flow from a single point, such as discharge from sump pumps, foundation drains, or stormwater entering directly through openings in the sewer system. MCES has determined a direct correlation between precipitation and volume of clear water flow from many communities served by the regional wastewater treatment system. The addition of clear water into the City of Minneapolis local sewer system creates two problems. First, the additional flow takes up capacity that was originally designed for growth. Second, the City is being charged for treatment of this clear water flow.

MCES has established I&I goals for all communities discharging wastewater into their treatment system. All communities that exceed their goals are required to develop and implement a program to reduce their I&I to the established goal no later than 2012. MCES has initiated a surcharge program in 2007 to collect revenue for the community to use for solving its I&I problem. MCES has calculated the City of Minneapolis surcharge to be

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\$7.231 million for 2007. However, if the community develops and initiates a successful I&I program, MCEs will waive its surcharge. The City has established its I&I reduction program so that it can proactively plan and implement an I&I reduction program to meet its goal within the specified timeframe and not have to participate in MCEs's surcharge program.

I&I Program Funding (amounts in \$1,000 increments)

	2007	2008	2009	2010	2011
Approved Budget for Capital Projects	\$5,000				
Future Budget for Capital Projects (not yet approved)		\$5,000	\$5,000	\$5,000	\$5,000
Total Program Funding	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000

CSO Program - Phase II Funding (amounts in \$1,000 increments)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Actual Operating Expenses	\$278	\$931	\$1,158	\$1,210	\$1,207					
Budget for Operating Expenses						\$1,172	Not yet determined			
Approved Budget for Capital Projects	\$0	\$2,000	\$2,000	\$2,000	\$0	\$1,000				
Future Budget for Capital Projects (not yet approved)							\$1,375	\$875	\$875	\$875
Total Program Funding	\$ 278	\$2,931	\$3,158	\$3,210	\$1,207	\$2,172	Not yet determined			

RAINLEADER DISCONNECTION PROGRAM

The 2006 Rainleader Disconnect Program (RDP) staff totaled 11 employees, including the Program Manager, 7 RDP field inspectors and 3 administrative positions.

The objective of the RDP is to identify and disconnect all private sources of clear water inflow to the sanitary sewer system in Minneapolis. Minneapolis Regulatory Services, Environmental Management & Safety Division, in coordination with Minneapolis Public Works (MPW), is responsible for managing the RDP.

An ordinance was drafted and approved, effective August 1, 2003, called [***Chapter 56: Prohibited Discharges to Sanitary Sewer System***](#). Previous City ordinances and state plumbing codes affected only new

construction, not existing connections. Revisions to Chapter 56 were approved in 2006 that were designed to accelerate compliance. These included adding Chapter 2 Administrative Citation enforcement, adding the ability to order connection to the City storm drain as the disconnection method, and utilizing assessments to cover disconnection costs.

Under the Chapter 56 ordinance, prohibited connections include both new and pre-existing roof drains, area drains, and other clear water connections, such as sump pump and foundation drains. Property inspections for private stormwater connections to sanitary sewers began in February 2003. A summary of the inspections follows here:

In 2006, 20 neighborhoods were inspected. There were 21,105 parcels inspected, with a total of 946 violations found. Of these 946 violations, 489 were inflow violations (prohibited connections to the sanitary sewer), and 457 were non-inflow violations (disconnections that had been completed in such a way that they could be easily reconnected).

Institutional Inspections → The RDP continued a joint inspection program with the University of Minnesota Environmental Health and Safety department. The Mall area was inspected in 2006.

Public Works Street Projects → Four street projects were inspected in 2006. Inspections were undertaken in advance of planned street reconstruction and renovation projects. These inspections provided property owners with sufficient notice to plan disconnection work in conjunction with MPW operations. This saved property owners money on street restoration costs and minimized the damage to newly constructed road surfaces.

Minneapolis Development Review (MDR) Inspections → Property inspections are conducted for the weekly MDR meetings. Many properties reviewed by MDR have already been inspected during previous RDP inspections. If not already inspected, an inspection is performed, and results for all non-compliant properties are forwarded to Minneapolis Public Works (MPW). If improper connections to the sanitary sewer are discovered, the RDP initiates the standard 'Notice to Disconnect' process.

Cross - Connection Inspections → In 2006, RDP staff assisted MPW with the investigation and resolution of two instances of sanitary flow into the City's storm system. Corrective action was aggressively pursued to remove these illegal connections.

CAPITAL IMPROVEMENT PROJECTS AND MAINTENANCE PROGRAMS

MPW Engineering Services staff have identified, categorized, and prioritized 126 CSO areas since Phase II started. Of those 126, 47 have been completed or resolved. Additionally, 8 new CSO areas were identified in 2006. The CSO Program coordinates with the Minneapolis Capital Improvement Project schedule to ensure that any CSO areas within construction limits of a pending capital project are addressed in conjunction with that project's schedule. Occasionally, new CSO areas are discovered by Engineering Services or Sewer Maintenance staff. This information is a result of:

- Private sewer and water connection reviews (for possible combined connections) are done prior to issuing any new/repair permits
- Utility and plumbing inspector's identification of CSOs as part of their current activities
- Continued education of City staff on the importance of identifying and disconnecting CSOs

Following is a list of public separation work completed in 2006:

CSO ID	CSO Area Location	Acres Separated
CSO Area 006	4th St SE, Central Av SE to E Hennepin Av	0.53 acres
CSO Area 021	N of E Lake St, E & W of Columbus Av	4.66 acres
CSO Area 026	W 45th St, Lyndale to Garfield Av S	11.10 acres
CSO Area 057	1st Av NE & E Hennepin, on University NE	0.75 acres
CSO Area 071	Linden Av & 16th St N	1.80 acres
CSO Area 079	27th Av S & 27th St E	0.42 acres
CSO Area 123	Benjamin & Cleveland St NE @ 37th Av NE	0.36 acres
	Total Acreage	19.62 acres

Some properties that are required to disconnect stormwater from the sanitary sewer have no storm drain in close proximity. When there is no green space to redirect the stormwater, such as in commercial areas or downtown, storm drain infrastructure needs to be built to accomplish the disconnection. No new or upgraded public storm drains were constructed in 2006 for private separation of storm and sanitary.

ADDITIONAL CSO EFFORTS

These activities directly or indirectly benefit the elimination of CSOs:

Sanitary System Maintenance

- Inspections of infrastructure to determine needed repairs
- The annual pipe rehabilitation program
- Repairs and bulkheading of sanitary pipes where an overflow previously existed
- Replacement of sanitary manhole covers (with more than one hole) in ponding areas. Approximately 700-800 manholes have been replaced thus far.

Sanitary System Modeling

Understanding the City's sanitary system performance during wet weather conditions is necessary to controlling CSOs. A pilot project modeled the Bryn Mawr area interceptor, as well as the contributing sanitary pipe network. This pilot project will help to determine parameters to be used in a citywide sanitary modeling effort, as well as to estimate reduction of inflow after CSO separation in those areas. Development of a citywide sanitary model would help to evaluate:

- The value of inline storage, including analyzing the capacity of the large, older combined sewers is not being utilized (Partially due to CSO Program efforts and CSO areas already separated)
- Unknown sources of I/I
- Peak flow factors due to industrial sources

Regulatory CSO Efforts

Minneapolis Regulatory staff assists the CSO Program in locating, investigating and resolving areas through the review of record drawings, or through the preliminary development review process. Regulatory initiatives include:

Minneapolis Development Review (MDR)

MPW staff continued to require complete separation of all sites that are reviewed by the MDR committee. This included the following combined connections:

- Roof drains

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- Surface parking lots
- Uncovered rooftop parking ramps
- Loading docks and area drains
- Internal drains
- Sump pumps
- Permitted non-stormwater clean water connections (cooling, heating, etc.)

New Combined Sewer Overflow Area Identification and Separation

Storm and sanitary record drawings are reviewed to identify instances of connections between sanitary sewers and storm drains that might have been missed during Phase I of the CSO Program. Questionable areas are investigated and field verified.

The amount of acreage still connected to the sanitary system continues to decline, as does the number of cross-connections. 2006 estimates were minimal, a good indicator that the City is nearing completion for this activity.

Temporary Connections or Overflow Inspections

Engineering Services staff has identified all currently known temporary connections or overflows that should have been eliminated with the program. These connections are verified and our sewer database is updated.

Additional Regulatory Initiatives

- The City will continue to review sewer and water connections for possible combined connections before issuing any new or repair permits for those properties.
- City utility and plumbing inspectors continue to identify and report combined systems as part of their current work duties.
- Continued education of City staff from Engineering Services, Planning, Regulatory Services and Zoning departments on the importance of eliminating combined sewer connections.

REGULATOR ELIMINATION AND MAINTENANCE

A regulator is a device installed in combined systems to control the amount of flow into the sewer system during periods of wet weather. Excess flows are routed to an outfall. In 2006, no regulators were closed.

Oak Street SE Outfall M012 (R20) is the one remaining regulator owned by the City. Monitoring for overflows was implemented in 2002. Additionally, CSO Area 56 (which is responsible for more than 13 acres draining to the sanitary system) drains to Outfall M012. Monitoring at Outfall M012 will continue until this CSO area is resolved. The schedule for the South East Minneapolis Industrial (SEMI) project will affect the CSO related portion of SEMI. Once this CSO area is resolved, short term monitoring should confirm that this outfall could be closed.

The remaining regulators in Minneapolis are controlled by MCES, and will require monitoring before they can be eliminated. In some cases, regulators may need to remain as emergency bypasses.

Minneapolis Flood Mitigation Program

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MINNEAPOLIS FLOOD MITIGATION PROGRAM

Construction of projects from the Flood Mitigation Program has the benefit of reducing I/I to sanitary system. The following flood control projects were partially constructed or completed in 2006:

PROJECT AREA	MITIGATION MEASURE	STORMWATER RUNOFF BENEFITS
Flood Area 1, 42 nd to 43 rd Av N, from James to Russell Av N	Construction of 8-acre pond and 3,000 feet of new storm drain	Safe conveyance of stormwater, flood mitigation, and water quality enhancement through removal of nutrients and metals from stormwater
Flood Area 19, W 44 th St & Aldrich Av S	Increased pipe capacity, reconstruction of outfall, addition of grit chamber	To prevent further erosion to the outfall area and reduction of sediment and floatables at outfall. Downstream construction of storm drain infrastructure to receive flow from FA24/CSO Area 26.
Flood Area 27, Phase II, 28 th Av S, E 38 th to 40 th St	Increased storm system capacity due to box culvert installation	Reduce I/I to the sanitary system

There are no flood mitigation projects slated for construction in 2007.

SANITARY SEWER COLLECTION SYSTEM

The Sewer Maintenance department routinely inspects sanitary infrastructure, and performs needed maintenance to ensure proper operation. The City maintains over 832 miles of sanitary sewers. Minneapolis Sewer Maintenance staff has divided the City into 100 areas for their sewer main cleaning program. This program is significant to the CSO program because it uncovers and reveals I&I. Sewer mains are cleaned by different methods including jetting, discing or rodding. Annual records are kept that describe the condition, as well as the cleaning that was done for that year. City staff also utilizes GIS to create maps to better track progress.

Each year, sanitary sewers are selected for cleaning on the basis of past experience, pipe size and location (in relation to flood-prone areas and poor soil conditions). Some mains are cleaned annually, but occasionally additional cleanings might be needed.

The 10 sanitary pump stations in the City are cleaned each spring, and then checked weekly to determine if additional cleaning is needed. In addition to cleaning, maintenance in 2006 also included:

- 20 major sanitary sewer repairs
- A total of 17,947 feet (3.4 miles) of sanitary sewer lined with a cured-in-place liner. Of that total,
 - 115 feet (.022 miles) were cement oval sewers
 - 17,832 feet (3.38 miles) were clay sewers
 - 0 feet (0 miles) were galvanized sewers
- 280 (requested by residents) possible sanitary backups were inspected
 - of those 280 backups, 21 were found to be plugged & were repaired, and 259 were private property issues
- 5,452 problematic sanitary locations were inspected
- 17 sanitary cave-ins were addressed
- 172 minor sanitary repairs were addressed
- 510 miles of sanitary sewer were jetted with high pressure forced water
- 0.5 miles were jetted and vacuumed
- 23.65 miles of sanitary sewer were rodded (cleaned)
- 8.46 miles of sanitary sewer were disced (sand/debris related)
- 5.43 miles of sanitary sewer were flushed and examined
- 36.57 miles of sanitary sewer were televised

STORM DRAIN COLLECTION SYSTEM

The Sewer Maintenance department also routinely inspects storm drain infrastructure, and performs needed maintenance to ensure proper operation. Inspection and maintenance frequency are event-driven, based on experience and inspection results history.

There are currently 142 grit chambers in Minneapolis, which help in sediment, debris, and oil collection. This number has increased each year. These grit chambers are inspected each spring and fall, and cleaned if necessary. Sediment is removed, the presence of floatables is noted, and the grit chamber cleaning dates are logged. This data are then compiled into a database, which is maintained by the Sewer Maintenance department.

Storm drain outfalls are inspected on a five-year schedule, generating information on:

- Condition of structures
- Significant erosion
- Any necessary repairs

Grit chamber maintenance and repairs are planned within the constraints of resources, budget, as well as the schedules of other operations. Ponds and pump stations are inspected after a significant rainfall event; however, other events might require a maintenance response.

Catch basins are cleaned, removing accumulated sediment, trash and debris. This prevents pollution of receiving waters and minimizes flooding problems. Street Maintenance performs annual inspections during which they clean catch basin grates on summer street sweeping routes, removing debris and sediment from blocked structures.

Statistics for the 2006 Sewer Maintenance program:

- Completed 2 major storm drain repairs
- 283 feet (.053 miles) of storm drain sewer was lined with a cured-in-place liner
- Inspected 157 and cleaned 114 grit chambers. A total of 859 cubic yards was removed and properly disposed of.
- Maintained 10 stormwater holding ponds (same as 2005)
- Inspected 70 of 387 storm drain outfalls. Of those inspected,
 - 18 needed maintenance or repair
- Monitored and maintained 25 pump stations