I. Executive Summary

Report Objective

This report is prepared in compliance with the requirements of NPDES (National Pollutant Discharge Elimination System) Permit No**.** MN0061018.

Background

The NPDES program was created in 1990 by the United States Environmental Protection Agency (EPA) to safeguard public waters through the regulation of the discharge of pollutants to lakes, streams, wetlands, and other surface waters. The Minnesota Pollution Control Agency (MPCA) is the local authority responsible for administering this program. Under this program, specific permits are issued to regulate different types of municipal and industrial activities.

The MPCA issued the first Municipal Separate Storm Sewer System (MS4) NPDES Permit to the City of Minneapolis on December 1, 2000. This Permit requires the implementation of approved stormwater management activities, referred to as Best Management Practices (BMPs). These efforts must be documented in the form of a Stormwater Management Program and Annual Report, which is due on June 1 of each year. The Permit also requires public input in the development of the priorities and programs, and adoption by City Resolution of the Annual Report as the City's Stormwater Management Plan. This Report presents the activities that will be implemented this year, and provides documentation and analysis of the activities conducted during the previous year.

The Minneapolis NPDES Stormwater Management program is developed and administered by the City departments/agencies that are responsible for permit activities. Included are the Minneapolis Park and Recreation Board (MPRB), and the City of Minneapolis Departments of Public Works and Regulatory Services. These stakeholders are jointly responsible for the completion of the required Permit submittals. Public Works provides program management and completes each Annual Report.

2007 Highlights and 2008 Work Plan

Storm Drain System Operational Management and Maintenance Program

The NPDES Permit objective for this program is to minimize the discharge of pollutants through the proper operational management and maintenance of the City's storm drain system. Routine maintenance in 2007 included 329 minor repairs and four major repairs to the storm drain system. In

2008, the program will continue to perform its routine functions, respond to emergencies or random events, and aim for removing inflow sources from the sanitary sewer system.

Structural Controls Operational Management and Maintenance Program

Within the City's storm drain system are structural controls that affect system flow rates and water quality discharges. Structural controls include grit removal structures, stormwater retention and detention ponds, storm drain inlets and outfalls, level control weirs, and pump stations. These components are routinely inspected and maintained to ensure proper operation and reliability.

In 2007, 113 of 387 (or about 30%) storm drain outfalls were inspected, and 12 were judged to be in need of maintenance. Of the outfalls needing maintenance, 9 had repairs completed in 2007 with the remaining scheduled for repairs in early 2008. In 2008, in addition to routine operational management and maintenance, we are focusing on improvements to consistency of pond and pump maintenance, and on improving the condition assessment of, and long-term budgeting for, pump station operations and maintenance.

Disposal of Removed Substances Program

A key component of this program is to minimize the discharge of pollutants by proper collection and disposal. Targeted pollutants are collected from grit removal structures, inlet structures, system piping, detention ponds, and deep drainage tunnels. In 2007, the removed material consisted primarily of sand and vegetative matter collected from grit removal structures. Contaminated substances are disposed of at an MPCA-approved site. Non-contaminated removed materials are combined for disposal with similar materials from street sweeping operations (see 'Roadways', below). In 2007 the inorganic materials were sent to Becker MN for use as landfill daily cover, and a Hutchinson MN contractor used the organic materials in production of compost for resale. Disposal of removed substances will continue, however because of budgetary constraints, there is currently a reduced effort in removing substances from system piping and deep drainage tunnels.

Stormwater Management for New Developments and Construction Program

The objective of this stormwater management program is to minimize the discharge of pollutants through the regulation of construction projects and new developments. Proposed construction activities are reviewed through the City's Development Review process for compliance with the Erosion & Sediment Control Ordinance, Minneapolis Code of Ordinances [MCO] Chapter 52. Development projects are reviewed for long-term stormwater management strategies including ongoing operation and maintenance commitments, in compliance with the Stormwater Management Ordinance, MCO Chapter

54. Projects are also reviewed for any combined sewer issues (in part, MCO Chapter 56) and for any flooding and capacity issues.

Redevelopment of existing sites provides an opportunity to lessen the impacts of urbanization on the Mississippi River and other Minneapolis water resources. During 2007, over 190 site plans were reviewed in connection with stormwater management requirements (down from over 250 in 2006, with the reduction apparently due to the economic downturn for housing and other development projects). During 2007, projects that had been reviewed during the Minneapolis Development Review process installed 52 Stormwater Best Management Practices (BMPs) on 35 sites (down from approximately 100 BMPs in 2006 on 70 sites, again with the reduction apparently due to an economic downturn for housing and other development projects). BMP types included rain gardens, pervious pavement, infiltration areas, ponds, and underground detention facilities. It is estimated that these BMPs will provide rate control and water quality improvement for approximately 75 acres of land.

In 2008, a proposal is under consideration to require construction bonds to be posted from contractors to assure effective erosion and sediment control compliance and site completion, and also to facilitate the removal of temporary erosion controls at the completion of construction activities. Our 2008 workplan also includes improved data collection, tracking and analysis for improved understanding of water quality impacts and costs.

Roadways Program

The objective of this stormwater management program is to minimize the discharge of pollutants through the proper operation and maintenance of public streets, alleys, and municipal equipment yards.

Street Sweeping

Minneapolis employs several street sweeping approaches in Minneapolis. Curb-to-curb sweeping operations occur citywide every year in the spring and fall. At those times, all City streets and alleys are swept systematically, and temporary parking bans are enforced to aid with sweeping operations. During the summer, between the spring and fall sweep events, sweepers are use for periodic sweeping of maintenance districts, downtown and other high traffic commercial areas, the Chain of Lakes drainage areas, and the Minneapolis Parkway System. In Fall 2007, over 3,300 tons of leaves were collected during the fall citywide sweeping and were sent to processing as compost. During Spring and Summer 2007, over 17,000 tons of materials were collected. A portion of this volume is assumed to be reclamation of sand applied to roadways for snow and ice control.

Snow and Ice Control

The Street Maintenance section applies salt and sand to City roadways every winter. Salt can cause damage to various types of infrastructures, as well as be harmful to groundwater, surface water, plants, and trees. The 2006-2007 winter season was colder than the year before with a number of large snow events along with fewer minor events. In 2007, the EPA approved a Total Maximum Daily Load study for chlorides (salt) that are an impairment to Shingle Creek, and the improved snow and ice control practices that the City had developed for Shingle Creek are also being implemented citywide. In 2008, the City will continue to be watchful for any new technologies and pilot study opportunities.

Storage of De-icing Materials

In 2007 and 2008, a new, consolidated maintenance yard is being designed that will employ the most effective Best Management Practices (BMPs) available, including runoff collection systems that would be installed around salt and sand stockpiles, and truck washing areas.

Flood Control Program

The NPDES Permit objective of this program is to design flood control systems that manage stormwater quantities so that the runoff does not exceed the capacity of the existing facilities while minimizing the impacts on the water quality of the receiving water body.

The Flood Mitigation Program began in 1998 and was originally scheduled to run through 2009. However, due to the state of the City's available finances, this Program has been temporarily suspended. Due to changes that the anticipated Total Maximum Daily Load (TMDL) standards will impose on new designs, current flood mitigation strategies are changing. The new type of project tries to achieve the three R's or the three *REDUCTIONS* of *VOLUME*, *RATE* and *LOAD*. This is a dramatic change in design development and a departure from past strategies of enlarging pipes to drain more stormwater faster. New techniques focus on green initiatives that treat stormwater where it falls and try to avoid the need for new or larger pipes.

In 2007, the City completed construction of three flood mitigation projects. In 2008, planning is underway for two additional flood mitigation projects.

The City's Flood Control Program is a companion to the Combined Sewer Overflow (CSO) Program and the Infiltration and Inflow (I & I) Program. Studies show that the City has a problem with inflow (stormwater that drains to the sanitary sewer system). Unfortunately, successful completion of CSO and I & I projects can be a burden for the Flood Control Program, because of additional volume. In

2007, the City removed 137-acre feet of inflow, thus the storm sewer system received 137 more acre-feet of runoff that had previously discharged to the sanitary sewer.

Pesticides and Fertilizer Control Program

The objective of this stormwater management program is to minimize the discharge of pollutants by controlling the application of pesticides and fertilizers.

The MPRB manages 6,400 acres of park land in the City of Minneapolis (approximately 18% of the City's 35,244 total land acres). In 2007, 205 MPRB employees held pesticide applicator licenses through the Minnesota Department of Agriculture.

In 2007, populations of beetles released for purple loosestrife control continued to maintain themselves, reducing the need for chemical spraying. Also in 2007, many Minneapolis suppliers are offering a wider range of zero-phosphorus turf fertilizers. In 2008, MPRB is expanding its documentation regarding the use of pesticides and fertilizers by City departments and agencies will be expanded. This information already exists for MPRB facilities. Information is being collected for other facilities within the City, including those managed by the Minneapolis Community Planning & Economic Development Department (CPED) and Property Services Division of Public Works, the Minneapolis Public Housing Authority, and the Minneapolis School Board.

Illicit Discharges and Improper Disposal to Storm Sewer System Program

The NPDES Permit objective of this program is to minimize the discharge of pollutants by implementing a program to detect and mitigate illicit discharges, and to encourage that an appropriate permit be obtained for non-stormwater discharges.

Environmental Services and the Minneapolis Fire Department personnel typically serve as the first responders to a spill event. The immediate goals of this response include spill containment, recovery of hazardous materials, and collection of data for use in assessment of site impacts. Recovery efforts can take several forms, but typically fall into two broad categories: recovery for re-use, or the use of absorbents or other media to collect hazardous waste for disposal.

In 2007, 100 calls for emergency response were successfully addressed, including containment of spills and response to chemical dumping, illegal disposal or handling of regulated or hazardous materials. In 2007 and 2008, GIS mapping is being implemented as a tool to support these activities.

Storm Sewer Design for New Construction Program

The City currently has a five-year focus on the reduction of inflow (stormwater directly connected to the sanitary sewer, streets, roof drains, foundation drains, etc.) and infiltration (groundwater leaks through sewer pipe joints and cracks, tree roots in the sanitary sewer system). The program focus is due to the Metropolitan Council Environmental Services (MCES) Inflow & Infiltration (I&I) Surcharge Program introduced in 2006 that established a mitigation fee (a "surcharge") of $350,000 per million gallons per day (MGD) of excess flow in the sanitary sewer system to the MCES treatment plant. At that time MCES determined that the City had 112.7 million MGD of excess flow. To forgo the surcharge, the City needs to identify and eliminate the sources of inflow and infiltration. The surcharge program requires that the City make progress in removing 20 percent of the excess flow each year from 2007 to 2011.

Based on volume, roughly half of the sources of the inflow have been identified. The principal work is elimination of public and private stormwater inlets or rainleaders connected to the sanitary sewer. The work of identifying the remaining sources is continuing. The City's success with the reducing I & I into the sanitary sewer system has increased the flow rates in the stormwater management system.

During the next five years, the removal of I & I from the sanitary sewer system, including Combined Sewer Overflow (CSO projects), will be the primary concentration. Mitigation begins with an effort to reduce the volume of runoff. Options that reduce volume must have space within the right-of-way or must have an off-site area, with suitable soils for volume reduction in either case. Next, load reduction options are investigated, using recognized Best Management Practices (BMPs) such as prefabricated swirl-type grit chambers, biofiltration or ponds. Space constraints in fully developed urban areas like Minneapolis limit the majority of projects to use of compact prefabricated BMPs for load reduction.

In 2008, Minneapolis is also studying the feasibility of incorporating pervious concrete and underground stormwater storage as a pilot project along a four-block segment of West 54th Street. This approach is designed to reduce stormwater volume discharging to Minnehaha Creek by increasing evapotranspiration and infiltration, to control rate of stormwater discharge, and also to remove pollutants from the stormwater prior to discharge to the creek.

Public Education Program

The City of Minneapolis and the MPRB's Public Education Program promotes, publicizes, and facilitates proper management of stormwater discharges to the storm sewer system. The program's main focus is to educate Minneapolis residents, business owners, employees and visitors about stormwater. The program's goals include showing how *everyone's* actions affect the quality of our lakes, wetlands,

streams and the Mississippi River, and how to reduce the discharge of pollutants to our receiving waters. The desired result is to change behavior in ways that will improve water quality.

Ongoing activities address water quality education about erosion and sediment control, proper application of pesticides and fertilizers, proper use of the stormwater system to avoid illicit discharges and reduce pollutants, reducing overall imperviousness, yard care, on-site stormwater management, and other measures that impact pollution.

Year 2007 highlights included ongoing use of popular mobile, multi-language water education kiosks, development of a multi-language/multi-cultural watershed education video, the Sewer Rats Program at 21 recreation centers, Earth Day Watershed Clean-up, naturalist activities, a rain barrel program, rain garden workshops, and launching of a campaign to 'get your butt off the street' - targeting cigarette butt litter in downtown Minneapolis.

In 2008 most of these activities will continue. Release of the Multi-Cultural Watershed Education Video is targeted for Fall 2008. Additionally, interpretive signage is being designed for installation at key public stormwater management sites, with project information and a self-guided tour of the sites that will appear on the City's web site.

Public Participation Process Program

The City of Minneapolis and the MPRB are the joint holders of the NPDES Permit, and the Annual Report is a coordinated effort by various City departments and the MPRB. The Permit requires an opportunity for public input in the development of the priorities and programs necessary for compliance. Information in the Annual Report covers the activities that will be implemented for the current year, and provides documentation and analysis of the activities conducted in the previous year.

Each year, the City holds a public hearing at a meeting of the Transportation & Public Works Committee of the City Council. The hearing provides an opportunity for public testimony regarding the Program and Annual Report prior to report submittal to the Minnesota Pollution Control Agency.

A notice of the availability of the draft Report for review and public comment was sent to all 81 Minneapolis neighborhood organizations, to the governmental entities that have jurisdiction over activities relating to stormwater management, and to other interested parties. The notice was sent by e-mail and included information for accessing or obtaining the draft Report, and for providing comments either in writing or in person at the public hearing. Once finalized, the Annual Report is also made available on the web site for viewing or downloading. The City Clerk's office also keeps copies of the Annual Report on hand for examination by the public, prior to the hearing date and for a period thereafter.

The public hearing was held on May 6, 2008. No testimony or questions were presented. Written comments were accepted until Friday, May 9, 2008. Only one question was submitted, as follows:

> *If you have 6 crews of 2 people each for cleaning storm water pipes and they cleaned 4.91 miles of pipe and it only cost $3,473 per mile (less than $15,000) seems like there is a disconnect. Where are the people and truck costs?*
>
> *If you have 2 crews of 2 people each to televise pipe and they televised 1.17 miles at 1.19 per foot ($7.351.34) where are the people and truck costs?*

Minneapolis Public Works prepared the following response:

> *This question pertains to wording of the DRAFT Annual Report, Section II., Storm Drain System Operational Management and Maintenance (Performance Measures).*
>
> *For the first part of the question, the draft language stated, "Miles of storm drain cleaned per year: 4.91 miles @ $3,473/mile".*
>
> *The final version has been corrected to state, "Miles of storm drain cleaned per year utilizing hydro-jet washing: 4.91 miles @ $3,473/mile."*
>
> *Hydro-jet washing is one component of storm drain system cleaning. It is done with two people at roughly $40/hr. and a truck at roughly $20/hr., and is only used for certain small diameter pipes that have relatively small amounts of sand build-up in them. Additionally, cleaning the storm drain system consists of removing trash from catch basins, shoveling sand/grit from large diameter pipes, and removing trash and other solid debris from inside pipes.*
>
> *For the second part of the question, the Annual Report (both the draft and the final versions) states, "Miles of storm drain televised per year: 1.17 miles @$1.19".*
>
> *The unit cost is for running a remote-controlled camera through a pipe. We do this work with two people and a truck, again at a cost of roughly $40/hr. for each person and roughly $20/hr. for a truck. The unit cost of $1.19 per foot does not include cleaning, engineering evaluation or any other investigatory work.*

Coordination with Other Governmental Entities Program

The objective of this program is to maximize stormwater management efforts through coordination and partnerships with other governmental entities. Coordination and partnerships of the City and the MPRB with other governmental entities include the four watershed organizations in Minneapolis: Bassett Creek Water Management Commission, Mississippi Watershed Management Organization, Minnehaha Creek Watershed District, and Shingle Creek Watershed Management Commission.

Coordination activities and partnerships with other governmental entities also include MnDOT, MPCA, neighboring cities, the Metropolitan Council, and various other entities. The coordination can include the joint review of projects, joint studies, joint water quality projects, stormwater monitoring, water quality education, and investigation or enforcement activities. In 2007, participation with other governmental entities in Total Maximum Daily Load (TMDL) studies and implementation plans became a significant new Work Plan component, and this will continue into the foreseeable future.

In 2008, the City will submit its Minneapolis Local Surface Water Management Plan (LSWMP), adopted by the City in October 2006, to the Metropolitan Council as a component of the City's updated comprehensive plan, The Minneapolis Plan For Sustainable Growth. The LSWMP was developed to meet the requirements of Minnesota Statute 103B, as well as to provide a resource for City staff. The LSWMP plan serves as a guidance manual for handling regulatory requirement issues, planning for and managing surface water resources and stormwater and sanitary sewer infrastructure, and also for stormwater management for development and redevelopment. The intent of the LSWMP is to benefit stormwater management within Minneapolis, and to improve both the coordination and effectiveness of efforts by the City, the MPRB, and the WMOs.

The LSWMP was prepared to guide the City in conserving, protecting, and managing its surface water resources. Contributors included various City departments, MPRB, MCES, and the four watershed organizations in Minneapolis. The LSWMP brings together all water resources issues and activities, and identifies improvements, gaps or overlaps that will help to better manage the City's water resources and attain overall goals.

Stormwater and Water Quality Monitoring - Results and Data Analysis Program

The Minneapolis Park & Recreation Board's annual *2007 Water Resources Report* is a comprehensive technical reference of water quality information for the citizens of Minneapolis. Due to the length of this document, only excerpts related to the NPDES stormwater runoff monitoring and BMP monitoring sections are included in the Annual NPDES Report. Electronic copies of the *2007 Water Resources Report* are available on the MPRB web page at *www.minneapolisparks.org*. Reports are also available to be checked out from every public library in Minneapolis. A CD-ROM copy of the entire report can be obtained by contacting the MPRB Water Quality Section at (612) 230-6400.

For required NPDES monitoring sites, storm event samples were collected May through November, and two snowmelt grab samples were collected in February and March. The target frequency for sample collection was once a month. The total volume sampled for each site, and the total recorded volume, is given in Table 23B of Appendix A, along with the percentage sampled per season. For

detailed information on sampling events see Table 23C of Appendix A. The parameters listed in the Limits and Monitoring Requirements section of the permit were monitored for each sample collected. Multiple bacteria grab samples were taken throughout the season, using standard protocols.

Best Management Practices (BMPs) include procedures and structures designed to help reduce water pollution. For monitoring of BMPs, in 2007 the MPRB monitored two of the City of Minneapolis' stormwater ponds located in north Minneapolis at Heritage Park. Monitoring will continue and expand in 2008. These data will be used to These data will be used to assess and give an indication of the baseline efficacy of the Heritage Park and Heritage Common BMPs and will be compared to data collected in later years.

For lake monitoring, in 2007 thee MPRB scientists monitored 12 of the city's most heavily used lakes. The data collected were used to estimate the fertility or Trophic State Index (TSI) of the lakes. Historical trends in TSI scores are used by lake managers to assess improvement or degradation in water quality. All the lakes in Minneapolis fall into either the mesotrophic or eutrophic category, which is as expected for lakes in a fully developed urban area. Calhoun, Cedar, and Harriet Lakes are mesotrophic with moderately clear water and some algae. Brownie, Isles, Hiawatha, Nokomis, Spring, Loring and Powderhorn Lakes are eutrophic with higher amounts of algae. Wirth Lake and Webber Pond fluctuate between these two categories. Trends in lake water quality can be seen by using the annual average TSI score over the last 14 years. Lakes showing water quality improvement included Calhoun, Cedar, Harriet, Powderhorn, Wirth and Webber Pond. Lakes with stable water quality included Brownie, Nokomis, Hiawatha, Isles and Spring.

Storm Drain System and Drainage Areas Inventory Program

The City of Minneapolis storm drain system handles runoff from approximately 50 square miles, and is the key element in ongoing efforts for flood protection and programs to improve and maintain water quality for the City's wetlands, lakes and streams. The City contributes stormwater runoff to Minnehaha Creek, Bassett Creek, Shingle Creek and Mississippi River watersheds.

The system includes main line storm drain piping, deep drainage storm tunnels, catch basin runs, outfall control structures, pump stations, and numerous Best Management Practices (BMPs) including ponds, wetlands, grit chambers and so on. The total replacement cost of the City's storm drain system exceeds $860 million (based on year 2000 dollars). Not included in the City system are facilities owned and operated by MnDOT, Hennepin County, and the University of Minnesota.

Calculations of seasonal loads for 2007 were calculated on the following basis:

Season	Inclusive dates	Precipitation, National Weather Service
Winter/snowmelt	01/01/07 – 03/31/07	**5.32 inches (0.135 m)**
Spring	04/01/07 – 05/31/07	**3.10 inches (0.079 m)**
Summer	06/01/07 – 08/31/07	**14.66 inches (0.372 m)**
Fall	09/01/07 – 12/31/07	**11.24 inches (0.285 m)**

For a summary of activities and responsible departments for each Section of this Report, refer to **Appendix A45**.

II. Storm Drain System Operational Management and Maintenance

Program Objective

The objective of the NPDES stormwater management program is to minimize the discharge of pollutants through the proper operational management and maintenance of the City's storm drain system. Targeted pollutants include:

- Sediment
- Nutrients
- Floatable Garbage

Program Overview

The City's storm drain system is operationally managed and maintained by the Construction and Maintenance sections of the Surface Water and Sewers Division. Design engineering and regulatory issues are managed by the Division's Capital and Regulatory sections.

The current total authorized staffing level of the Construction and Maintenance sections together is approximately 96 full time employees. Of this, there are currently 50 permanent, full time and 2 seasonal employees working directly within the operations and maintenance area. General operations and maintenance efforts includes; pump station and pipeline inspections, pipeline cleaning, system repairs, rehabilitation or reconstruction, inspection and operation of control structures, operation of pump stations, cleaning of water quality structures, and operational management of stormwater detention ponds. The table below shows the base operational functions along with the corresponding staffing:

Crews	Staff/crew	Type	Tasks
4	2	Route Truck	Daily pipe line system inspections, complaint response, and resolution to minor system operational problems
6	2	Jet Truck	"As-requested" cleaning of storm system components, routine cleaning of sanitary system pipes, and "as-requested" cleaning of pump/lift stations. Hydro jet-wash technique.
2	2	TV Truck	Televise and inspect storm drain and sanitary sewer system components. Log and assess condition of televised lines to determine and prioritize rehabilitation and/or repair needs to storm drain and sanitary sewer system components.
2	2	Repair Truck	Perform medium-sized repairs, requiring minimum excavation, to storm drain and sanitary sewer system pipeline components. May assist in the repair or reconstruction of larger repair/ reconstruction jobs.
3	2	Vacuum Truck	Vacuum-cleaning of water quality structures, manholes, and catch basins within the storm drain system. Assist in sanitary sewer cleaning by vacuum removal of sludge and debris build-up. Assist in repair/ construction activities using vacuum excavation process. Assist in erosion control compliance using vacuum cleanup of eroded soils and/or cleaning of erosion control structures.
1	2	Rod Truck	Remove roots and foreign objects from sanitary sewer system. Remove large debris from storm drain pipes and free ice from frozen catch basin leads.
1	3	Pond & Pump	Operate, maintain, and repair sanitary lift station and stormwater pump stations. Operate and maintain stormwater detention basins.
1	3	Shop	Perform general maintenance and repair to specialty use vehicles and emergency response equipment. Fabricate, as needed, custom metal and wood objects for sewer and storm drain operations. Provide field deliveries of materials, tools, and equipment. Maintain material inventory and fleet management data.

Previous Year Activities

Some of the more noteworthy 2007 cleaning and repair statistics are summarized in the following list:

- Responded to 867 complaints of plugged or backed-up catch basins
- Responded to 27 complaints of cave-ins around catch basins and manholes
- Performed 329 minor repairs to storm drain lines, catch basins or manholes
- Completed 4 major repairs to the storm drain system
- Cleaned 4.91 miles of storm drain utilizing hydro-jet washing

- Televised and condition assessed 1.17 miles of storm drain pipe line

Work Plan

The Program will continue to perform its routine functions, respond to emergencies or random events, and aim for removing inflow sources from the sanitary sewer system.

Performance Measures

- Miles of storm drain televised per year 1.17 miles @ $1.19 / ft.
- Miles of storm drain cleaned per year utilizing hydro-jet washing: 4.91 miles @ $3,473 / mile

III. Structural Controls Operational Management and Maintenance

Program Objective

The objective of this NPDES stormwater management program is to minimize the discharge of pollutants through the proper operational management and maintenance of the City's storm drain system. Within the City's storm drain system are structural controls which affect system flow rates and water quality discharges.

Structural controls include:

- Grit Removal Chambers
- Stormwater Retention/Detention Ponds
- Outlet Structures
- Inlet Structures
- Pump Stations
- Level Control Weirs

Targeted pollutants include:

- Sediment
- Nutrients
- Floatable Garbage

Program Overview

Structural controls that are part of the City's overall storm drainage system are operationally managed and maintained by the Operation & Maintenance section of the Public Works Surface Water & Sewers Division. These components are routinely inspected and maintained to ensure proper operation and reliability. Frequency of inspections and assigned maintenance efforts are based on both operational experience and incurred environmental events. Structural controls are separated into five separate categories:

1. Grit Removal Structures

These are devices that have been installed for sediment, debris, and oil collection. The City continues with its effort to increase the number of grit chambers installed. The devices are inspected in the spring and fall of each year, and then cleaned, if required. The amount of sediment removed, the presence of floatables, and the dates that devices were cleaned are recorded on log-sheets, and then added to a database. Appendix A35 contains a list of these devices, and maintenance dates.

2. Storm Drain Outfalls

These are the structural ends of system pipelines where conveyance of stormwater runoff is discharged into receiving water bodies. Outfalls are inspected on a five-year schedule where 20% of the outfalls are inspected each year. Site inspections evaluate the general condition of structures, determine if any significant erosion has occurred and observe any contaminant discharges. When indications of illicit or otherwise contaminated discharges are observed, they are immediately reported to the Minnesota Duty Officer and the Minneapolis Regulatory Services – Environmental Section for further investigation and resolution. Any identified structural repairs or maintenance work is prioritized and scheduled within the constraints of available personnel, budget funding, and coordination with other essential operations. Appendix A36 contains maintenance information for these devices.

3. Pumps & Weirs

These are structural devices that mechanically affect the flow of stormwater runoff through the storm drain system. Pump stations are inspected on a monthly basis for routine operational checks and are inspected annually for detailed condition assessment. Maintenance and/or repairs are performed with routine items being completed as needed and larger items being coordinated into a budgeted pump station operation program. Weirs and outlet structures are inspected and repaired as needed to facilitate their proper operational working order.

4. Ponds

These are structural devices that detain stormwater runoff, and in some cases improve the water quality. Ponds are regularly maintained for volume and also for their park-like amenities including turf grass, pathways, benches, and lighting. Based on current level of experience, the need for dredging of sediment buildup appears to be in a 15- to 20-year cycle. At present, only a few of the City's holding ponds are at or near this age such that the need for sediment removal from them has been considerable.

5. Storm Drain Inlets

These are structural devices that provide entrance of stormwater runoff into the storm drainage system. They are catch basins located along the City's street system. There is no formalized inspection schedule, however Surface Water & Sewers crews and Street maintenance crews both routinely look for plugged or damaged structures. Reported damages and/ or plugs are given a priority for repair and/or cleaning. Cleaning catch basins, while ensuring proper runoff conveyance from City streets, also removes accumulated sediments, trash, and debris. Augmenting this effort is the street sweeping program carried out by the Street maintenance section, that targets the pick-up of street sands, leaves, and debris prior to their reaching catch basins. Repair of damaged catch basins is also a priority, given their location in city streets and ultimate impact to the traveling public.

Previous Year Activities

- Monitored and maintained pump stations.
- Inspected 180 and cleaned 127 grit chambers. A total of 634.5 cubic yards was removed. The majority are both maintained and owned/operated by Public Works, however some are owned/operated by others but cleaned by Public Works under contact.
- Maintained 10 stormwater holding ponds
- Inspected 113 of 387 storm drain outfalls in 2007 inspection program. Of the 113 outfalls inspected, 12 were judged to be in need of maintenance. Of the outfalls needing maintenance, 9 had repairs completed in 2007 with the remaining scheduled for repairs in early 2008.

Work Plan

Operational management and maintenance of the City's structural control devices will continue as in prior years. In 2008 we are also concentrating on improving the consistency of maintenance of stormwater ponds and pumps, and on improving condition assessment of, and long-term budgeting for, pump station maintenance and operations.

Performance Measures

Structures operated and maintained annually:

- 25 pump stations @ avg. cost $4,945 / station
- 10 stormwater holding ponds @ avg. $18,344 / pond
- 138 grit chambers serviced @ avg. $1,334 / chamber

IV. Disposal of Removed Substances

Program Objective

The objective of this NPDES stormwater management program is to minimize the discharge of pollutants through the proper operational management and maintenance of the City's storm drain system. A key component is the collection and disposal of targeted pollutants in a manner that will prevent pollution and that will comply with applicable regulations. Targeted pollutants include:

- Sediment
- Nutrients
- Floatable Garbage

Program Overview

Targeted pollutants are collected from grit removal structures, inlet structures, system piping, detention ponds, and deep drainage tunnels. Removed substances are screened for visual or olfactory indications of contamination. If contamination of the material is suspected, the Engineering Laboratory will select representative samples for an environmental analysis. Contaminated substances are disposed of in a landfill or another site that is approved by the Minnesota Pollution Control Agency (MPCA). Non-contaminated targeted pollutants are disposed of the same way as street sweepings, as reported in **Section VI. Roadways**. During cleaning and disposing operations, erosion control measures are applied when needed to prevent removed material from re-entering the storm drain system.

Previous Year Activities

Approximately 634.5 cubic yards of targeted pollutants were removed by Minneapolis Public Works crews from the City's storm drain system and from facilities in 2007. Minneapolis Public Works maintains this system & facilities for other agencies, such as Hennepin County and the Minnesota Department of Transportation. The removed material consisted primarily of sand and vegetative matter collected from grit removal chambers. See **Section III. Structural Control Operational Management and Maintenance** for operation and maintenance details.

Work Plan

Disposal of removed substances will continue as in years past with exception that budget cuts will require reduced effort in removing substances from system piping and deep drainage tunnels.

Performance Measures

- Quantity of materials removed: 634.5 cubic yards @ $88.62/cubic yard (includes labor costs for additional inspections)
- The Sewer and Storm Drains Section responded to, and subsequently mitigated, 6 contaminated substance/ hazardous waste spills in 2007.

V. Stormwater Management for New Developments and Construction

Program Objective

The objective of this stormwater management program is to minimize the discharge of pollutants, through the regulation of construction projects and new developments. Regulation includes erosion and sediment control, and approval of stormwater management including ongoing operation and maintenance commitments. Targeted pollutants include:

- BOD5[1]
- Nitrate + Nitrite
- Mercury
- Phosphorus
- TSS[2]

Program Overview

Minneapolis Code of Ordinances, Title 3, Air Pollution and Environmental Protection, contains erosion and sediment control requirements, and stormwater management instructions for new developments and other land-disturbing construction activities.

Site Plan Review

Construction activities and new development projects are reviewed through the City's site plan review process. The Minneapolis Development Review (MDR) facilitates this process where a Development Coordinator directs a preliminary, multi-disciplinary review of the submitted plans. This review provides comments that are integrated into a final plan submittal that is subsequently routed to the City's Licensing, Building Plan Review, Fire, and Community Crime Prevention units, and to the Public Works Department (Street, Traffic, Sidewalk, Water, Right of Way, and Surface Water & Sewers sections), for review of compliance issues. The Surface Water & Sewers Division reviews projects for compliance with the Erosion & Sediment Control Ordinance (Minneapolis Code of Ordinances (MCO) Chapter 52), Stormwater Management Ordinance (MCO Chapter 54), combined sewer issues (in part, MCO Chapter 56) and flooding and capacity issues.

[1] Biochemical Oxygen Demand of wastewater during decomposition occurring over a 5-day period
[2] Total Suspended Solids

Erosion Control

Ordinance

On May 16, 1996 the Minneapolis City Council amended Title 3 of the Minneapolis Code of Ordinances relating to Air Pollution and Environmental Protection by adding ***Chapter 52***, entitled "*Erosion and Sediment Control for Land Disturbance Activities*". ***Chapter 52*** ordinance was designed with the intent of regulating topsoil disturbances, thus limiting soil from entering the storm drain system.

Requirements

The ordinance addresses development sites, utility excavations, demolition projects, and all other land disturbing activities. Sites disturbing more than five cubic yards, or 500 square feet, need an erosion control permit. Erosion & Sedimentation Control (ESC) Permits must be acquired prior to commencement of work, and must be obtained before a building permit will be issued for the site. If there will be a disturbance of greater than 5,000 square feet, demolition and construction sites also require an approved erosion control plan before the ESC Permit can be issued.

Enforcement

Ongoing site inspections are performed by Public Works and Regulatory Services inspectors. A violation of the ordinance holds a maximum penalty of $700. Inspectors may issue a warning notice citation or a "Stop Work Order". Failure of the permittee to comply with the ordinance will constitute a violation (pursuant to Section 52.300), and will be considered a nuisance pursuant to the laws of the State of Minnesota. If there is a demonstrated failure to comply, the City reserves the right to terminate an ESC permit at any time. The City then has the option of proceeding with the necessary restoration of the site. This restoration would be done at the expense of the owner/permittee.

Ongoing Stormwater Management (following completion of construction projects)

Ordinance

On November 24, 1999, the Minneapolis City Council amended Title 3 of the Minneapolis Code of Ordinances (relating to Air Pollution and Environmental Protection) by adding ***Chapter 54***, which is entitled "Stormwater Management". ***Chapter 54*** establishes requirements for permanent stormwater management for projects on sites that are greater than one acre.

Plan Review

Stormwater management plans are required for all construction projects greater than 1 acre in size. These plans are reviewed through the Minneapolis Development Review (MDR) process and

approved by the Minneapolis Public Works, Surface Water & Sewers Division. Sites less than 1 acre are also encouraged to incorporate stormwater BMPs in their design as a means of satisfying other city codes such as green space requirements.

Registration

Stormwater devices are registered with the City of Minneapolis Department of Regulatory Services, with an annual permit required for each stormwater device registered. A maintenance and inspection program is included in the permitting process.

Goals

The Minneapolis Stormwater Ordinance specifies that stormwater management standards be set according to the receiving water body. These standards include but are not limited to:

- Reductions of suspended solids for Mississippi River discharges
- Controlled rate of runoff for discharges to streams, areas prone to flooding, and areas with infrastructure limitations
- A reduction in nutrients for stormwater that discharges to lakes and wetlands
- Provision of on-site, off-site, or regional stormwater facilities
- Maximizing infiltration by minimizing the amount of impervious surface
- Employing natural drainage and vegetation

Previous Year Activities

Site Plan Review

During 2007, Minneapolis Public Works took part in the preliminary review of over 190 site plans (down from over 250 in 2006, with the reduction apparently due to the economic downturn for housing and other development projects). Of those 190 sites, 110 site plans received final approval with the appropriate permits issued. Continued attention to erosion control plan submittals along with increased awareness in the industry provided for better compliance during site inspections.

Erosion Control

Increased awareness of the ordinance, improving plan submittals and a continued compliance-based inspection program resulted in a continued rise in compliance. A summary of the 2007 inspections is as follows:

- 2,493 site inspections completed
- Successfully responded to 140 public complaints
- 15 enforcement actions issued to gain site compliance
- Coordinated inspections with Minnehaha Creek Watershed District (MCWD)

During 2007, Public Works Surface Water & Sewers inspectors continued to work with internal forces on erosion compliance providing site inspections for Street, Bridge, Traffic, Sewer and Water construction forces improving overall compliance. Improved understanding of erosion control BMPs by City construction forces has allowed inspectors to focus on private sites improving compliance citywide.

Ongoing Stormwater Management

Redevelopment of existing sites provides an opportunity to lessen the impacts of urbanization on the Mississippi River and other Minneapolis water resources. During 2007, 52 Stormwater Best Management Practices (BMPs) were installed on 35 sites reviewed through the Minneapolis Development Review process (down from approximately 100 BMPs on 70 sites, again with the reduction apparently due to an economic downturn for housing and other development projects). BMP types that were proposed included:

- Rain gardens
- Pervious pavement
- Infiltration areas
- Ponds
- Underground detention facilities

When installed, these BMPs will provide rate control and water quality for approximately 75 acres of land.

Work Plan

Site Plan Review

Public Works staff will continue their detailed review of site plans, while utilizing a *Stormwater Project Review Application Form* and a tracking process to identify stormwater management opportunities. Despite limited resources, Public Works has been tracking the type, location, and number

of constructed stormwater BMPs. Public Works will continue to review all development plans from a *Low Impact Design* (LID) and sustainable water quality perspective.

Erosion Control

New developments and other projects that disturb soil will see a continued presence by Public Works inspectors. This effort should lead to a continued awareness of the problems associated with construction site sediment. This presence will also result in a continuing increase in the overall rate of compliance citywide. Public Works will continue to study other options to increase compliance, and to help limit the amount of erosion and sediment loss associated with new construction. Options under review for implementation are as follows:

- Requiring construction bonds to be posted from contractors to assure compliance and site completion, and also to facilitate the removal of temporary erosion controls at the completion of construction activities
- Education and outreach about erosion and sediment control and ongoing stormwater management to City staff, property owners, developers, consultants

Data Collection and Analysis

- Creating new performance measures and improving data collection, tracking and analysis. Means of measuring and understanding water quality impacts that are under study include total acres providing on-site water quality treatment, total pervious area in the City, regulatory costs per site, and cost vs. compliance benefits.

Ongoing Stormwater Management

Current activities will assure the continuation of the progressive nature of our program. In addition to current activities Public Works will:

- Continue to finalize inspections and registration of all stormwater devices installed under Minneapolis Code of Ordinances ***Chapter 54***, Stormwater Management, to-date.
- Continue to promote water quality incentives through the ***Stormwater Utility credit program***; while incentives may provide some improvement in water quality, they will not by themselves dramatically reverse the negative impacts of urbanization on water quality.
- Explore potential for new regulations that could accelerate the goals of the permit.
- Propose amendments to ***Chapter 54 Stormwater Management*** to reduce the threshold for sites that are captured under the Ordinance, and to increase the buyout in lieu of site treatment fee.

Performance Measures

Current performance measures include: [3]

1. Number of sites captured in 2007 under Stormwater Management Ordinance: 33
2. Number of erosion control inspections in 2007: 2,493
3. Number of large BMPs such as ponds or wetlands installed with public projects in 2007 as a result of current programs: None [4]
4. Number of small BMPs (such as rain gardens) installed with private projects in 2007 as a result of current programs: 23 [2]
5. Number of large area grit chambers installed with public projects in 2007: 9 [2]
6. Number of small area grit chambers installed with private projects in 2007: 16 [2]

[3] Unit costs are not available because functions exist in more than one department, and because expended labor and resources are not tracked separately from other site review and permitting functions.
[4] *City of Minneapolis Annual Sustainability Report*

VI. Roadways

Program Objective

The objective of this stormwater management program is to minimize the discharge of pollutants through the proper operation and maintenance of public streets, alleys, and municipal equipment yards.

Targeted pollutants include:

- TSS[5]
- BOD5[6]
- COD
- Phosphorus
- Chlorides

Program Overview

Street Sweeping

Minneapolis employs several street sweeping approaches in Minneapolis. Some are citywide, and some vary by area or land use. Curb-to-curb sweeping operations occur citywide every year in the spring and fall. At those times, all City streets and alleys are swept systematically, and temporary parking bans are enforced to aid with sweeping operations. Operational routines and special methods are employed to address seasonal conditions, and to optimize cleaning. Flusher trucks apply pressurized water to the streets in an effort to push sediment and debris to the gutters. Street sweepers follow behind the flusher trucks and clean the gutters. During the fall, leaves are first bunched into piles, and then the leaves are picked up before flushing and sweeping occurs. During the summer, between the spring and fall sweep events, sweepers are assigned to maintenance districts for periodic area sweeping. Downtown and other high traffic commercial areas are swept at night on a weekly basis. In addition,

[5] Total Suspended Solids

summer sweeping in the Chain of Lakes drainage areas has occurred since 1995 as part of the Clean Water Partnership project. Two sweepers are dedicated to cleaning drainage areas around the Chain of Lakes, and one sweeper is devoted to the Minneapolis Parkway System.

The materials collected from Street Sweeping are received at two different locations, based on time of the year and nature of the material. The inorganic materials go to a construction demolition landfill site in Becker, Minnesota, to be used as daily cover. A five-year 2003 contract states that the organic materials, which are collected mostly in the fall of the year, go to Hutchinson, Minnesota to be composted and converted to a retail mulch material that is then distributed by a company called 'Creekside Soils'.

Snow and Ice Control

The Street Maintenance section applies salt and sand to City roadways every winter for snow and ice control. Efficient application of de-icing materials is sought to reduce costs, required maintenance, and environmental impact. The most obvious cost savings is realized in a reduction of the overall amount of materials used; catch basins and grit chambers require more frequent cleaning due to the accumulation of the additional sand. Salt causes corrosive damage to bridges, reinforcement rods in concrete streets, metal structures and pipes in the street, and vehicles. Salt is also harmful to groundwater, surface water, plants, and trees. Sand harms lakes and streams by disturbing the ecosystems, and in depositing pollutants that bind to sand particles in lake bottoms and streambeds. In 2007, the EPA approved a Total Maximum Daily Load study for chlorides (salt) that are an impairment to Shingle Creek, and the improved snow and ice control practices that the City had developed for Shingle Creek are also being implemented citywide. Maintenance supervisors are trained in winter maintenance techniques through sessions that are sponsored by the Local Road Research Board (a training partnership of Mn/DOT and the University of Minnesota). Specific topics covered include guidelines for sand and salt application rates that are based on weather conditions, application techniques, and spreader calibration. Plans for future training sessions will include those actual equipment operators. Material spreaders are calibrated annually before the winter season. Maintenance yard housekeeping practices are designed to minimize salt/sand runoff. The materials that are used are tallied on a daily basis.

[6] Biochemical Oxygen Demand of wastewater during decomposition occurring over a 5-day period

Storage of De-icing Materials

All salt stockpiles are stored under cover to minimize potential groundwater contamination and runoff. After evaluating existing storage facilities, new storage sheds were constructed in 1991 at maintenance yards located at 60th & Harriet Ave. S. and 1809 Washington Ave. N.E. These facilities were designed according to Mn/DOT specifications, to minimize runoff. Two other salt storage facilities exist that will be abandoned or replaced in the next few years. This will be done in coordination with plans to consolidate maintenance yards, and to build a new facility at 26th St. E. & Hiawatha Ave.. The storage shed at the 44th St. E. & Snelling Ave. maintenance yard is closed. The temporary storage shed at 198 Aldrich Ave. N. will be abandoned in 3-5 years, contingent upon the construction of new facility at 26th St. E. & Hiawatha Ave.. A temporary storage shed was added to 26th St. E. and Hiawatha Ave. Like the site at 198 N. Aldrich, this will be abandoned when the new complex is built. The new maintenance yard will employ the most effective Best Management Practices (BMPs) available, including runoff collection systems that would be installed around salt and sand stockpiles, and truck washing areas.

Previous Year Activities

The 2006-2007 winter season was colder than the year before with a number of large snow events along with fewer minor events. The most snowfall was observed in February and March which was later than the year before, but significant snowfalls were seen in December and January in single or two-day events. There were two snow emergencies, and 166 days of snow and/or temperatures below freezing. The quantities of salt and sand used in snow and ice control are tracked by recording amounts that are delivered by suppliers, and also by estimating the quantities that are on-hand on a daily basis. Street sweepings are counted by volume (truckload). These counts are converted to material weight by taking an average of a random weighting of trucks, and by then multiplying that number by the number of truckloads hauled. Leaves picked up are weighed at certified scales that are located at City facilities or in Hutchinson. The statistics for last year's program are as follows:

- 12,690 tons of salt was applied to roadways
- 7,776 tons of sand was applied to roadways
- 17,220 tons of materials was reclaimed during spring and summer street sweeping operations

- 3,382 tons of leaves were collected (for composting) during the fall City-wide sweeping
- Twenty staff members attended an eight-hour refresher for the 40-hour hazardous materials training class
- Seven Foremen attended training on the use of salt at the annual salt symposium
- All division shift–staff attended the annual review of procedures. The review covers the recognition and response to hazardous materials or situations.

Work Plan

Ongoing activities to fulfill permit requirements will continue. Currently, the method for tracking the quantities of materials gathered through street sweeping operations is to use data on how much material is hauled away. Additional education opportunities will be explored for management and maintenance workers. Management will keep abreast of new technologies for snow and ice control, and street sweeping, as they become available. Any promising technologies will be tested on a pilot basis before implementation.

Performance Measures

- Unit costs are not available
- Amount of materials recovered as a percentage of materials applied: 221%
- Amount of salt and sand applied relative to total snowfall: 421 tons/inch

VII. Flood Control

Program Objective

The objective of the Minneapolis stormwater management program is to design flood control systems that manage stormwater quantities so that the runoff does not exceed the capacity of the existing facilities while minimizing the impacts on the water quality of the receiving water body. Targeted pollutants include:

- Phosphorus
- TSS[7]

Program Overview

In July 1997, Minneapolis experienced torrential rainstorms that exceeded the capacity of the City's existing storm drain system and caused flooding throughout the City, causing physical damage to homes, businesses & vehicles. In response, Minneapolis Public Works established the Flood Mitigation Program to develop potential solutions and a plan for implementation for each of 39 areas that experienced flooding and/or property damage as a result of the 1997 storms.

The Flood Mitigation Program began in 1998 and was originally scheduled to run through 2009. However, due to the state of the City's available finances, this Program has been temporarily suspended. New flooding areas continue to be identified by residents, or through continued analysis of the system. These additional project areas will be considered for future implementation. Due to changes that the anticipated Total Maximum Daily Load (TMDL) standards will impose on new designs, current flood mitigation strategies are changing. The design storm is unchanged. Storm drains are still designed to accommodate open channel flow during a 10-year, 24-hour design[8] and provide protection to homes from the 100-year, 24-hour design event. The mitigation techniques have a much different priority now. TMDL standards currently proposed require a new type of flood management project. The new type of project tries to achieve the three R's or the three ***REDUCTIONS*** of ***VOLUME***, ***RATE*** and ***LOAD***.

[7] Total Suspended Solids
[8] City of Minneapolis 10-year design based on 4.2" of rainfall in a 24-hour event and 100-year design based on 5.9" of rainfall in a 24-hour event.

With this current strategy, the designer first looks for ***VOLUME REDUCTION***. This is a successful approach to TMDL reduction, because these volume reducing techniques used do not concentrate the phosphorus or suspended solids, so there is a corresponding ***LOAD REDUCTION***. Next the designer looks for ***RATE REDUCTION***. This too is a successful approach to TMDL reduction because the techniques used slow the water down at its source, thereby reducing the initial amount of sediment that reaches the stormwater system. This is a dramatic change in design development and a departure from past strategies of enlarging pipes to drain more stormwater faster. New techniques focus on green initiatives that treat stormwater where it falls and this approach develops options that eliminate the need for new or larger pipes. Examples of the new ***Three R*** techniques include:

- A proposal to use street right-of-way for infiltration is a ***Three R*** project because phosphorus-laden suspended solids would be filtered by porous media and then infiltrate into the soil
- Another proposal to use street right-of-way in areas with heavy soil is a ***Three R*** project because, once again, phosphorus-laden suspended solids would be filtered by porous media to an underground reservoir that feeds tree roots for evapotranspiration
- When volume-reducing strategies are precluded by soil conditions, rate control systems such as underground storage are used

In many cases, adding catch basins or augmenting inlet capacity has the negative effect of increasing the runoff rate. New strategies would look for volume-reducing techniques upstream so the existing system would then have capacity for existing flows. Here are other strategies to help control flooding:

- Installation of backup generators for existing pump stations
- Increased inspection and maintenance of catch basin inlets and storm drains that are located within flood-sensitive areas
- Inclusion of various Best Management Practices (BMPs), including grit chambers, rain gardens, permeable pavers, etc.

The City's Flood Control Program is a companion to the Combined Sewer Overflow (CSO) Program and the Infiltration and Inflow (I & I) Program. Studies show that the City has a problem with inflow (stormwater that drains to the sanitary sewer system). Citywide, the estimated inflow in Spring 2007 was 112.706 million gallons per day, or 346 acre-feet of runoff. Unfortunately, successful completion of CSO and I & I projects can be a burden for the Flood Control Program, because of additional volume. In 2007, the City removed 137-acre feet of inflow, thus the storm sewer system received 137 more acre-feet of runoff that had previously discharged to the sanitary sewer.

Previous Year Activities

The following is a summary of flood mitigation project activity in 2007:

Flood Mitigation Area 1

- Pipe work and pond excavation was completed in 2006. Final grading and landscaping was completed in 2007. The flood control system is now in service.

Flood Mitigation for CSO Area 13

- This project is located on E 38th St, from 19th Av S to 22nd Av S, and also in a near by alley. This project removed 1.90 acres of clearwater discharging to the sanitary system and redirected it to Sibley Holding Pond.

Flood Mitigation for CSO Area 102

- This project disconnected an alley drain from the sanitary sewer and connected to a nearby storm sewer, and also included construction of box culverts. These box culverts were needed for rate reduction and control, to mitigate the impact of the additional runoff until there is capacity in the existing storm sewer at 5th and Morgan Avenues N. This project removed 1.62 acres of clearwater discharging to the sanitary system and redirected it to the stormwater system.

Work Plan

The following a summary of scheduled flood mitigation project activities in 2008:

Flood Mitigation Area 5

- Develop a plan for flood mitigation that focuses on treating stormwater where it falls. The plan should convert street right of way for stormwater volume reduction and rate control; it should include the use of abandoned properties where possible and encourage the use of other private property for onsite rate control. This plan should be developed so that it capitalizes on the potential value of landscaped areas. Some part of this work should be ready for 2008 construction.

Flood Mitigation for CSO Area 54

- Develop a plan for mitigating the impact of increased runoff due to removing an alley drain from the sanitary sewer and using the alley as an infiltration area for the alley drainage so the increased runoff does not cause flooding downstream.

Water Quality Improvement for West 54th Street

- As a pilot project to demonstrate the viability of incorporating multiple Best Management Practices (BMPs) in a project, the work on West 54th will consist of several water quality improvements that include pervious concrete pavement, the use of French drains as reservoirs under the street to store runoff and provide ***RATE CONTROL*** and ***VOLUME REDUCTION*** as well as water for trees. In both cases, the system will rely on trees along the edge to provide evapotranspiration for ***VOLUME REDUCTION***.
- A swirl-type grit chamber will be provided to collect sediment before the flow enters a lift station and then discharges to Minnehaha Creek.
- All of this work will be followed with a program of monitoring to prove the effectiveness of these BMPs.

Performance Measures

While most citizens will measure success by whether there is reduced neighborhood flooding, the Flood Control work proposed for 2008 and in the future, also targets water quality. Many of the projects are intended to determine and demonstrate technology that works specifically for this City. Continuing the objectives of previous years, the goal is increased water quality of lakes, river and streams in Minneapolis. The Flood Mitigation Program Projects now focus more on treating stormwater where it falls and making ***VOLUME REDUCTION*** the common element of systems, because volume-reducing systems provide for reduction of TSS, nutrients, litter, and other pollutants, as well as providing some ***RATE CONTROL***.

VIII. Pesticides and Fertilizer Control

Program Objective

The objective of this stormwater management program is to minimize the discharge of pollutants by controlling the application of pesticides and fertilizers. Targeted pollutants include:

- Pesticides
- Nutrients

Program Overview

Integrated Pest Management (IPM) Policy and Procedures

The Minneapolis Park and Recreation Board's (MPRB) IPM policy (for golf courses and general park areas) is included in the MPRB's General Operating Procedures.

The Coordinator of Horticulture Programs works with both the Park Maintenance and Environmental Services staff to decide the best approach to dealing with pest issues. The main focus is the Cowles Conservatory, the Minneapolis Sculpture Garden, and the major display gardens at Lyndale Park, Loring Park, and Minnehaha Falls Park. Plant Health Care/Integrated Pest Management Action Forms are filed when there are specific plant health problems for these garden areas. These forms document the specific problems and the recommended course of corrective action.

The Coordinator of Horticulture Programs frequently assists golf course and maintenance staff (who have concerns regarding turf and ornamental pests), and also provides recommendations regarding natural resource vegetation management. The Coordinator regularly sends IPM updates; each golf course foreman is responsible for the IPM decisions at his/her course. The golf course foremen, along with other staff, attend the annual Minnesota Green Expo in January. There they receive updated information on the newest turf and other related research as it applies to fertilizers, pesticides, biocontrols, etc.

Staff Pesticide Applicator Licensing and Continuing Education

All recent park keeper and Mobile Equipment Operator (MEO) hires are required to obtain their Minnesota Non-Commercial Pesticide Applicator license (within one year of their hiring). Every two years, as mandated by the Minnesota Department of Agriculture, staff attends re-certification training, offered

and coordinated by the University of Minnesota. This effort is in conjunction with the Agronomy Services Division of the Minnesota Department of Agriculture.

Use of Pesticides and Fertilizers on Park Lands

The MPRB manages 6,400 acres of park land in the City of Minneapolis (approximately 18% of the City's 35,244 total land acres).

Pesticide Use

Use of pesticides to control turf weeds is not a regular practice of park maintenance. Weed control pesticides may be used when a park is being renovated, or when athletic fields and surrounding areas are being sodded/seeded. It may also be used when weeds exceed 50% of the ground "turf" cover. These procedures for general grounds and athletic fields are included in the MPRB's General Operating Procedures.

The MPRB actively manages Eurasian watermilfoil and purple loosestrife, which are two non-native invasive plant species. Eurasian watermilfoil, an aquatic weed, is harvested mechanically on Lakes Harriet, Cedar, Calhoun, and Isles throughout the summer months. The MPRB has established (in its General Operating Procedures) that no chemical application will be used to control aquatic weeds. The MPRB collaborated with the University of Minnesota (UMN) researchers to develop a bio-control program using a weevil predator for Eurasian watermilfoil. Purple loosestrife, an invasive emergent plant, is controlled using a leaf-feeding beetle as part of the UMN's bio-control program efforts. Purple loosestrife is the only plant where a biocontrol agent has been successful at controlling the spread of the invasive species. In years where beetle populations are low, and biocontrol methods are not as effective, spot-spraying or hand-pulling of purple loosestrife is done by park maintenance staff. Eurasian watermilfoil and purple loosestrife control are permitted through Minnesota Department of Natural Resources, Division of Ecological Services. Coordination of control programs for purple loosestrife and Eurasian watermilfoil are determined, and supervised, by the Environmental Operations Section. Park Maintenance and Environmental Operations staff document chemical application for purple loosestrife control when this is used as a control method.

The Coordinator of Horticulture Programs maintains chemical application records, for a period of 5 years, in accordance with Minnesota Department of Agriculture regulations.

Since the 1980s, golf course foremen and park maintenance staff, have documented the type, amount, and locations of the chemicals that are stored at park storage facilities. These chemical inventories provide detailed information to the fire department as to how to deal with a possible fire at

these sites. The plans identify how the fires are best extinguished, and how to protect surface water in the surrounding area. The plans were put into place in the early 1980's, following a chemical company fire in north Minneapolis that resulted in the contamination of Shingle Creek.

Fertilizer Use

In September 2001, the Minneapolis City Council amended Title 3 of the Minneapolis Code of Ordinances (relating to Air Pollution and Environmental Protection) by adding Chapter 55, Lawn Fertilizer. Under the ordinance, since January 1, 2002 the retail sale of fertilizer containing any amount of phosphorus or other compound containing phosphorus, such as phosphates, is prohibited in Minneapolis, except as allowed by Minnesota Statute 18C.60 Phosphorus Turf Fertilizer Use Restrictions. The Minnesota Statute allows the use of phosphorus turf fertilizer if:

- An approved and recent test indicates that the level of available phosphorus in the soil is insufficient
- The fertilizer is being applied to newly established turf, and only during the first growing season
- The fertilizer is for use on a golf course under certain conditions specified in the Statute.

Fertilization of turf on Minneapolis Park & Recreation Board Property is performed for golf courses, around athletic fields, and in areas of heavy traffic. Golf course managers and maintenance foremen are instructed that no phosphorus can be used for turf fertilization unless a current soil test has demonstrated the need for this nutrient. MPRB staff is required to complete a report for every turf fertilizer application. These records are maintained for a period of 5 years, per state law.

Previous Year Activities

Staff Pesticide Applicator Licensing and Continuing Education

Currently 205 MPRB employees hold pesticide applicator licenses, through the Minnesota Department of Agriculture (MDA).

Use of Pesticides and Fertilizers on Park Lands

Pesticide Use

MPRB maintenance and environmental staff continue to maintain the purple loosestrife control program. Populations of released beetles in Minneapolis' parks continue to maintain themselves at most sites, thereby reducing the need for chemical spraying.

Fertilizer Use

The MPRB included zero phosphorus turf fertilizers beginning with the 2002 fertilizer bid. This was done in response to the City/state regulation changes regarding phosphorus turf fertilizers. A wide range of fertilizers were offered to allow park maintenance and golf course foremen to pick the highest performing fertilizer (based on soil test results). In 2007, many suppliers are offering a wider range of zero-phosphorus turf fertilizers (expanding the bid list considerably).

Public Education

Minneapolis Environmental Services has developed a lawn fertilizer brochure by partnering with local communities and the University Extension Program. The brochures were sent out to hardware stores, nurseries, and other stores selling lawn fertilizer.

Audubon Cooperative Sanctuary Program (ACSP) for Golf Courses

Audubon International provides comprehensive conservation and environmental education assistance, to golf course superintendents and industry professionals, through collaborative efforts with the United States Golf Association (USGA). The ACSP seeks to address environmental concerns while maximizing golf course opportunities thereby providing open space benefits. An important component of this program is the implementation of IPM procedures, and the reduction of chemical and fertilizer use to protect water quality and provide a healthier habitat for wildlife.

Participation in the program requires that golf course staff address environmental concerns related to the potential impacts of water consumption, and chemical use on local water sources, wildlife species, and native habitats. Additionally, the program provides assistance in comprehensive environmental management, enhancement and protection of existing wildlife habitats, and recognition for those who are engaged in environmentally responsible projects.

Audubon International provides information to help golf courses with:

- Environmental Planning
- Wildlife and Habitat Management
- Water Conservation
- Water Quality Management
- Outreach and Education

By completing projects in each of the above, the golf course receives national recognition as a Certified Audubon Cooperative Sanctuary. MPRB Operations staff, working with Theodore Wirth and Meadowbrook Golf Course foremen, received the ACSP certification for both courses. MPRB staff conducts yearly water quality and aquatic vegetation monitoring at the courses.

Work Plan

- Maintain vegetation database: Environmental Operations staff tracks maintenance activities on the MPRB's Environmental Operations' vegetation database.
- Implement an MPRB-created Pesticide and Fertilizer Application Database to improve tracking and reporting of chemical applications to MPRB lands.
- Continue to recertify employees as pesticide applicators
- Continuing to certify and train more MPRB staff through the Pesticide Applicator Licensing program at the MDA.
- Continue Audubon Cooperative Sanctuary Program efforts: Environmental Operations staff is working with Meadowbrook and Wirth Golf Courses to maintain ACSP certification.
- Continue to institute IPM practices for fertilizers and pesticides across all City land management departments, and include training of MPW and other City staff as part of the MPRB training program. MPRB horticulture staff will work with MPW staff to develop and incorporate IPM into their daily work.
- Document the use of pesticides and fertilizers on all City facilities. This information exists for MPRB facilities. This same information will be collected for other facilities within the City, including those managed by the Minneapolis Community Planning & Economic Development Department (CPED) and Property Services Division of Public Works, the Minneapolis Public Housing Authority, and the Minneapolis School Board.

Performance Measures

- No unit costs are available for this program.
- Number of MPRB staff with pesticide applicator licenses: 205

IX. Illicit Discharges and Improper Disposal to Storm Sewer System

Program Objective

The objective of this stormwater management program is to minimize the discharge of pollutants by implementing a program to detect and mitigate illicit discharges, and to encourage that an NPDES (or other such permit) be obtained for non-stormwater discharges. Targeted pollutants include: all pollutants.

Program Overview

Hazardous Spills

Public Works, Transportation Maintenance & Repair Division, Street Maintenance section, the Minneapolis Fire Department, the Regulatory Services Environmental Services unit – all coordinate training for emergency spill procedures.

Typical Spill Response

Environmental Services and the Minneapolis Fire Department personnel typically serve as the first responders to a spill event. The immediate goals of this response are containment of the spill, recovery of hazardous materials, and collection of data (for use in assessment of site impacts). Recovery efforts can take several forms, but typically fall into two broad categories:

1) Recovery for re-use
2) The use of absorbents or other media to collect hazardous waste for disposal

The life cycle of an event requires City personnel to work as a team, utilizing all available resources to protect residents, the environment and property. Each event is followed by a post-action debriefing to determine the cause of the event, to identify measures to improve the City's response, and to determine the means to limit future occurrences.

The protocol used by the Street Maintenance section for handling spills is documented in the **Appendix 32: City of Minneapolis Standard Operating Procedure for Vehicle Related Spills.**

Small Spills

Street Maintenance will dispatch personnel with appropriate equipment to apply sand. Once the sand has absorbed the spill, it is removed by a street sweeper. The contaminated sand is removed from the street sweeper, and then deposited in a leak-proof container.

Large or Hazardous Spills

For large or extremely hazardous spills, the small spill process is followed with the exception that additional resources are expended. The Fire Department's Hazardous Materials Response Team is mobilized (in lieu of the local fire station). As the assessment of the event occurs, other City departments become involved, and outside agencies and private emergency response contractors are also incorporated as needed. Spills that fall within the minimum reporting requirements are reported to the Minnesota Pollution Control Agency (MPCA) Public Safety Duty Officer. For these spills, an ***Oil and Hazardous Materials Spill Data*** form must be completed within 24 hours, or by the next business day. The completed forms are used to document the type of spill, as well as the response to the spill. Environmental Services is responsible for coordinating long-term recovery efforts with other regulatory agencies. Qualifying spills are also reported to the National Duty Officer as required by law.

Emergency Response Program

The Department of Regulatory Services purchased a boat for use on the Mississippi River and other Minneapolis water bodies, to be able to respond to spills that could impact our valuable water resources. In the past when such impacts have occurred, City efforts were restricted to mitigation efforts from land. The presence of a properly equipped boat facilitates addressing these events on the Mississippi River and City lakes provides a valuable service to the citizens. The boat is an asset in that it allows City personnel to address these events, and to coordinate this work with other City efforts and the MPCA's Spill Response Program. Environmental Services staff are trained in the river deployment of booms, have field experience in placement of both containment and absorbent types of booms, and have years of experience on the water. These skills, coupled with an extensive level of knowledge of the Mississippi River, City lakes, landings and outfalls, provide a high level of protection for our precious natural resources.

Additionally, the boat is available for the placement of monitoring and sampling equipment used for tracking water quality, identifying points of illegal discharges, illegal sewer connections, infiltration from a sanitary sewers or water mains, assessment of outfalls, and investigation of complaints that are inaccessible from shore.

Unauthorized Discharges

Environmental Services is responsible for pollution prevention and control. Results are achieved through educational efforts, inspections, and coordinated community outreach events. These activities may include enforcement, pursuant to Chapter 48[9] and other applicable City codes, and coordination with other regulatory agencies at the county, state and federal levels. Enforcement yields identification of the responsible party, documentation of clean-up activities, and also endeavors to reduce the flow of pollutants from illegal dumping and disposal. Four full-time and one half–time Environmental Services staff are employed to enforce anti-pollution laws and to coordinate various anti-pollution efforts. Environmental Services responds to reports of unauthorized discharges and illicit connections. Complaints are received from the public, City and private contractors, City staff and other government agencies, by the following means:

- *Environmental Management Complaint Form*
- Confidential calls to Minneapolis Information & Services. Within Minneapolis, the phone number is 311. Outside of Minneapolis, the phone number is 612-673-3867.
- Reports from sewer maintenance crews, plumbing inspectors, and other City personnel
- Direct contact to Environmental Services staff at 612-673-5843

Non-Stormwater Discharges

Environmental Services reviews non-stormwater permits and renewals while working with the MPCA permitting authority to address local concerns. Environmental Services also reviews alleged violations to a permit or code. If permits are violated, or if conditions indicate that the permit should be revised, Environmental Services staff will assist MPCA permitting staff in updating or revoking the permit.

Additional control measures are implemented within the City of Minneapolis to minimize impacts on receiving waters due to the non-stormwater discharges listed below:

[9] Minneapolis Code of Ordinances, Chapter 48 Minneapolis Watershed Management Authority.

a.	NPDES permitted non-stormwater discharges	Permits are reviewed and registration is required. Ordinances: Title 3 Chap. 50.
b.	Water line flushing and other discharges from a potable water distribution system	Minneapolis Dept. of Public Works Water Distribution & Treatment Division implements procedures for de-chlorination prior to discharge to the storm drain system.
c.	Landscape irrigation and lawn watering	Pollutants are controlled through City ordinances: Title 11 Chap. 230 and Title 3 Chaps. 48, 52 & 55.
d.	Irrigation water	Same as above.
e.	Diverted stream flows	Regulated by state statute and adopted in the City Charter. Diversions require approval by the City and other regulatory agencies.
f.	Rising ground water	The Minneapolis Brownfield Program addresses relevant contamination issues.
g.	Foundation and footing drains	Contribute to I/I problems, and ultimately to Combined Sewer Overflows.
h.	Water from basement sump pumps	Not a significant source of pollution. Contribute to I/I problems, and ultimately to Combined Sewer Overflows.
i.	Air conditioning condensation	Not a significant source of pollution.
j.	Springs	Not a significant source of pollution.
k.	Individual residential and fund-raising car washings	Not a significant source of pollution.
l.	Flows from riparian habitats and wetlands	Not a significant source of pollution.
m.	Swimming pool discharges	Regulated by City ordinances: Title 5 Chap. 111 and Title 11 Chap. 231.
n.	Flows from fire-fighting	Minneapolis Fire Department and Public Works Sewer Maintenance section cooperate to control fire-fighting flows. Environmental Services gets involved if there are chemicals on site.
o.	Lawn Fertilizer use, application and sale	Minneapolis Environmental Services provides education and enforcement of MCO 55 Lawn Fertilizer.

Detection and Removal Screening Program

The field screening program to detect and investigate contaminated flows in the storm drain system is an integral part of Sewer Maintenance and Environmental Services daily operations. Sewer Maintenance crews routinely inspect and clean storm drain structures throughout the City. In addition, inspections of flows that generate unusual odors, stains, and deposits are included in the annual outfall

inspection and grit chamber cleaning programs. Any suspect flows are then reported to Environmental Services inspectors for further investigation. Environmental Services also receives reports of alleged illicit discharges to the storm drain system from the public, other City departments, and various agencies. These combined efforts result in an annual screening of more than 20% of City drainage areas. In 2005, the Environmental Services unit entered into an agreement with the Mississippi Watershed Management Organization to conduct a joint sampling program of the storm drainage system that drains to the Mississippi River. The intent of this partnership is to detect illegal discharges, and to establish a baseline of chemical, physical, and biological parameters. The best avenue for a continued effective screening program in the City of Minneapolis, without duplication of services, is to continue to use current practices, and to explore the development of certain aspects of the program to improve enforcement results.

Facility Inspection Program

Environmental Services and Fire inspectors perform site visits of facilities that store large quantities of regulated and hazardous materials. In addition, site plan inspections yield the following information:

- Drainage patterns from the site to the nearest drain or water body
- Watershed destination and outlet location
- Handling, storage, and transfer procedures as they relate to the site

Previous Year Activities

- Successfully addressed 100 calls for emergency response (containment of spills, chemical dumping, illegal disposal or handling of regulated or hazardous materials)
- 40 direct connections (registrations) to the storm drain (NPDES Permits)
- Investigated 918 water and land pollution complaints (illegal dumping, improper storage of material, and chemical storage)
- Notices sent to 14 of 411 residential erosion control permit holders (for residential, multi-family and commercial projects, construction and demolition)
- Inspected 2 contaminated soil complaints
- Approved installation of 5 contaminated soil and ground water remediation systems
- Approved 14 limited duration sanitary sewer and storm drain discharge permits

- Approved 71 underground and above ground chemical storage tank installations and removal

The Sewer Maintenance Department also responded to 6 incidents of alleged illicit discharges to the storm drain system.

Work Plan

Environmental Services will continue existing programs as outlined in the program overview, and will continue to develop and improve documentation of program activities. GIS mapping will be implemented as a tool to support various activities. Information that is gained through the Facilities Inspection Program will be used to compile data on non-stormwater discharges, storage of hazardous materials, and activities or operations that may be potential water pollution point sources.

Performance Measures

Unit costs are not available because of the integrated nature of these activities with other operations.

- Resolution of all reported or discovered non-compliant activities in previous year: 894 of 1018
- Erosion control permit non-compliance that were addressed: 6 of 14

X. Storm Sewer Design for New Construction

Program Objective

There is a continuing effort to minimize the discharge of pollutants to public waters. This section describes the current focus and outlines the design measures used to control the discharge of pollutants by controlling the volume, loading or rate of stormwater discharged. Targeted pollutants include:

- TSS[10]
- Phosphorus
- Chloride
- Fertilizers

Program Overview

The City of Minneapolis currently has a five-year focus on the reduction of inflow (stormwater directly connected to the sanitary sewer, streets, roof drains, foundation drains, etc.) and infiltration (groundwater leaks through sewer pipe joints and cracks, tree roots in the sanitary sewer system). The program focus is due to the Metropolitan Council Environmental Services (MCES) Inflow & Infiltration (I&I) Surcharge Program introduced in 2006 that established a mitigation fee (a "surcharge") of $350,000 per million gallons per day (MGD) of excess flow in the sanitary sewer system to the MCES treatment plant. MCES determined that the City had 112.7 million MGD of excess flow. To forgo the surcharge, the City needs to identify and eliminate all the sources of inflow and infiltration. The surcharge program requires that the City make progress in removing 20 percent of the excess flow each year from 2007 to 2011.

Based on volume, roughly half of the sources of the inflow have been identified. The principal work is elimination of public and private stormwater inlets or rainleaders connected to the sanitary sewer. The work of identifying the remaining sources is continuing. The City's success with the reducing I & I into the sanitary sewer system has increased the flow rates in the stormwater management system. The management techniques focus first on volume reduction, and vary with each project. Most projects involve a one lot roof area or a 1-acre drainage area. By themselves, these inflow areas may not be serious problems but cumulatively, the runoff becomes significant.

[10] Total Suspended Solids

At this time, mitigation begins with an effort to reduce the volume of runoff. Options that reduce volume must have space within the right-of-way or must have an off-site area, with suitable soils for volume reduction in either case. Next, load reduction options are investigated, using recognized Best Management Practices (BMPs) such as prefabricated swirl-type grit chambers, biofiltration or ponds. Space constraints in fully developed urban areas like Minneapolis limit the majority of projects to use of compact prefabricated BMPs for load reduction.

Previous Year Activities

During 2007, the flood area work carried over from the 2006 was completed. No other storm drain system upgrades associated with the street paving program were needed. The focus is unchanged for paving projects. Whenever storm drain upgrades are required, installation of volume reduction systems are first considered. Load reducing facilities are considered next and finally rate reduction BMPs are incorporated in the work scope. The storm drain project areas, and associated water quality impacts, for 2007 are referenced in the following table:

PROJECT AREA	PROJECT DESCRIPTION	STORMWATER RUNOFF BENEFITS
CSO Area 102 *(5th Av N, Morgan Av N to Newton Ave N)*	Alley drain was disconnected from the sanitary sewer and connected to a nearby storm drain, which also included construction of box culverts for peak flow storage.	Eliminated CSO area and achieved rate reduction
Diamond Lake *(east of I-35W)*	Replaced existing storm drain, installed a grit chamber on the outfall to Diamond Lake	Load reduction in Total Suspended Solids
Flood Mitigation Area 1 *(generally Queen Av N to Sheridan Av N, and N 41st to N 43rd)*	Final work was completed in 2007. The flood control system is now in service.	Project includes a stormwater pond.
Flood Mitigation for CSO Area 13 *(E 38th St, 19th Av S to 22nd Av S)*	Provided new alley drain to redirect runoff away from sanitary sewer, and enlarged storm drain.	Eliminated CSO area
Heritage Park *(Humboldt Av N to Lyndale Av N, and Plymouth Av N to Glenwood Av N)*	This project is ongoing (2001-2008) and is using a treatment train approach consisting of grit chambers, sediment basins/ sediment forebays, level spreaders, filtration and infiltration galleries with native plant communities, and water quality ponds.	Load reduction in Total Suspended Solids, nutrients and other pollutants

Work Plan

Design staff will be instructed to take advantage of training opportunities that become available on stormwater management and water quality topics, and will be responsible for staying informed about new technologies as they advance.

Minneapolis Public Works Department Surface Water & Sewers Division design teams will continue to include BMPs to improve water quality in all new projects that require the modification of the stormwater management system. These BMPs will be selected so that they advance program objectives on the basis of their feasibility. The selection will be made giving priority to the following objectives, in this order:

1) Reducing the volume
2) Reducing the load
3) Reducing the rate of runoff
4) Increasing pipe conveyance as a localized flood control measure

One BMP gaining popularity is pervious pavement, however most existing demonstration projects are limited to parking lots. To determine whether it is appropriate for street use, experience is needed regarding pervious pavement constructability and durability issues, appearance and acceptability over time, how to properly maintain to maintain porosity, expected life of the product, overall long-term costs, performance for stormwater management maintenance, and other characteristics. In 2008, Minneapolis is planning to incorporate pervious concrete as a pilot project along a four-block segment of West 54th Street. This approach is designed to reduce stormwater volume discharging to Minnehaha Creek by increasing evapotranspiration and infiltration, to control rate of stormwater discharge, and also to remove pollutants from the stormwater prior to discharge to the creek.

During the next five years, the removal of I & I from the sanitary sewer system, including Combined Sewer Overflow (CSO projects), will be the primary concentration. That does not mean the primary focus for volume, load and rate reduction is ignored. Listed below are some of the I & I projects that include elements that achieve the program objectives. At the same time, we are incorporating BMPs when we upgrade debilitated infrastructure. Future flood mitigation projects, and their impacts on stormwater runoff, are discussed in **Section VII. Flood Control**.

The table below lists some of the storm drain construction projects and planned benefits of the each project scheduled for 2008:

PROJECT AREA	PROJECT DESCRIPTION	STORMWATER RUNOFF BENEFITS
Flood Mitigation Area 5	Develop a plan for flood mitigation that focuses on treating stormwater where it falls.	Convert street ROW for stormwater volume reduction and rate control; consider use of properly located vacant or abandoned properties for onsite rate control. Capitalize on the potential value of landscaped areas. A portion of this project should be ready for 2008 construction.
Flood Mitigation for CSO Area 54	Develop a plan to mitigate the impact of increased runoff, due to removing an alley drain from the sanitary sewer; use the alley as an infiltration area for the alley drainage, so the increased runoff does not cause downstream flooding.	
West 54th Street - Water Quality Improvement (also see paragraph above)	This pilot project will incorporate multiple BMPs, including porous concrete, French drains and enhanced planting soils for more evapotranspiration and infiltration.	Store runoff, provide rate control Enhance infiltration and evapotranspiration in order to provide volume reduction. A swirl type grit chamber will collect sediment before the flow enters a lift station.
Completion of Heritage Park stormwater management amenities	(see table above for additional information)	(see table above for additional information)

Performance Measures

Total BMPs and existing infrastructure:

- 16 water quality pond systems or constructed wetlands, and 149 grit chambers (unit costs are not available)
- An increase in the percentage of City watershed acres receiving treatment prior to discharge into the receiving waters

XI. Public Education

Program Objective

The objective of this stormwater management program is to educate the public regarding point and non-point source (stormwater) pollution. Targeted pollutants include:

- All pollutants

Program Overview

The City of Minneapolis and the Minneapolis Park & Recreation Board (MPRB) implement their Public Education Program to promote, publicize, and facilitate the proper management of stormwater discharges to the storm sewer system. The program's main focus is to educate Minneapolis residents, business owners, employees and visitors about stormwater. The program's goals include showing how *everyone's* actions affect the quality of our lakes, wetlands, streams and the Mississippi River, and how to reduce the discharge of pollutants to our receiving waters. The desired result is to change behavior in ways that will improve water quality. Many of the components of the program can be found on the following web site: *http://www.ci.minneapolis.mn.us/stormwater/*.

Previous Year Activities

Mobile Water Education Kiosks

In 2007, three mobile kiosks that feature interactive water education components were used at neighborhood recreation centers in Minneapolis. The kiosks have stand-alone computers that house six interactive water education modules. Each year, over 10,000 individuals can learn about water quality from each kiosk. The message is all about urban runoff:

- Impacts of impervious surfaces
- Problems caused by non-point source pollution
- Solutions that can be implemented

These kiosks were managed by: The MPRB, Minneapolis Public Works, the Mississippi Watershed Management Organization (MWMO) and the Minnehaha Creek Watershed District (MCWD). Kiosks were moved approximately every four weeks. Use of these kiosks varied greatly by site, from more than 400 users at Luxton Park to fewer than 50 at Central Park.

All of the kiosks were programmed to operate in the English, Hmong and Spanish languages. The Somali language may be added at a later date. Listed here are the six different modules:

- **Journey of a Raindrop**: This module follows the journey of a raindrop from the roof of an urban residence through the storm sewer system to the river. Users learn about eight common sources of non-point source pollution as well as ways to clean up these sources.
- **Rappin' with Alex**: In this module, Alex the Frog performs in a rap video about water and water pollution.
- **The Water Cycle**: Graphics visualization along with a quiz teaches users about the water cycle and its various parts.
- **Streets to Streams - Impervious Surfaces**: An urban planner simulation lets users explore the impacts of impervious surfaces on surface waters and river water quality.
- **The Water Watchers**: This module profiles people who have positively impacted the quality of their local waters, showing how individuals can make a difference by working to promote clean waters.
- **What's Your Watershed Address?**: In this module, users learn what a watershed is as well as the fact that everyone lives in a watershed.

Earth Day/Watershed Clean Up Event

The 2007 Earth Day Watershed Clean Up took place on Saturday, April 21, from 9:30 am – Noon, and was ranked one of the best Earth Day clean up events in the country by the Earth Day Network. Over 2,000 volunteers, from 25 different sites in Minneapolis, collected & removed more than 17,000 pounds of garbage in just over two hours. This event involved cleaning major watersheds and waterbodies in the City of Minneapolis including: the Chain of Lakes, Lake Nokomis, Lake Hiawatha, Powderhorn Lake, Diamond Lake, Shingle Creek, Minnehaha Creek, Bassett's Creek and the Mississippi River. The goals of the Minneapolis Earth Day Watershed Clean Up include providing both a volunteer experience and environmental information to Minneapolis residents and park users who participate in the event.

Multi-Cultural Watershed Education Video

In 2007, Minneapolis Public Works partnered with the MPRB and the Mississippi Watershed Management Organization (MWMO) to develop an educational water quality Digital Video (DVD) aimed at non-traditional and non-English speaking audiences, using a spoken language approach. This DVD will

include five languages, including both audio & subtitles in Hmong, Vietnamese, Lao, Cambodian and English. This DVD is scheduled for completion & distribution by July 31, 2008. The Somali language may be added at a later date.

Minneapolis Park & Recreation Board Events and Naturalist Program

MPRB Staff continued to provide water quality education programs throughout the City. Armed with stormwater education models and printed materials, Environmental Operations Naturalist staff participated in 66 Minneapolis community festivals, events, and concerts at Lake Harriet, Father Hennepin Park (along the Mississippi River) and Minnehaha Park. Hands-on water quality educational displays focused on neighborhood watersheds and how human activities impact local water bodies. Adults and children participated in "*Watershed Jeopardy*" and other educational games. Printed materials, bookmarks, and water bottles with educational messages were also distributed at these events.

Minneapolis Park & Recreation Board Sewer Rats Program

Twenty-one recreation centers[11] from across the city participated in ***Sewer Rats*****,** a four-part, four-hour program series. By providing information in a series of programs, Naturalist staff helped children to achieve a better understanding of stormwater and learn how their actions or inactions affect local water bodies (that is, the lake or creek children like to wade, swim or fish in). ***Sewer Rats*** incorporates hands-on learning activities that focus on watersheds, storm drains, pollution patrol, water quality testing, macro invertebrates, wetlands and more. The MPRB will continue to improve and update the program series based on evaluations. Children from 35 parks created art work as part of the Earth Day poster contest. The winner's art was featured on the 2007 Earth Day poster.

To give people of all ages a better understanding of how stormwater negatively impacts local waterbodies, MPRB staff led guided canoe trips on lakes and ponds. The MPRB provided canoes, paddles, and lifejackets, and paddling instruction. Participants paddled by stormwater outlets and observed alluvial fans, floating debris, and adjacent erosion. Participants were also able to use secchi disks to determine lake and pond clarity. In some locations, like Lakes Harriet and Nokomis, participants were able to view and learn about adjacent stormwater ponds. Evaluations indicated that participants enjoyed being on the water and observing and learning about lakes and ponds. The combination of recreation and education was well received by those who were just learning to canoe. MPRB staff are

[11] Participating MPRB recreation centers included: Beltrami, Bethune, Bottineau, Brackett, Corcoran, Creekview, Folwell, Fuller, Harrison, Hiawatha Park School, Keeywadin, Kenwood, King, Lake Hiawatha, Logan, Lynnhurst, Matthews, McRae, Morris, Northeast, Stewart, Windom South.

confident that by providing opportunities on the water, participants will place a greater value on the resource and change their behaviors to help protect lakes and ponds. More than 400 people participated in this pilot program.

Rain Barrel Grant

In 2006, the City of Minneapolis applied for a $100,000 grant from the Environmental Protection Agency to demonstrate rain barrels as a stormwater BMP. The grant was awarded, and the City contracted with two nonprofit organizations (the Green Institute & Metro Blooms), to distribute 2,000 rain barrels at reduced cost to City residents for use on single-family properties, and to provide education and materials.

Judging by the rapid sale of rain barrels, the program was very well received by the public, as they sold out by early May. By June of 2007, Metro Blooms workshops had served in excess of 875 attendees. These workshops provided not only rain barrel information, but also education on urban stormwater management, the design, implementation & maintenance of rain gardens and other sustainable landscaping practices.

The City of Minneapolis proactively seeks new opportunities to educate the community and encourage the use of stormwater Best Management Practices (BMPs). The enthusiastic response to this program demonstrates a high level of public interest in the environmental issues surrounding urban stormwater management. The Neighborhood Rain Barrel Partnership provided City staff with valuable experience in the design and execution of education programs and initiatives. The final report on the program will be available on the City's web site in May 2008. As a one-time grant opportunity, the City does not anticipate additional rain barrel distribution in future years.

Heart of the Beast 'Water Awareness' Performances

In 2007, the City and the MPRB collaborated with the Heart of the Beast Theatre to develop a series of three programs that addressed water quality, quantity and ownership issues. These shows were titled ***Invigorate the Common Well, Beneath the Surface*** and ***Decorate the Well in Gratitude,*** for showing in 2007, 2008 and 2009. They focus on the drinking water distribution system in Minneapolis, the Mississippi River watershed, the bottled water industry, stewardship of our water, water quantity, quality and ownership.

Keep Minneapolis Beautiful Campaign

In 2007, the City of Minneapolis launched a public awareness campaign called ***Keep Minneapolis Beautiful***, targeting cigarette butt litter in downtown Minneapolis. This effort was launched downtown at a September 2007 event on the Nicollet Mall with a presentation, petition and volunteer sign-up. Attendees pledged to do their part to Keep Minneapolis Beautiful in this grassroots effort. Personal pocket ashtrays were also distributed to help reduce cigarette butt litter.

Pesticides and Fertilizers

The City's NPDES permit requires that the City implement a City-wide education program regarding the proper application of pesticides and fertilizers. To this end, the City's Department of Regulatory Services - Environmental Services has implemented a fertilizer and pesticide education program, including providing City Ordinance literature to suppliers of fertilizers. The information pertains to fertilizer application in general, phosphorus containing fertilizer, and retail requirements. The program also offers education materials to Minneapolis homeowners on local requirements. For additional information, see **Section VIII. Pesticides and Fertilizer Control** in this report.

Illicit Discharges

Another NPDES requirement is City education regarding illicit discharges. The City maintains a plan that is designed to adequately notify the public of potential health threats due to discharge of untreated or partially treated wastewater. The City of Minneapolis developed a program to inform residents not to discharge non-stormwater substances to storm drains that discharge to a lake or stream. Interested parties can visit the City's web site to become better educated regarding the ordinances to prevent illicit discharge into the City's water bodies. The City's Environmental Services Division of its Regulatory Services Department has a program in place to encourage compliance with restrictions on certain kinds of discharges.

Web sites

ENVIRONMENTAL MANAGEMENT – The Department of Regulatory Services maintains the following web site for additional information about the above initiatives and other programs:
http://www.ci.minneapolis.mn.us/environment

STORM & SURFACE WATER MANAGEMENT – The City provides the following primary web site for information about Storm and Surface Water Management:
http://www.ci.minneapolis.mn.us/stormwater/

ANNUAL NPDES REPORT – The City and MPRB work with local watershed organizations, internal agencies, and other government agencies to partner with these organizations as a requirement of the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit. The current and prior annual reports that can be reviewed at the following web site provide education to interested parties about the City's authorization to discharge stormwater via its NPDES MS4 Permit: *http://www.ci.minneapolis.mn.us/stormwater/NPDESAnnualReportDocuments.asp*

LOCAL SURFACE WATER MANAGEMENT PLAN – The City's comprehensive approach can be reviewed at the following web site: *http://www.ci.minneapolis.mn.us/stormwater/local-surface.asp*

REGULATORY CONTROL OF SURFACE WATER MANAGEMENT – The City of Minneapolis provides information regarding pesticides, fertilizers, illicit discharges, improper disposal and other water quality issues via the following City web site: *http://www.ci.minneapolis.mn.us/stormwater/water-quality-control.asp*

STORMWATER MONITORING PROGRAM – The MPRB provides the following web site to educate interested parties regarding their Stormwater Monitoring Program: *http://www.minneapolisparks.org/default.asp?PageID=833*

HERITAGE PARK REDEVELOPMENT – The City began to redevelop Heritage Park in the fall of 2000. The redevelopment is expected to be complete in December of 2009, and includes a stormwater educational component. For more information, refer to the following web site : *http://www.ci.minneapolis.mn.us/cped/docs/heritage_park_stormwater.pdf*

FLOOD CONTROL INFORMATION – The City web site provides educational information regarding flood control. For information on flooding and safety precautions, the following web site can be viewed by interested parties: *http://www.ci.minneapolis.mn.us/stormwater/flood-information/index.asp*

COMBINED SEWER OVERFLOW (CSO) PROGRAM – The City maintains a web site to educate Minneapolis residents and property owners about the City's CSO program to eliminate Combined Sewer Overflows: *http://www.ci.minneapolis.mn.us/cso/*

STORMWATER UTILITY FEE and ***BEST MANAGEMENT PRACTICES (BMPs)*** – As a component of the City's Stormwater Utility Fee, the City web site encourages the implementation of various Best Management Practices (BMPs) that would reduce the overall amount of impervious surface area throughout the City, as well as filter and cleanse stormwater. The City also maintains a link to the following Metropolitan Council and MPCA BMP web sites, where numerous BMP suggestions are available for small scale implementation:

http://www.metrocouncil.org/environment/watershed/bmp/manual.htm
http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html

PUBLIC EDUCATION & OUTREACH – Additional information about how the City and MPRB advance stormwater education activities can be found at the following web sites:

City of Minneapolis – *http://www.ci.minneapolis.mn.us/stormwater/outreach.asp*

Minneapolis Park & Recreation Board – *http://www.minneapolisparks.org/home.asp*

Erosion and Sediment Control Education for Contractors and Developers

Public Works personnel provided Erosion and Sediment Control (ESC) education and guidance to contractors and developers. This education included information regarding the City's ordinances, and local, state and federal regulations. This information is provided at various stages, including during the Site Plan Review process, via Minneapolis Development Review, and during onsite inspections.

Education and Training of City Personnel

Public Works sent professional and technical staff to various Stormwater and Erosion/Sediment Control educational conferences, seminars, and presentations, and provided internal mentoring and training to City personnel regarding the construction of storm sewers and the importance of infiltration, and proper erosion and sediment control techniques.

The Transportation Maintenance & Repair Division provided internal training to City personnel as part of its Facilities Operation and Quality Control, Removed Substances, and Roadways plan.

Work Plan for 2008 Activities

Identifying additional opportunities and better methods for education and outreach will continue. The City and MPRB will maintain and strengthen partnerships with multiple agencies, including the Metro Blooms Program, Mississippi Watershed Management Organization, Minnehaha Creek Watershed District, Friends of the Mississippi River, Hennepin County, WaterShed Partners, Shingle Creek Watershed Management Commission, Bassett Creek Water Management Commission, the Minnesota Pollution Control Agency, the Minnesota Department of Natural Resources, neighborhood groups, private citizens and business owners. The following initiatives are targeted for implementation in 2008:

- Metro Blooms Program – continued funding of rain garden workshops
- Mobile Water Education Kiosks

- Combined Sewer Overflow (CSO) Program
- Completion and Distribution of Watershed Multi-Cultural Educational DVD
- MPRB Public outreach activities
- Installation of stormwater interpretive signs at public water quality demonstration sites and development of web site with project information and self-guided tour map
- Implementation of multicultural educational needs
- Continued training of and by Public Works staff regarding erosion and sediment control measures, and proper handling of salt for snow and ice control on streets, sidewalks, and parking lots
- Utilizing Minneapolis GIS tools to better communicate to the public what is happening in their watershed and what they can do to help
- Additional web site development and enhancements
- Heart of the Beast '***Water Awareness***' Performances
- Earth Day/Watershed Clean Up activities
- A continued broad-based approach that targets Minneapolis residents, workers and visitors in a coordinated effort to change behavior, that will be reflected in an overall increase of environment knowledge and watershed awareness

Performance Measures

Water quality education unit cost:

Not available at this time.

Storm and Surface Water Management web site:

2007 Stormwater web site statistics:

Total visits:	**36,394**	(up from 33,201 in 2006)
Average visits per day:	**96**	(up from 90 in 2006)
Average visits per visitor:	**2.57**	(up from 2.34 in 2006)
Visitors who visited more than once:	**2,488**	(up from 2,314 in 2006)

XII. Public Participation Process

Program Objective

The objective of this stormwater management program is to maximize the effectiveness of the City's NPDES program by seeking input from the public. Targeted pollutants include:

- All pollutants

Program Overview

The City of Minneapolis and the MPRB are the joint holders of the NPDES Permit, and the Annual Report is a coordinated effort by various City departments and the MPRB. The Permit requires an opportunity for public input in the development of the priorities and programs necessary for compliance. Information in the Annual Report covers the activities that will be implemented for the current year, and provides documentation and analysis of the activities conducted in the previous year.

Each year, the City holds a public hearing at a meeting of the Transportation & Public Works Committee of the City Council. The hearing provides an opportunity for public testimony regarding the Program and Annual Report prior to report submittal to the Minnesota Pollution Control Agency on June 1. The hearing is officially noticed in *Finance and Commerce*, and also publicized through public service announcements on the City cable television channel. This year's public hearing date was May 6, 2008, at 9:30 AM in Council Chambers, Room 317 City Hall, 350 S 5th Street, Minneapolis, MN.

A notice of the availability of the draft Report for review and public comment was sent to all Minneapolis neighborhood organizations, to the governmental entities that have jurisdiction over activities relating to stormwater management, and to other interested parties. The notice was sent by e-mail on April 23, announcing the web site link to the draft Report, and informing that written comments would be accepted until 4:30 PM on Friday May 2, 2008, or in person at the public hearing on May 6.

The notice explained that, due to limited mail delivery, emails or faxes were the preferred methods for submitting written comments. The contact information for written comments was listed as:

City of Minneapolis, Department of Public Works
Surface Water & Sewers Division c/o Mr. Lane Christianson
NPDES REPORT COMMENTS
300 City of Lakes Building, 309 2nd Avenue S, Room 300
Minneapolis MN 55401-2268

Phone: 612-673-2522 Fax: 612-673-2048
E-mail: lane.christianson@ci.minneapolis.mn.us

The draft Annual Report is made available in April and May for viewing or downloading from the City's *Storm and Surface Water Management website* prior to finalization. Once finalized, the Annual Report is also made available on the web site for viewing or downloading. The City Clerk's office also keeps copies of the Annual Report on hand for examination by the public, prior to the hearing date and for a period thereafter. An electronic version of the entire report can also be obtained on CD by contacting Lane Christianson of Minneapolis Public Works at lane.christianson@ci.minneapolis.mn.us or 612-673-2522.

All testimony presented at the public hearing, and all written comments received, are recorded and given due consideration. A response to those public comments is then included with the Annual Report as Appendix C. A copy of the council resolution adopting the Stormwater Management Program and Annual Report Activities is included with the submission to the Minnesota Pollution Control Agency (MPCA) by June 1 of each permit year.

Work Plan

City staff will continue to maintain and update the Storm and Surface Water Management website: *http://www.ci.minneapolis.mn.us/stormwater/*

Performance Measures

- Unit costs are not available.
- Number of interested parties that were directly notified of public hearing and Annual Report availability: 98 (includes 81 neighborhood organizations)

XIII. Coordination with Other Governmental Entities

Program Objective

The objective of this Stormwater Management Program is to maximize stormwater management efforts through coordination and partnerships with other governmental entities.

Program Overview

Coordination and partnerships of the City and the MPRB with other governmental entities include the four watershed organizations in Minneapolis: Bassett Creek Water Management Commission, Mississippi Watershed Management Organization, Minnehaha Creek Watershed District, and Shingle Creek Watershed Management Commission. Coordination activities and partnerships with other governmental entities also include MnDOT, MPCA, neighboring cities, the Metropolitan Council, and various other entities.

The coordination and partnership activities can include the joint review of projects, joint studies, joint water quality projects, stormwater monitoring, water quality education, and investigation or enforcement activities.

Coordination with the Bassett Creek Water Management Commission (BCWMC)

The BCWMC approved its Second Generation Watershed Management Plan in September 2004. Under the current plan, they require stormwater management, erosion control practices and floodplain management for redevelopment projects that are greater than 5 acres. Minneapolis provides yearly financial contributions to the BCWMC annual operations budget. The City and the MPRB are also stakeholders with other BCWMC joint power cities in development of several Total Maximum Daily Load (TMDL) studies and implementation plans.

Coordination with the Mississippi Watershed Management Organization (MWMO)

The MWMO adopted its Second Generation Watershed Management Plan in June 2000. This plan focuses on the creation of water quality capital improvement projects and public education. The MWMO delegates stormwater management requirements for new developments to its member cities and does not provide separate project review and approval. The MWMO receives revenue through direct taxation against properties within its jurisdiction. In 2007, it commenced work on its next generation plan. The City and MPRB participate in its planning committees.

Coordination with the Minnehaha Creek Watershed District (MCWD)

The MCWD adopted its Third Generation Plan in late 2006. The District administers state mandated wetland protection rules and Department of Natural Resources regulations, as well as District rules relating to erosion control (land disturbance of 5,000 square feet or greater), floodplain alteration, wetland protection, dredging, shoreline & stream bank improvements, stream & lake crossings, and stormwater management. The MCWD receives revenue through direct taxation against properties within its jurisdiction. The City of Minneapolis and the MPRB are stakeholders in development of TMDL studies and implementation plans, in collaboration with the MCWD and other stakeholders.

Coordination with the Shingle Creek Watershed Management Commission (SCWMC)

The SCWMC adopted its Second Generation Watershed Management Plan in August 2004. SCWMC reviews plans of any land development adjacent to or within a lake, wetland, or a natural waterway, within the 100-year floodplain, 15 acres or larger (for single-family detached housing use), and 5 acres or larger for all other land uses. SCWMC requires these developments to provide erosion protection during construction, in addition to on-site detention and treatment. Developments also have the option of demonstrating that adequate detention and treatment is available via a regional facility. Minneapolis provides yearly financial contributions to the SCWMC annual operations budget. The City of Minneapolis and the MPRB are stakeholders with other SCWMC joint power cities in development of TMDL studies and implementation plans.

Coordination with the Minnesota Department of Transportation

The City of Minneapolis coordinates with the Minnesota Department of Transportation (MnDOT) in the following ways:

- Erosion control review, inspections, and enforcement
- Plan review of storm and water quality improvements associated with road projects
- Roadway and storm drain maintenance agreements

Coordination with the Metropolitan Council Environmental Services (MCES)

The City of Minneapolis coordinates with MCES in the following ways:

- Review of non-stormwater permit applications
- Inspection of existing infrastructure and regulators
- Joint permittees for Combined Sewer Overflow

Previous Year Activities

Ongoing Coordination Efforts

The Minneapolis Park and Recreation Board (MPRB) and the City of Minneapolis coordinate stormwater management efforts, and coordinate with WMOs and other governmental agencies on a number of water quality projects. Minneapolis Public Works (MPW) maintains communications with all WMOs within the City boundaries. Interactions with WMOs take several forms to facilitate communication and provide support:

- Attend local WMO board and special issues meetings with individual WMO staff
- Attend Education and Public Outreach Committee (EPOC) meetings
- Take part in Technical Advisory Committee (TAC) meetings
- Inform individual WMOs of upcoming City capital projects in an effort to identify projects that may benefit from partnerships
- Provide developers (who submit projects for site plan review) with information and contacts to meet watershed requirements
- Share information and data regarding storm drainage system infrastructure, watershed characteristics, flooding problems, modeling data, etc.

The Environmental Services Division of the Minneapolis Regulatory Services Department coordinates with the MPCA and the MCES regarding investigations and enforcement for incidents of illegal dumping or illicit discharges to the storm drain system.

The MPRB coordinates with individual WMOs, as well as the MCES, on watershed outlet monitoring. The MPRB and the City coordinate and partner with WMOs on capital projects and water quality programs. The MPRB also works with the DNR and surrounding suburbs on various capital projects and programs.

Current Capital Project and Program Partnerships

Bassett Creek Water Management Commission

In 1996, BCWMC developed Wirth Lake Watershed and Lake Management Plan (Lake Plan). Wirth Lake is located in the City of Golden Valley, but owned by the MPRB. The water quality in the lake has typically fallen below the BCWMC's water quality goal. Within the Lake Plan there are identified Improvement Projects complete with recommendations for implementation. The improvement projects

were included in the 10-year capital improvement program for the Second Generation Watershed Management Plan. The Capital Improvement Program (CIP) is funded through an ad valorem tax. Wirth Lake is impaired for phosphorus and a TMDL Study is planned to begin in 2008. Stakeholders include the MPRB, the Cities of Golden Valley and Minneapolis, MnDOT and Hennepin County. The TMDL study will include a public outreach component.

Shingle Creek Watershed Management Commission

A TMDL study for chloride impairment of Shingle Creek was completed and approved by the EPA in 2007. A second TMDL study for Shingle Creek, for biota and dissolved oxygen, is commencing in 2008. Additionally, a TMDL study is underway in 2008 for Crystal Lake, for nutrients. Minneapolis is partnering with the WMO and the other joint powers cities on these watershed-based initiatives.

Mississippi Watershed Management Organization

The water quality components of these capital projects are included in MWMO's capital program:

- **Heritage Park - Near Northside Wetlands**: The City's Near North Redevelopment project includes a "treatment train" approach, with installation of pre-treatment grit chambers, sediment forebays, filtration and infiltration galleries with native plant communities ("wet meadows"), and wet ponds. The stormwater components of this project are scheduled for completion in 2008.

- **University Industrial Park (formerly known as SEMI)**: Redevelopment of the University Industrial Park Area will include the construction of several wet ponds, and may include the installation of a variety of stormwater Best Management Practices (BMPs) such as biofilters, swales, filter strips, rain gardens, and linear urban wetlands. This project is currently being redesigned.

- **MPRB Mississippi River Corridor Restoration Projects**: A series of restoration projects along the shoreline of the Mississippi River. Partners for one or more of these projects include the MPRB, Minneapolis Environmental Services, Minneapolis Community Planning and Economic Development, Minneapolis Public Works, the Minnesota DNR, and the Army Corps of Engineers (USACE). Individual projects are scheduled for completion over 10 years.

Minnehaha Creek Watershed District

- The Blue Water Partnership, comprised of the City of Minneapolis, the Minneapolis Park and Recreation Board, and the Minnehaha Creek Watershed District, has implemented all of the recommendations of the Blue Water Commission's 1998 report except for the second of two

water quality ponds draining into Lake Hiawatha. Completed by the parties under a Cooperative Agreement have been the following: three stormwater ponds, two grit chambers, weir outlet, alum treatment at Lake Nokomis and one stormwater pond at Lake Hiawatha. Neighborhood meetings on the proposed stormwater pond are planned for Fall 2008. The non-profit organization was established in 2002 to focus on monitoring and improving the water quality in Lakes Hiawatha and Nokomis in Minneapolis. Board Members include residents of NENA, SENA and HPDL neighborhoods, as well as residents of other nearby neighborhoods and the MCWD, MPRB 5th District Commissioner Carol Kummer, and the City of Minneapolis 12th Ward Council Member Sandra Colvin Roy.

- The MCWD's Third Generation Plan includes funding for a series of capital projects in Minneapolis. These projects are proposed to help the city manage flooding in areas that also need to remove stormwater from the sanitary sewer. MCWD and the City propose to initiate a green infrastructure approach to these projects. A green infrastructure management approach includes infiltration and evapotranspiration to minimize the flooding caused by wet weather.

Minnesota Department of Transportation

The City of Minneapolis and MnDOT completed a joint study of flooding issues along the I-35W corridor and adjacent Minneapolis neighborhoods. The project included a detailed hydrologic and hydraulic modeling of the I-35W storm tunnel and its contributing drainage area. The modeling effort involved existing conditions, proposed development conditions, and evaluated alternative solutions to solve the current under-capacity problem.

The Minneapolis Local Surface Water Management Plan (LSWMP)

In 2008, the City will submit its Minneapolis Local Surface Water Management Plan (LSWMP), adopted by the City in October 2006, to the Metropolitan Council as a component of the City's updated comprehensive plan, The Minneapolis Plan For Sustainable Growth. The LSWMP was developed to meet the requirements of Minnesota Statute 103B, as well as to provide a resource for City staff. The LSWMP plan serves as a guidance manual for handling regulatory requirement issues, planning for and managing surface water resources and stormwater and sanitary sewer infrastructure, and also for stormwater management for development and redevelopment. The intent of the LSWMP is to benefit stormwater management within Minneapolis, and to improve both the coordination and effectiveness of efforts by the City, the MPRB, and the WMOs.

The LSWMP was prepared to guide the City in conserving, protecting, and managing its surface water resources. Contributors included various City departments, MPRB, MCES, and the four watershed

organizations in Minneapolis. The LSWMP brings together all water resources issues and activities, and identifies improvements, gaps or overlaps that will help to better manage the City's water resources and attain overall goals.

The LSWMP brings together all water resources issues and activities, and identifies improvements, gaps or overlaps that will help to better manage the City's water resources and attain overall goals. The content of the LSWMP is in large part determined by Minnesota Statutes Chapter 103B and Minnesota Rules Part 8410. Web links are provided throughout the document to allow the user to access the wealth of local water resources information available on the Internet. The LSWMP is also a component of the City's draft revised comprehensive plan, The Minneapolis Plan For Sustainable Growth, which will be submitted to the Metropolitan Council in 2008. The Plan can be accessed at City's Stormwater website: *http://www.ci.minneapolis.mn.us/stormwater/local-surface.asp*

Work Plan

Coordination and partnerships on capital projects, water quality programs, and studies will continue. In 2007, participation with other governmental entities in Total Maximum Daily Load (TMDL) studies and implementation plans became a significant new Work Plan component, and this will continue into the foreseeable future. Coordinated activities, and the status of cooperative efforts, shall be provided in each Annual Report.

Performance Measures

Unit costs that would reflect the expenditures of all departments are not available at this time.

XIV. Stormwater and Water Quality Monitoring - Results and Data Analysis

Stormwater Runoff Monitoring Results[12]

Storm event samples were collected May through November, and two snowmelt grab samples were collected in February and March. The target frequency for sample collection was once a month. If a sample was not taken one month, more than one sample was taken the next month. The required number of samples was met or exceeded for the year. The total volume sampled for each site, and the total recorded volume, is given in Table 23B of Appendix A, along with the percentage sampled per season. For detailed information on sampling events see Table 23C of Appendix A. The parameters listed in the Limits and Monitoring Requirements section of the permit were monitored for each sample collected. Multiple bacteria grab samples were taken throughout the season, using standard protocols.

Sampled data for 2007 were fairly comparable to typical urban stormwater data (Tables 23H and 23I of Appendix A, respectively). Table 23H shows median values for residential sampled sites; the results were comparable or less than reported Nationwide Urban Runoff Program (NURP) values. Most MPRB land use category values were comparable to NURP values with the exception of TP and TKN values. All metals were well below NURP values.

While most parameters were comparable to MRPB 2001-2006 data, residential land use Cu (copper) and Pb (lead) values were higher in 2007, as well as TSS (total suspended solids) values for all land use categories. Mixed land use 2007 data were comparably lower for TP (total phosphorus), TSS (total suspended solids) and Zn (zinc). All of the sites for 2007 were comparably lower for Zn (zinc) but higher for TSS (total suspended solids) as compared to our 2001-2006 data and to NURP. It is important to note that the new sites monitored in 2005, 2006 and 2007 are different watersheds and have similar, but not identical, land uses as previously monitored sites in 2001-2004. Most MPRB mean concentrations were comparable to other studies as listed in Table 23I. TP values are most closely related to those monitored by local agencies. Median concentrations from MPRB Sites 1-5a (2001-2004) and 6-9 (2005-2006) were similar to Sites 6-9 in 2007. TKN (total Kjeldahl nitrogen) and TSS (total suspended solids) median concentrations were higher in 2007 while TP (total phosphorus), TDP (total dissolved phosphorus), TDS (total dissolved Solids) and Zn (zinc) concentrations were lower in 2007.

[12]For tables referenced in this section, see Appendix A4 of this report. This section, as well as Appendix A4, are adapted from the 2007 Water Resources Report, which is produced by the Minneapolis Park & Recreation Board. These annual reports can be found at this *Minneapolis Park & Recreation website*.

Best Management Practices Monitoring Results[13]

Best management practices (BMPs) include procedures and structures designed to help reduce water pollution. In 2007, the MPRB monitored two of the City of Minneapolis' stormwater ponds located in north Minneapolis at Heritage Park. Heritage Park is a large redevelopment project of 140 acres which was formerly public housing and a public park. It is now a mix of public and private housing, a public park and an innovative collection of stormwater treatment systems. The treatment train approach using grit chambers, trench forebays or sedimentation ponds, infiltration or filtration galleries, and stormwater ponds was designed for hydraulic mitigation purposes, to help reduce pollutants discharged to the Mississippi River and to create high quality amenities in an amenity-poor area of the City. Level spreaders and flow splitters are also engaged to distribute flows. The stormwater ponds are located north and south of the intersection of Olson Memorial Highway along Van White Memorial Boulevard and are referred to as Heritage Park Pond to the north and Heritage Commons Pond to the south. Heritage Park Pond outlet auto-monitoring began July 30, 2007. The Heritage Commons Pond grab sample monitoring began August 21, 2007, following construction. Heritage Park Pond outlet samples were collected by flow weighted auto-monitoring and grab samples were collected at the Heritage Commons Pond's three inlets and the North outlet.

In 2007 fifteen storm flow weighted events were auto-sampled at the Heritage Park Pond outlet.

In 2007 at the Heritage Commons Pond North outlet, eleven storm events were sampled. Grab samples were also collected at Heritage Commons Pond, six at inlet A, three at inlet B and two at inlet C.

These data will be used to assess and give an indication of the baseline efficacy of the Heritage Park and Heritage Common BMPs and will be compared to data collected in later years. The dates and lab results are presented in Table 24A of Appendix A. Statistics were calculated and are presented in Table 24B of Appendix A. Lab values reported below detection were divided in half for statistical calculations. Mean outlet values in Table 24B show the results for many water quality parameters. The fact that these data were collected with construction ongoing should be interpreted as a baseline of these "disturbed" systems and not as how these systems will ultimately work. Parameters with increased mean output shown in Table 24B at Heritage Commons were TP, TDP, NH3, Cl, TDS and Zn. It is likely that two factors caused this result. First, landscaping installation was ongoing and soil erosion from side-

[13] For tables referenced in this section, see Appendix A5. This section, along with Appendix A5, are adapted from the 2007 Water Resources Report, which is produced by the Minneapolis Park & Recreation Board. These annual reports can be found at this *Minneapolis Park & Recreation website*.

slopes and/or other activities may largely explain some of the findings. Second, a large resident Canada goose population was observed in the outlet pond which likely contributed significant animal waste products. Parameters with decreased mean output at Heritage Commons were NO3NO2, TSS, Cu and Pb. It appears that settling in the pond is removing some TSS and metals.

Total volume recorded at the monitored location and total pollutant load calculations for Heritage Park outlet are given in Table 24C of Appendix A. The Heritage Park total outlet volume recorded for the sampling period 7/30/07 – 11/7/07 was 578,360 cf.

It should be noted that the Heritage Park complex includes an automatic in-ground sprinkler system at Sumner Field Park. It was observed producing runoff into the system (7/30/07) during a non-precipitation event which may have had an unknown effect.

Both Heritage Commons and Heritage Park systems had CDS units, or grit chambers, that appeared to be backing up and malfunctioning with standing water in the upstream pipes. Some of the infiltration basins/trench forebays at Heritage Park appear to be silting in. Design consultant SRF Engineering was made aware of these issues and is investigating. Sediment also appears to be circumventing upstream treatment where silt is being deposited in front of the level spreaders.

It is difficult to draw solid conclusions from this limited data set which included grab samples, limited inlet data and a dynamic system under construction. Further comprehensive study will be needed to explore and answer some of the questions raised. It is laudable for the City and designers to approach stormwater as a resource to be enjoyed and not disposed of in large pipes underground. The Heritage Park systems should serve to connect people to the impact they have on stormwater by being close to it, recreating around it and seeing it.

Minneapolis Lake Trends

In 2007, MPRB scientists monitored 12 of the city's most heavily used lakes. The data collected were used to estimate the fertility or Trophic State Index (TSI) of the lakes. Changes in lake water quality can be tracked by looking for trends in TSI scores over time. These values are especially important for monitoring long-term trends (5-10 years). Historical trends in TSI scores are used by lake managers to assess improvement or degradation in water quality.

All the lakes in Minneapolis fall into either the mesotrophic or eutrophic category, which is as expected for lakes in a fully developed urban area. Calhoun, Cedar, and Harriet Lakes are mesotrophic with moderately clear water and some algae. Brownie, Isles, Hiawatha, Nokomis, Spring, Loring and Powderhorn Lakes are eutrophic with higher amounts of algae. Wirth Lake and Webber Pond fluctuate

between these two categories. Trends in lake water quality can be seen by using the annual average TSI score over the last 14 years.

Lakes showing water quality improvement

- Lake Calhoun
- Cedar Lake
- Lake Harriet
- Powderhorn Lake
- Wirth Lake
- Webber Pond

Lakes with stable water quality

- Brownie Lake
- Lake Nokomis
- Lake Hiawatha
- Lake of the Isles
- Spring Lake

2007 Water Resources Report

The Minneapolis Park & Recreation Board's annual ***2007 Water Resources Report*** is a comprehensive technical reference of water quality information for the citizens of Minneapolis. Due to the length of this document, only the NPDES stormwater runoff monitoring and BMP monitoring sections are included in Appendix A of this Annual Report. Electronic copies of the *2007 Water Resources Report* are available on the MPRB web page at *www.minneapolisparks.org*. The whole report can be found in the "Caring for Our Parks - Lakes & Water Resources- Water Quality" section of the website. Reports are also available to be checked out from every public library in Minneapolis. A CD-ROM copy of the entire report can be obtained by contacting the MPRB Water Quality Section at (612) 230-6400.

XV. Storm Drain System and Drainage Areas Inventory

Storm Drain System Infrastructure

The City of Minneapolis storm drain system handles runoff from approximately 50 square miles, and is the key element in ongoing efforts for flood protection and programs to improve and maintain water quality for the City's wetlands, lakes and streams.

History: From 1870 to 1922, all sewers built in Minneapolis were combined sewers intended to convey both sanitary sewage and stormwater runoff. In 1922, the City began construction of a separate storm drain system in newly developing areas of the City. In older previously developed areas, combined sewers continued as the only drainage system until 1960, when the City began actively separating combined sewers. From 1961 to 1984, construction of new storm drain piping proceeded in conjunction with the City of Minneapolis Residential Paving Program. In 1984, storm drain construction for sewer separation was accelerated because of development of a formalized Combined Sewer Separation program, called CSO Program, Phase I. There are currently 556 miles of main line storm drain piping and 22 miles of deep drainage storm tunnels within the City of Minneapolis. This total does not include the State of Minnesota Department of Transportation, Hennepin County, the University of Minnesota or other agency systems. Approximately 91% of the City's storm drain system is constructed of reinforced concrete pipe (RCP). Service connections to catch basin inlets and private drains are mainly constructed of Polyvinyl Chloride (PVC). In 2003, the Minneapolis Public Works Department (MPW) was assigned to take over the storm drain system of the Minneapolis Park and Recreation Board (MPRB). This added roughly 17.16 miles of mainline piping and approximately 100 outfall control structures to the Minneapolis system (the exact number and delineation of areas drained is to be determined by a field survey). The total replacement cost of the City's storm drain system exceeds $860 million (based on year 2000 dollars). In addition to the main line piping, MPW also maintains approximately 151 miles of catch basin runs.

Structural Controls

The City of Minneapolis owns and operates 25 stormwater pump stations, 147 sedimentation (grit removal) structures, 387 outlets (exclusive of the added MPRB outlets noted above), and 10 stormwater detention ponds/ filtration wetlands. Grit removal structures, detention ponds, and outfall locations are displayed in Appendix B.

Drainage Areas and Discharges

Drainage Areas Inventory: The City of Minneapolis contributes stormwater runoff to Minnehaha Creek, Bassett Creek, Shingle Creek and Mississippi River watersheds. A map of the drainage areas that have been delineated according to topographic contours and the storm drain system is included in Appendix B. The population, size of drainage area, land uses, distribution, and runoff coefficients by body of receiving water are also listed in the appendix.

Stormwater Hot Spots: The City of Minneapolis currently has no known stormwater hotspots.

Event Mean Concentration and Annual Pollutant Loadings

Calculated event mean concentrations and annual pollutant loading are included in Appendix A. The following formula was used to calculate the total annual pollutant load:

L = [(**P**) (**Pj**) (**Rv**) (**C**/1000) (**A***4046.9)], where:

L = seasonal pollutant load, kilograms/season

P = seasonal precipitation, inches/season (meters/season)

Pj = correction factor for storms which do not produce runoff = 0.85

Rv = runoff coefficient

C = median event mean concentration of pollutants, mg/L

A = area, in acres

Conversion factors were used to convert acres to square meters, and to adjust the concentration data units. Conversion factors are as follows:

- 4046.9 for acres → square meters
- 1000 for liters → cubic meters

The Flow Weighted Mean Concentration (FWMC), expressed as a mean of all sites, was used for the annual load estimation calculations. The FWMC most accurately reflects stormwater loading on an annual basis. The seasonal loads were calculated from the pooled data using the median event mean concentration, as there were too few data points from each watershed. The median of the data set is a

better representation of the runoff data than the mean values (Bannerman, et al, 1992). The annual load, and a summation of the seasonal loads, will not be equal due to this difference in calculation methods. Seasonal loads were calculated on the following basis:

Season	Inclusive dates	Precipitation, National Weather Service
Winter/snowmelt	01/01/07 – 03/31/07	**5.32 inches (0.135 m)**
Spring	04/01/07 – 05/31/07	**3.10 inches (0.079 m)**
Summer	06/01/07 – 08/31/07	**14.66 inches (0.372 m)**
Fall	09/01/07 – 12/31/07	**11.24 inches (0.285 m)**