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 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 1st of each year. The Permit also requires public input in the development of the priorities and programs, and adoption of the Annual Report as the City's Stormwater Management Plan. This Report presents the activities that will be implemented for this year, and provides documentation and analysis of the activities conducted during the previous year.

In 1991, The City of Minneapolis started to implement stormwater management programs to mitigate stormwater pollution impacts on local surface waters, along with the preparation of NPDES Permit Application Parts 1 and 2. Program activities include: passage and implementation of a Stormwater Management and Erosion Control and Sedimentation Ordinance; construction of wetlands and stormwater ponds; construction of stormwater sediment chambers, installation of manufactured BMP devices; surface water and stormwater quality monitoring; street sweeping; stormwater drainage system inspection and cleaning; and public education.

The Minneapolis NPDES Stormwater Management program is developed and administered by the City departments that are responsible for permit activities. These departments include the following: Minneapolis Park and Recreation Board; the Engineering Services, Field Services - Sewer Maintenance, and Field Services - Street Maintenance divisions of the Public Works Department; the Environmental Services division of the Department of Regulatory Services; and the City Attorney's Office. These stakeholders are jointly responsible for the completion of the

required Permit submittals. Engineering Services provides program management and completes each Annual Report. The responsibilities of staff to maintain this Permit include the following tasks:

- Program and Annual Report guidance, coordination, production, task assignment, submittal schedule, and procedures establishment
- Revise coding to meet financial reporting requirements
- Propose specific Program goals
- Propose performance measures to be used to gauge effectiveness, success, or benefits of activities
- Propose permit modifications
- Propose new programs and regulatory controls
- Provide education and status updates for policy-makers on Program and Report
- Provide department representatives at public hearings, and provide a response to comments received
- Renew and amend cooperative agreements between the Joint Permittees
- Propose changes, participate in negotiations, and complete applications for new Permits

2005 Highlights

All activities mandated by the Permit have been implemented. A description of each activity that is required by the permit, and the responsible department, is listed on page 8. Below is a summary of accomplishments and noteworthy events by activity category.

II. Storm Drain System Operation

Maintenance operations accomplishments:

- Responded to 466 complaints of plugged or backed-up catch basins.
- Responded to 66 complaints of cave-ins around catch basins and manholes.
- Completed 395 minor repairs to storm drain lines, catch basins or manholes.
- Completed 27 major repairs.
- Cleaned 8.02 miles of storm drain by jetting.
- Televised 4.69 miles of storm drain.

III. Structural Controls Maintenance and Operation

- Monitored and maintained 25 pump stations.
- Inspected 121 and cleaned 90 grit chambers. A total of 626 cubic yards or about 870 tons of grit was removed.
- Maintained 10 (up from 9 in 2004) stormwater holding ponds.
- Inspected 120 of 387 storm drain outfalls in 2005 inspection program. Of the 120 outfalls inspected, 11 were judged to be in need of maintenance.

V. Stormwater Management for New Developments and Construction

Public Works' staff have been reviewing the Storm Water Management Ordinance for potential modifications. Revisions will be recommended following careful analysis. Site inspections and other work associated with the erosion and sedimentation control program have been increased substantially after a full time employee was hired for the task.

Other accomplishments:

- Minneapolis Public Works took part in the preliminary review of over 250 site plans. Of those 250 sites, 160 site plans eventually received City of Minneapolis Planning Commission approval, were routed for final review, and received permits.
- Over 40 sites provided some sort of Stormwater BMP. The BMPs that were proposed included rain gardens, pervious pavement, infiltration areas, ponds and underground detention facilities. When installed, these BMPs will provide rate control and water quality for over 100 acres of land. City personnel coordinated 3,061 site inspections for erosion and sediment control compliance, with 8 sites receiving enforcement action for non-compliance.
- Number of sites captured for stormwater management: 26
- Number of BMPs installed as a result of current programs: 350
- Number of properties receiving quality or quantity credits: 215

VI. Roadways

The 2004-2005 winter season was a cold year though many small snow events with the most snowfall in January and February, two snow emergencies and 156 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 weighing of trucks and multiplying by 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:

- 12,500 tons of salt was applied to roadways
- 9,400 tons of sand was applied to roadways
- 16,200 tons of material was reclaimed during spring and summer street sweeping operations
- 5,700 tons of leaves were collected (for composting) during the fall citywide sweeping
- Twenty staff members attended an eight hour refresher for the 40-hour hazardous materials training class

VII. Flood Control

During 2005, several flood projects realized significant progress. The following is a summary of Flood mitigation project activity in 2005:

Flood Mitigation Area 1

- Pipe work completed on 42nd from Newton to Russell.
- Road restored at 42nd & Russell.

Flood Area 5 - 35th Ave. N. to Dowling Ave. N. & Washburn to Morgan Ave. N.

- The XPSWMM model and engineering report were completed

Flood Area 8 - 3rd St. N at 23rd Ave. N.

- The XPSWMM model and engineering report were completed

Flood Area 14 - 40th St. E from 4th to 5th Ave. S

- The XPSWMM model and engineering report were completed

Flood Area 18 - 47th St. W between Pleasant Ave. S. and Garfield Ave. S.

- The XPSWMM model and engineering report were completed

Flood Mitigation Area 19 – Phase II Tunnel Construction

- Project was completed on September 20, 2005.

Flood Mitigation Area 19 – Phase III Construction by City Crews

- The Grit Chamber near Upper Harriet Parkway was completed.

Flood Area 25 - 44th St. W. to MNDOT I-35W tunnel

- The XPSWMM model and engineering report were completed

Flood Mitigation Area 27

- Road resurfacing is completed on 30th and 29th Ave S from 40th to 38th St E.

Flood Area 29 - 50th to 51st St. W. and York to Zenith Ave. S.

- The XPSWMM model and engineering report were completed

Flood Area 30 - 51st St. W & Abbott Ave. S.

- The XPSWMM model and engineering report were completed

Flood Area 38 - Dean Parkway

- The XPSWMM model and engineering report were completed

Flood Area 39 - 36th Street E from 4th Ace. S. to the Mississippi

- The XPSWMM model and engineering report were completed

VIII. Pesticides and Fertilizer Control

The Minneapolis Park and Recreation Board manages 6,400 acres of parkland in the City of Minneapolis (18% of 35,244 total land acres).

Accomplishments:

The Minneapolis Park & Recreation Board (MPRB) continued water quality education programs throughout the City in 2005. With storm water education models and printed materials in hand, Environmental Operations Naturalist staff participated in 56 Minneapolis community festivals (such as May Day, Stone Arch Bridge Art Festival), and events (Aquatennial, Log Rolling Championships), neighborhood celebrations (like local corn-feeds and Pageant Hill), and concert series at local water bodies (Lake Harriet, Minnehaha Park, Loring 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. Bookmarks, temporary tattoos, stickers, and water quality informational materials were also distributed at these events.

IX. Illicit Discharges and Spill Control

Accomplishments:

- Successfully addressed 164 calls for emergency response (containment of spills, chemical dumping, illegal disposal or handling of regulated or hazardous materials).
- 41 direct connections (registrations) to the storm drain (NPDES Permits)

- Investigated 301 water and land pollution complaints (illegal dumping, improper storage of material , chemical storage)
- Sewer Maintenance responded to, and subsequently mitigated 16 spills in 2005
- Notices sent to 48 residential erosion control permit holders of 479 erosion permits issued for residential, multi-family and commercial projects.
- Inspected 15 contaminated soil complaints

XI. Public Education

The Public Works Department managed the 2005 Stormwater Education Program. These efforts included partnerships with third party organizations and the MPRB, extensive distribution of information via the City's Website, and various other educational initiatives.

XIII. Coordination with Other Governmental Agencies

In 2005, the City continued its coordinated efforts with the following four watershed management organizations: the Bassett Creek Watershed Management Commission, the Shingle Creek Watershed Management Commission, the Mississippi Watershed Management Organizations, and the Minnehaha Watershed Management District. In addition, the City coordinated efforts with the Minnesota Pollution Control Agency, Metropolitan Council Environmental Services, Hennepin County, and various other governmental agencies.

XIV. Stormwater and Water Quality Monitoring

Accomplishments:

- In 2005, the MPRB monitored one of the City of Minneapolis' stormwater ponds located in north Minneapolis. The pond was designed for flood mitigation purposes and to help reduce pollutants. The stormwater pond is referred to as Logan Pond, which is located at 29th Ave. N. and Logan Ave. N.
- In 2005, the MPRB monitored the permeable paver lot located at the City of Minneapolis' Animal Shelter in north Minneapolis.
- 11 lakes/ponds show stable water quality or water quality improvements.
- Continued Wetland Health Evaluation Project begun in 2002 including Diamond Lake.

Program Assessment

Program strengths:

- A coordinated effort among City departments and other governmental entities
- An exchange of information among City departments, other governmental entities, environmental and citizen's groups, in an effort to implement stormwater management programs
- Increased awareness and clarification of roles and responsibilities of City departments
- Development of uniform documentation and reporting procedures

Program weaknesses:

- Limited flexibility to modify requirements of programs to fit the specific needs of Minneapolis
- Lack of Federal or State support for funding of the stormwater management program
- Extensive amount of documentation and record-keeping associated with permit compliance

The current permit expired on January 1st of 2004. A permit renewal application has been submitted to MPCA. The City will continue its program under the existing permit until the new permit is received.

Structural Controls Maintenance and Operation	*Responsible department:* Public Works Field Services, Sewer Maintenance
	Activities: ▪ Inspect controls (grit chambers, ponds, pump stations, other controls) at least 2 times a year. ▪ Adjust frequency of inspections after 2 years as indicated to prevent pollutants being conveyed to the receiving water. ▪ Inspect 20% of outfalls on a rotating basis. ▪ Perform maintenance and repairs as needed, or provide a schedule for work required. ▪ Document inspection results, date, antecedent weather conditions, sediment storage and capacity remaining
Storm Sewer System Operation and Quality Control	*Responsible department:* Public Works Field Services, Sewer Maintenance
	Activities: ▪ Maintain all facilities or systems in good working order and operate as efficiently as possible ▪ Provide adequate operating staff to insure compliance with the conditions of this permit
Disposal of Removed Substances from Structural Controls	*Responsible department:* Public Works Field Services, Sewer Maintenance
	Activities: ▪ Dispose of removed substances in a manner that will prevent pollution and comply with applicable regulations ▪ Document quantity of removed substances and categorize by structural control source, type of substance, and season
New Developments and Construction	*Responsible department:* Regulatory Services, Environmental Management Public Works, Engineering Services
	Activities: ▪ Use a planning process (site plan review) to regulate construction, and require erosion control and stormwater management
Roadways	*Responsible department:* Public Works Field Services, Street Maintenance
	Activities: ▪ Sweep at least twice a year ▪ Document frequency, methods, quantity of material picked up (categorize by season and/or material), disposal of materials. ▪ Use techniques or practices to minimize runoff of deicing materials from application and handling activities. ▪ Document quantity of materials used each year. ▪ Minimize runoff of deicing materials from storage – document location and condition of all storage facilities, planned improvements.
Flood Control	*Responsible department:* Public Works, Engineering Services
	Activities: ▪ Design flood control projects to minimize the impacts on the water quality of the receiving water. ▪ When planning repairs, improvements, or changes for flood control devices; evaluate the feasibility of retrofitting the existing devices to provide additional pollutant removal from stormwater discharges.
Pesticides and Fertilizers	*Responsible department:* Minneapolis Park and Recreation Board
	Activities: ▪ Implement a city wide education program regarding the proper application of pesticides and fertilizers. ▪ Conduct a pilot project to investigate the use of pesticides and fertilizers on City facilities.
Illicit Discharges and Improper Disposal to Storm Sewer System	*Responsible department:* Regulatory Services, Environmental Management Public Works Field Services, Street Maintenance Public Works Field Services, Sewer Maintenance
	Activities: ▪ Provide appropriate control measures for non-stormwater discharges ▪ Conduct field screening annually in 20% of the drainage areas. ▪ Prohibit disposal of motor vehicle fluids & household chemical wastes ▪ Report number of spills and unauthorized discharges that occurred and the response to the spills. ▪ Educate staff regarding the duty to notify the Department of Public Safety Duty Officer. ▪ Adopt notification protocol for response and containment of materials
Storm Sewer Design for New Construction	*Responsible department:* Public Works Engineering Services
	Activities: ▪ Design & construct new storm drain and BMPs to capture runoff and pollutants
Public Education	*Responsible department:* Minneapolis Public Works
	Activities: ▪ Conduct a public education program to promote, publicize, and facilitate the proper management of stormwater discharges.
Public Participation Process	*Responsible department:* Public Works Engineering Services
	Activities: ▪ Adopt a process to allow for public input into the development of priorities and activities necessary to maintain compliance with this permit. ▪ Conduct a public hearing or other meeting where the opportunities for public testimony is available prior to annual report submittal & notify all governmental entities with jurisdiction over activities related to stormwater management in the area. ▪ Include a formal resolution from the City Council adopting the report with a summary of the public input received and the City's response
Coordination with Other Governmental Entities	*Responsible department:* Public Works Engineering Services Planning Department
	Activities: • Submit an annual report by June 1of each year describing how the different governmental entities are cooperating and coordinating efforts in managing stormwater related activities in the drainage area including goals for each cooperative effort, where and how the activity will be performed, & schedule for implementation.
Stormwater Monitoring	*Responsible department:* Minneapolis Park and Recreation Board
	Activities: ▪ Conduct runoff monitoring. ▪ Provide analysis of data collected.

II. Storm Drain System Operation and Quality Control

Program Objective

The objective of this stormwater management program is to minimize the discharge of pollutants through the proper maintenance and operation of the City's storm drain system. Targeted Pollutants: Sediment, Nutrients

Program Overview

The Field Services - Sewer Division, of the Public Works Department, maintains the City's storm drain and sanitary sewer systems. Current staffing of the division is 49 permanent, full time and 2 seasonal employees. Routine operations including the following; inspection, cleaning, repairing, and reconstruction of storm drains, control structures, pump stations, and grit removal structures. The table below shows the base operational functions of the Division along with the corresponding staffing.

Crews	Staff/crew	Type	Tasks
4	2	Route	Daily inspection of storm and sanitary systems, respond to complaints and minor problems
6	2	Jet	Clean storm and sanitary by jetting
2	2	TV	Televise and inspect storm and sanitary
2	2	Repair	Handle minor and major repairs of storm and sanitary
2	3	Disc	Clean sanitary by deicing
3	2	Vacuum	Clean grit chambers, manholes and inlets in paving areas, and assist other crews
1	2	Rodding	Clean roots in sanitary by rodding
1	2	Pond	Maintain stormwater ponds
1	3	Shop	Lift station maintenance and repairs, equipment repairs and shop work

Previous Year Activities

The Field Services - Sewer Division, of the Public Works Department, actively engaged in the cleaning and repair of the City's storm drain system in 2005. Some of the more noteworthy accomplishments are summarized in the following list.

- Responded to 466 complaints of plugged or backed-up catch basins.
- Responded to 66 complaints of cave-ins around catch basins and manholes.
- Completed 395 minor repairs to storm drain lines, catch basins or manholes.
- Completed 27 major repairs.
- Cleaned 8.02 miles of storm drain by jetting.
- Televised 4.69 miles of storm drain.

Work Plan

- Maintenance and repair operations of the City's storm drain system are budgeted to continue at the approximately the same levels as the previous year.

Performance Measures

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Miles of storm drain inspected per year 4.69 miles @ $0.98 / ft.

Miles of storm drain cleaned per year: 8.02 miles @ $1,795 / mile.

III. Structural Controls, Maintenance, and Operation

Program Objective

The objective of this stormwater management program is to minimize the discharge of pollutants through the proper operation and maintenance of stormwater structural controls. Structural controls in the context of the NPDES permit are devices in the storm drain system used to control flow rates and water quality. These structures can include grit chambers, retention/detention ponds, outlets, inlets, pump stations, and weirs.

POLLUTANTS TARGETED: Sediment, Nutrients

Program Overview

Generally, the Sewer Maintenance department inspects their structural control facilities routinely, and performs maintenance as needed to ensure proper operation. Frequency of inspections and maintenance are event-driven in some cases, and based on maintenance experience and inspection results history.

The number of grit chambers installed (as devices for sediment, debris, and oil collection) in the City is steadily increasing. These facilities are inspected in the spring and fall of each year, and then cleaned, if cleaning is required. The amount of sediment removed, the presence of floatables, and the dates that devices were cleaned, are recorded by maintenance crews on log-sheets, and then logged into a database.

Storm drain outfalls are inspected on a five-year schedule; site visits of outfall locations yield information on the condition of structures, any significant erosion observed, and whether or not repairs are necessary. Any indications of upstream illicit discharges or improper disposal are immediately reported to Minneapolis Environmental Services for further investigation. Any identified maintenance or repairs are prioritized and scheduled as soon as practicable within the constraints of resources, budget, and the schedules of other essential operations.

Ponds and pump stations are routinely inspected after significant rainfall events that may require a maintenance response. Catch basins are cleaned to remove accumulated sediments, trash, and debris. This activity is done in an effort to prevent pollution of receiving waters, and to minimize flooding problems. Street Maintenance workers annually inspect and clean basin grates on street sweeping routes. Sewer Maintenance crews remove debris and sediments from

blocked structures discovered in the course of their operations, or reported by Public Works field personnel, and also by residents. Other controls are serviced on an as-needed basis.

Previous Year Activities

- Monitored and maintained 25 pump stations.
- Inspected 121 and cleaned 90 grit chambers. A total of 626 cubic yards.
- Maintained 10 (up from 9 in 2004) stormwater holding ponds.
- Inspected 120 of 387 storm drain outfalls in 2005 inspection program. Of the 120 outfalls inspected, 11 were judged to be in need of maintenance.

Work Plan

After a review of the current activities and record keeping practices, the Division has determined that it will continue its five-year storm drain outfall inspection program. Work schedules will then be prepared based on inspection results.

Performance Measures

Note: Unit costs (shown below) include overheads (labor, administrative, general fund) and equipment costs. Structures operated and maintained annually:

25 pump stations @ avg. cost $4,878 / station

10 stormwater holding ponds @ avg. $12,973 / pond.

IV. Disposal of Removed Substances

Program Objective

The objective of this stormwater management program is to dispose of substances removed from structural controls, in a manner that will prevent pollution, and that will comply with applicable regulations.

POLLUTANTS TARGETED: Sediment, Nutrients

Program Overview

Removed substances are screened for visual or olfactory indications of contamination. If contamination of the material is suspected, the Public Works Engineering Laboratory will select representative samples for an environmental analysis. Disposal will be in a landfill, or another site that is approved by the Minnesota Pollution Control Agency (MPCA). During cleaning operations, erosion control measures are applied when needed to prevent removed material from re-entering the storm drain system.

Previous Year Activities

Operations crews removed 626 cubic yards. The material removed consisted primarily of sand collected from grit chambers that are designed to retain sediment before it affects any receiving water. See Section III for Maintenance and Operation details.

Work Plan

Continue to screen removed substances for contamination that may require hazardous disposal means, and properly dispose of all removed substances.

Performance Measures

Quantity of materials removed: 626 cubic yards @ $154.30/cy

Sewer Maintenance responded to, and subsequently mitigated 16 spills in 2005

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 control, and long term stormwater management review and implementation.

Targeted pollutants include: Mercury, TSS, BOD5, Phosphorus, Nitrate + Nitrite

Program Overview

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

Site Plan Review

A site plan review determines compliance with local ordinances and applicable state building and mechanical codes; this review is done by a city planner. When the planner gives approval, the next step is to apply for permits.

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". This ordinance was designed with the intent of regulating topsoil disturbances, thus limiting soil from entering the storm drain system.

Requirements

Sites disturbing more than five cubic yards, or 500 square feet, need an erosion control permit. This includes utility excavations, and any residential or commercial demolition projects. Erosion and Sedimentation Control (ESC) permits must be acquired prior to commencement of work. Demolition and construction sites also require an approved erosion control plan if there will be a disturbance of greater than 5,000 square feet. The erosion control permit must be submitted before a building permit will be issued for the site.

Enforcement

Ongoing site inspections are performed by Public Works and Regulatory Services inspectors. A violation of the ordinance is a misdemeanor (which holds a maximum penalty of $700 and/or

ninety days in jail). 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 (Chapter 587, Article 9, Section 4). If there is a demonstrated failure to comply, the City reserves the right to terminate an ESC permit at any time. The City would then have the option of proceeding with the necessary restoration of the site. This restoration would be done at the expense of the owner/permittee.

Long-term Stormwater Management

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 land disturbance activities 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. Sites less than 1 acre are encouraged to incorporate stormwater BMPs in their design as a means of satisfying other city codes such as green space requirements. These plans are reviewed through the Public Works Site Plan Review process.

Registration

Stormwater devices will be registered with the City of Minneapolis Department of Regulatory Services, with an annual permit being required for each stormwater device registered. A maintenance and inspection program will be 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

Stormwater "Buy Out"

This option is reserved for those sites that can demonstrate that they do not have sufficient space for stormwater treatment structures. Therefore, with approval of the City Engineer, the ordinance allows developers to contribute to the construction of a regional stormwater facility in lieu of on-site treatment. The fee for contribution to a regional facility is currently set at $15,000. Final Plan approval is contingent upon the City receiving final payment.

Previous Year Activities

Site Plan Review

During 2005, Minneapolis Public Works took part in the preliminary review of over 250 site plans. Of those 250 sites, 160 site plans eventually received City of Minneapolis Planning Commission approval, were routed for final review, and received permits. Increased attention to erosion control plan submittals provided for better compliance with site inspections. The site plan review process was instrumental in providing for increased awareness of our erosion control requirements, in addition to allowing for an increase in stormwater management BMPs.

Erosion Control

A lead inspector for erosion control inspections was approved by Council and filled in late 2004. Increased attention to erosion control plan submittals coupled with a proactive inspection program saw site compliance rise. 2005 inspections resulted in 3,061 site inspections for erosion and sediment control compliance, with 8 sites receiving enforcement action for non-compliance. In addition to the enforcement of the ordinance, inspectors use their time in the field to help educate the contractors by providing information, directing contractors to resources, and assisting with site BMP inventories.

In addition to the above private site inspections, engineering Services staff have worked with internal forces on erosion compliance. Inspectors provided site inspections for Street, Bridge, Traffic, Sewer and Water construction forces to improve compliance. Improved understanding of Erosion control BMP's, by City Construction Forces, will allow for inspectors to focus on private sites improving control compliance city-wide.

A program initiative which provides for an exchange of information between The City of Minneapolis and the Minnehaha Creek Watershed District has been initiated. This program allows each agency to be aware of enforcement actions or problem sites in a timely manner. This

coordinated enforcement and joint inspections have provided for increased awareness and compliance in the MCWD.

Long-Term Storm water Management

- During 2005, over 40 sites provided some sort of Stormwater BMP. The BMPs that were proposed included rain gardens, pervious pavement, infiltration areas, ponds and underground detention facilities. When installed, these BMPs will provide rate control and water quality for over 100 acres of land. The increased development of existing sites has provided an opportunity to lessen the impacts of urbanization on the Mississippi River and other Minneapolis water resources.
- A storm water Management Facility was constructed with previously collected buyout funds. This facility serves the new City of Minneapolis Parking Ramp, associated developments, and four existing sites. This underground treatment facility will provide treatment to a level of 70% TSS removal for a 12 acre sub watershed.
- In order to meet Site plan requirements, the Minneapolis Downtown Library installed an extensive green roof. This roof will provide for improved water quality and a reduction of site runoff. Public Works has provided funding for the liner that will provide the base for the soil and vegetation that will cover the roof. Public Works completed the analysis of the costs associated with onsite treatment, as well as the cost benefit to the city for regional vs. on site treatment.
- Public Works begin an analysis on the effects of reducing the threshold for sites which are captured by the site plan review process.
- The Minneapolis Storm water Utility took effect on March 1, 2005, and provides a more equitable way of charging for stormwater services. The new rate is based on impervious cover and lot size, as opposed to sewer/water use. A major component of this ordinance was the associated credit program which provides a credit for those properties that can provide on-site treatment or retention. During the first 9 months of the program, credits applications were submitted on behalf of nearly 200 properties. These properties provided either water quality or quantity improvements which included BMPs ranging from small rain gardens to wet ponds with over an acre of surface.

Work Plan

Site Plan Review

Public Works staff currently continues their detailed review of site plans, while utilizing a *Stormwater Project Review Application Form* and a tracking process to identify stormwater management opportunities. This will aid in the better understanding and implementation of erosion control and stormwater BMPs. Despite limited resources, Public Works has been endeavoring to track the type, location, and number of constructed stormwater BMPs. The process for site plan review has worked in the best interests of water quality. 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 see a continuing increase in the overall rate of compliance city-wide. 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 still yet to be thoroughly implemented 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.
- Continuing efforts by Public Works Staff to provide education both on an internal and external basis.

Long-Term Storm water Management

Current activities will assure the continuation of the progressive nature of our program. In addition to current activates, Public Works will continue to work on the following tasks (initiated in 2005) to improve its program.

- Public works will continue to promote water quality initiatives through the Storm water Utility Credit, while exploring new regulations that may accelerate the goals of the permit. Understanding that while incentives may provide some improvement in water quality, they will not by themselves dramatically reverse the negative impacts that urbanization has had on our water quality.

- Public Works will put forth an amendment to the stormwater ordinance to increase the buyout fee. This increased buyout fee has been derived by a careful analysis of all costs associated with onsite treatment, as well as the cost/benefit to the City for regional vs. on site treatment.
- Public Works will complete a thorough analysis of the effects of reducing the threshold for sites which are captured by the site plan review process. This analysis will yield the following information:
    1) How many sites would be captured with the lower threshold?
    2) Annual projected removals (TSS, Phosphorous).
    3) What would be the increased regulatory and inspection costs?

Performance Measures

- 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. In order to better report on the improvements made in water quality, Public Works will work to create new performance measures and to determine a better means of tracking them. New Measures may include:
    1) Total acres providing water quality treatment on site.
    2) Regulatory cost per site.
    3) Cost vs. compliance benefit
- Current Performance measures include
    1. Number of sites captured for stormwater management: 26
    2. Number of BMPs installed as a result of current programs: 350 ([1])
    3. Number of properties receiving quality or quantity credits: 215

[1] Preliminary data only, A benchmark will be set during 2006 to determine the total number of sites city-wide implementing BMPs as a result of the current programs.

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, BOD5, COD, Phosphorus and Chlorides

Program Overview

Street Sweeping

Citywide sweeping operations occur every year in the spring and fall. All City streets and alleys are swept systematically; enforcement of temporary parking bans aide 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 daily area sweeping. Downtown and other high traffic commercial areas are swept at night on a weekly basis. In addition, summer sweeping in the Chain of Lakes watershed 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. Street sweeping techniques now utilize a combination of air regenerative and mechanical sweepers. Mechanical sweepers are best for sweeping where the debris is heavy, and then air regenerative street sweepers can be used to vacuum-up some of the remaining, finer materials. Under the current program, each street in Minneapolis is swept a minimum of 4 to 5 times each year.

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). In 2003 a five year 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

Street Maintenance applies salt and sand to City roadways every winter for snow and ice control. Efficient application of deicing 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. 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.

Storage of Deicing 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. These facilities were designed, according to MnDOT 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. S. 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 198 Aldrich site, this will be abandoned when the new complex is built. The new maintenance yard will employ the most effective BMPs available, including runoff collection systems that would be installed around salt and sand stockpiles, and truck washing areas.

Previous Year Activities

The 2004-2005 winter season was a cold year with many small snow events. The most snowfall was observed in January and February. There were two snow emergencies, and 156 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 weighing 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:

- 12,500 tons of salt was applied to roadways
- 9,400 tons of sand was applied to roadways
- 16,200 tons of material was reclaimed during spring and summer street sweeping operations
- 5,700 tons of leaves were collected (for composting) during the fall citywide sweeping
- Twenty staff members attended an eight hour refresher for the 40-hour hazardous materials training class
- All divisional 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. Presently, 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 material recovered as a percentage of material applied: 135.0%

Amount of salt and sand applied relative to total snowfall: 690 tons/inch

VII. Flood Control

Program Objective

The objective of the City's stormwater management program is to design flood control systems that manage stormwater quantities while minimizing the impacts on the water quality of the receiving water body.

Targeted pollutants include the following: Volatiles, Metals, Cyanide, Phenols, TSS, BOD5, COD, Bacteria, Oil & Grease, Phosphorus, and Nitrogen.

Program Overview

In July of 1997, Minneapolis experienced torrential rainstorms that severely overburdened the existing City's storm sewer system. The rainstorms caused flooding at locations throughout the City. The flooding resulted in physical damage to homes, businesses, and automobiles. In response to the flooding, Minneapolis Public Works established the Minneapolis Flood Mitigation Program. Under the program, potential solutions and a plan for implementation were developed for each of 39 areas of the city that experienced flooding and property damage as a result of the 1997 storms. The program began in 1998 and was originally scheduled to run through 2009. Due to state of the City's available finances, the flood program has been temporarily deferred. New flood areas have been identified since 1997. These new flood areas have been identified by residents or through continued analysis of the system. These additional project areas are being considered for future funding.

The ongoing flood mitigation program includes application of the following design features:

- Construction of dry detention basins
- Construction of stormwater ponds
- Upgrading existing storm sewers to accommodate open channel flow during a 10-year 24-hour design[1] and provide protection to homes from the 100-year storm
- Replacing catch basin grates to provide for more inlet capacity, and construction of additional catch basin inlets to reduce run-by into low areas
- Installation of back-up generators for existing pump stations

[1] City of Minneapolis 10 year design based on a 4.2" - 24-hour rain event.

- Increased inspection and maintenance of catch basin inlets and storm drains that are located within flood-sensitive areas
- Reducing sewer back-ups by removing cross-connections between storm and sanitary sewer systems, by continuing efforts to reduce I & I (inflow and infiltration), and by replacing standard manhole covers in low areas with watertight sealed covers.
- Inclusion of various BMPs including Grit Chambers, Rain Gardens, Permeable Pavers, etc…

Previous Activities

The following is a summary of Flood mitigation project activity in 2005:

Flood Mitigation Area 1

- Pipe work completed on 42nd from Newton to Russell.
- Road restored at 42nd & Russell.

Flood Area 5 - 35th Ave. N. to Dowling Ave. N. & Washburn to Morgan Ave. N.

- The XPSWMM model and engineering report are complete

Flood Area 8 - 3rd St. N at 23rd Ave. N.

- The XPSWMM model and engineering report are complete

Flood Area 14 - 40th St. E from 4th to 5th Ave. S

- The XPSWMM model and engineering report are complete

Flood Area 18 - 47th St. W between Pleasant Ave. S. and Garfield Ave. S.

- The XPSWMM model and engineering report are complete

Flood Mitigation Area 19 – Phase II Tunnel Construction

- Project was completed on September 20, 2005.

Flood Mitigation Area 19 – Phase III Construction by City Crews

- The Grit Chamber near Upper Harriet Parkway was completed.

Flood Area 25 - 44th St. W. to MNDOT I-35W tunnel

- The XPSWMM model and engineering report are complete

Flood Mitigation Area 27

- Road resurfacing is completed on 30th and 29th Ave S from 40th to 38th St E.

Flood Area 29 - 50th to 51st St. W. and York to Zenith Ave. S.

- The XPSWMM model and engineering report are complete

Flood Area 30 - 51st St. W & Abbott Ave. S.

- The XPSWMM model and engineering report are complete

Flood Area 38 - Dean Parkway

- The XPSWMM model and engineering report are complete

Flood Area 39 - 36th Street E from 4th Ace. S. to the Mississippi

- The XPSWMM model and engineering report are complete

Work Plan

The following a summary of scheduled Flood mitigation project activities:

Flood Mitigation Area 1

- Pond excavation currently under construction.

Flood Mitigation Area 19 – Phase III Construction by City Crews

- With regards to the connection and inlets at Aldrich & 44th, the work will be coordinated with the Flood Area 24/CSO 26 project and will start in 2006.

Flood Mitigation Area 21/22

- Flood Area 21/22, Lake Hiawatha/Blue Water Partnership – Zone 1
  - City personnel are in the process of requesting funding for the 2007 – 2011 CIP.
- Flood Area 21/22, Bloomington Ave. – Zone 2
  - City personnel are in the process of requesting funding for the 2007 – 2011 CIP.
- Flood Area 21/22, Sibley Field – Zone 3
  - City personnel are in the process of requesting funding for the 2007 – 2011 CIP.

Flood Area 24/CSO 26

- The Flood Area 24 storm drains were designed to discharge to the new storm tunnel constructed along W 44th St form Aldrich Ave S to Lake Harriet to resolve Flood Area 19 (W 44th St & Aldrich Ave S) Construction for Flood Area 24 will not start until Flood Area 19 is complete.
- Construction to begin in 2006

Flood Mitigation Area 27

- The final 2 blocks of box culvert construction on 28th Ave S is anticipated to begin in March 2006.
- Street reconstruction on 28th Ave S will be completed in summer 2006.

Performance Measures

The Flood Program Projects provide removal of TSS, nutrients, litter, and other pollutants, as well as providing some rate control. The performance will be realized in reduced neighborhood flooding, and increased water quality of Minneapolis Water bodies.

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 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 provide recommendations regarding natural resource vegetation management. The Coordinator regularly attends 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 that is usually held at park facilities. The training is offered and coordinated by the University of Minnesota. This effort is in conjunction with the Agronomy Services Division of the Minnesota Department of Agriculture.

Pilot Project to Investigate the Use of Pesticides and Fertilizers

The Minneapolis Park and Recreation Board (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 Water Milfoil 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 biocontrol program using a weevil predator for Eurasian Water Milfoil. Purple loosestrife, an invasive emergent plant, is controlled using a leaf-feeding beetle as part of the UMNs biocontrol 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. Eurasion Water Milfoil 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 Water Milfoil 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 1980's, 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 monthly "Pre Fire" plans provide detailed information to the fire department as to how to deal with a 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 resulting 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. This ordinance regulates the rate of application of turf and phosphorus-containing fertilizers. The ordinance prohibits the application of phosphorus-containing and turf fertilizers, with the following exceptions:

- If the fertilizer is organic
- If the fertilizer is being applied to newly established turf
- If a soil test has been taken that indicates that the turf needs phosphorus

Fertilization of turf on Minneapolis Park Board Property is applied to 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.

Public Education Program

Minneapolis Park and Recreation Board staff televises programs to address water quality issues in the City of Minneapolis: "Every Curb is a Shoreline" is a 20-minute video that runs daily on Minneapolis Cable TV. This video, developed in conjunction with the University of Minnesota Extension Service, educates people about stormwater runoff, and how lawn care practices affect water quality. "Billy Bass and the Lake He Calls Home" is a 5-minute video developed by the Minneapolis Park and Recreation Board as part of an elementary school educational program. The video addresses how litter, and other forms of pollution, affect the lake that Billy Bass lives in, and goes on to discuss what children can do to help. This video airs daily during the after-school time slot.

The Minneapolis Park and Recreation Board (MPRB) continued water quality education programs throughout the City in 2005. With storm water education models and printed materials in hand, Environmental Operations Naturalist staff participated in 56 Minneapolis community festivals (such as May Day, Stone Arch Bridge Art Festival), and events (Aquatennial, Log Rolling Championships), neighborhood celebrations (like local corn-feeds and Pageant Hill), and concert

series at local water bodies (Lake Harriet, Minnehaha Park, Loring 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. Bookmarks, temporary tattoos, stickers, and water quality informational materials were also distributed at these events.

Previous Year Activities

Staff Pesticide Applicator Licensing and Continuing Education

Currently 160 MPRB employees hold pesticide applicator licenses, through the Minnesota Department of Agriculture (MDA).

Pilot Project to Investigate the Use of Pesticides and Fertilizers

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 in the 2002 fertilizer bid. This was doe 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 2005, 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 member receives national recognition as a Certified Audubon Cooperative Sanctuary. Minneapolis Park and Recreation Board Environmental Operations staff, working with Theodore Wirth and Meadowbrook Golf Course foremen, received the ACSP certification for both courses. MPRB staff conducts water quality and aquatic vegetation monitoring at the courses.

Work Plan

- Maintain vegetation database: Environmental Operations staff is working to establish documentation data entry procedures for IPM, chemical applications on the MPRB's Environmental Operations' vegetation database.
- 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 Development Agency, 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: 160

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 nonstormwater discharges.

Targeted pollutants include all Pollutants.

Program Overview

Hazardous Spills

Public Works Street Maintenance, the Fire Department, and the Regulatory Services Environmental Services unit coordinate training for emergency spill procedures.

Typical Spill Response

Environmental Services and 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 reuse, or 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 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 Street Maintenance for handling spills is documented in the City's *Standard Operating Procedure for Vehicle Related Spills,* which is included in the appendix.

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 of additional resources being 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 involve; 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's Public Safety Duty Officer. For these spills, a *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.

Emergency Response Program

In 2004, the Department of Regulatory Services purchased a boat, for use by Environmental Services unit, on the Mississippi River and other water bodies. The new boat is necessary for responding to spills that have the potential to impact our valuable water resources. When such impacts have occurred, the city efforts were restricted to mitigation efforts that could advanced from land. The presence of a properly equipped boat facilitates addressing these events on the Mississippi River and City Lakes, and provided 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 Minnesota Pollution Control Agency 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.

In addition, the boat would also be used in the placement of monitoring and sampling equipment used for tracking water quality, identifying points of illegal discharges, sewer cross-connections, 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 primarily through educational efforts, inspections, and coordinated community outreach events. These activities may include enforcement, pursuant to Chapter 48[1] and other applicable City Codes, and coordination with other regulatory agencies at the county, state and federal level. 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 inspectors 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, and City staff, by the following means:

- Complaint forms on the City's web page
- A confidential tip line
- Direct reports to sewer maintenance crews, plumbing inspectors, and other city personnel
- Direct contact

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:

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 Water Works 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 Chap. 52 & 55.
d.	Irrigation water	Same as above.

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

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 and Sewer Maintenance departments 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 integrated part of ongoing 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 164 calls for emergency response (containment of spills, chemical dumping, illegal disposal or handling of regulated or hazardous materials).
- 41 direct connections (registrations) to the storm drain (NPDES Permits)
- Investigated 301 water and land pollution complaints (illegal dumping, improper storage of material, and chemical storage)
- Notices sent to 48 of 479 residential erosion control permit holders (for residential, multi-family and commercial projects).
- Inspected 15 contaminated soil complaints

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

Work Plan

Environmental Services will continue existing programs as outlined in the program overview. Work 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 pointsources.

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: 439 of 480
- Erosion control permit non-compliance that were addressed: 46 of 48

X. Storm Sewer Design for New Construction

Program Objective

The objective of this stormwater management program is to minimize the discharge of pollutants. This section will include design measures responsible for capturing runoff debris.

Targeted pollutants include: TSS, Pesticides, and Nutrients

Program Overview

With approximately 30,000 inlet structures and 384 outfalls in Minneapolis, the storm drain design methods utilize outlet control measures to improve water quality. At this time, manufactured BMPs (stormwater treatment chambers) are the preferred BMP. The greatest constraint, in a fully developed city, is space. Limited space makes the compact nature of manufactured BMPs the feasible alternative for the majority of projects. Minneapolis has included pervious concrete pavements in multiple locations to supplement the grit chamber approach.

Previous Year Activities

During 2005, the City operational forces' primary focus has been storm drain upgrades associated with the street paving program, in addition to the construction of designated projects in the Flood Mitigation Program. The Ewing Ave S reconstruction project had two storm water treatment devices installed at two outfalls that discharged to a low area (un-named wetland). Another important project in 2005 was the construction of 9 storm water treatment chambers in the Heritage Park Neighborhood Development area. Additionally, Hennepin County has installed a grit chamber on E Lake St to capture sediments prior to discharge. The storm drain project areas, and associated water quality impacts, for 2005 are referenced in the table on the following page:

PROJECT AREA	PROJECT DESCRIPTION	STORMWATER RUNOFF BENEFITS
Heritage Park Neighborhood redevelopment – 9 Grit chambers installed as pre-treatment to storm water ponds	Construction of 9 storm water treatment devices capturing sediment in storm water draining to Bassett's Creek Storm Drains	Reduction of litter, TSS and related pollutants to receiving waters
E Lake St @ 14th Ave S	Construction of grit chamber draining to the Mississippi River	Reduction of litter, TSS and related pollutants to receiving waters
Theodore Wirth Parkway Storm water pond	Construct a storm water sedimentation pond to pre-treat surface runoff prior to discharge to Wirth Lake	Reduction of TSS, litter and attached pollutants, constructed weir wall to promote infiltration and groundwater recharge
Ewing Ave S permeable concrete pavement	Install permeable concrete pavement in a constructed bicycle path area	Reduction of TSS, ground water recharge
The Mill Quarter Regional Storm Water facility.	Construction of the project was coordinated with development in the area and the construction of new Chicago Ave from Washington to 2nd. The storm water facility was designed to treat storm water runoff from the Mill Quarter Parking Ramp, the Park Ave Lofts East, St. Anthony Main Apartments, the Guthrie District Parking Facility, Chicago Ave S, and 9th Ave S (between Washington Ave. & 2nd St). The combined area of these sites is 10 acres.	Reduction of in TSS, groundwater recharge, nutrients and other pollutants to the Middle Mississippi River Watershed. The treatment goals are 80% Removal of Total Suspended Solids (TSS) which equates to 18,982.69 lb/yr TSS and 33lb/yr of Total Phosphorus (TP).
Antoinette Ave S permeable pavement gutter section	Install 3300 square feet (6' x 550' linear) of permeable pavement in the gutter section	Reduction of storm water run off

Work Plan

The future focus of our operational forces will be to continue upgrading debilitated infrastructure, and the adaptation of existing infrastructure for the implementation of various water quality improvement projects (using green alternatives where beneficial). Future flood mitigation projects, and their impacts on stormwater runoff, are discussed in the Flood Control section of this document. The table below lists the storm drain construction projects and planned benefits of the each project scheduled for 2006:

PROJECT AREA	PROJECT DESCRIPTION	STORMWATER RUNOFF BENEFITS
Continuation of the Heritage Park Redevelopment Project.	Storm drain and water quality infrastructure for new development.	Reduction in TSS, nutrients and other pollutants to the Middle Mississippi River Watershed.
Southeast Minneapolis Industrial (SEMI) Redevelopment Project	Pond construction and new storm, sanitary, & roadway infrastructure. CSO separation. Installation of bio-filter swales, filter strips, rain gardens, and a linear urban wetland.	Reduction in TSS and pollutants by utilizing the newly constructed regional ponding facility.
Central Avenue Reconstruction	Upgrades to existing storm drain infrastructure and inlets. Construction of a new storm water pond. Separation of combined sewer area.	Runoff from Central Avenue will be routed through a new storm water treatment facility.
W 44th St @ Lake of the Isles Blvd Grit Chamber	Install grit chamber on new storm drain tunnel pipe	Reduction of litter, TSS and related pollutants to Lake of the Isles
Ewing Ave S – 2 grit chambers installed.	Construction of storm water treatment devices for an un-named wetland	Reduction of litter, TSS and related pollutants to receiving.
Folwell Middle School Green Initiative.	The removal of over 2.5acres of asphalt to facilitate the construction of an infiltration/basin rain garden. This basin will provide retention for the entire site as well as the adjacent 5+ acre watershed for the 100 year storm event.	Reduced inflow to the sanitary sewer Less storm runoff to East 38th Street reducing the probability of CSO events occurring. Water Quality Teaching Opportunity, Outdoor classrooms etc. Reduction in TSS and pollutants by utilizing the newly constructed regional ponding facility
The Village in Phillips Community Gardens	developed property adjacent to an alley will be converted into a water retention and infiltration pond. The neighborhood, homeowners association, developer and the City of Minneapolis working as partners will make sure the pond serves both the needs of the City and those in the neighborhood.	Reduction in TSS and pollutants through infiltration and pretreatment.

Engineering Services design teams will continue to design new outlets with stormwater BMPs that will advance program objectives. Design teams will include additional BMPs on new storm drain construction projects, wherever feasible, to improve overall water quality. 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.

Performance Measures

Total BMPs and existing infrastructure:

- 16 water quality pond systems or constructed wetlands, and 135 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.

Program Overview

One of the requirements of the City's NPDES permit is that the City implements 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. This program includes providing City Ordinance literature to local 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.

Another NPDES requirement is that the City's education program requires education regarding illicit discharges. One element of this education includes the required notification of the Department of Public Safety Duty Officer (as required in Chapter 3, Section 8) for reportable spills. 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 reports to the MPCA Duty Officer (800) 422-0798 or (651) 649-5451 all pertinent information regarding illicit discharges. The City of Minneapolis has developed a program to inform residents not to discharge non-stormwater substances to drains that discharge to a lake or stream. Interested parties can visit the City's website to become better educated regarding the ordinances to prevent illicit discharge into the City's water bodies. The City of Minneapolis – Environmental Services has a program in place to encourage compliance in prohibiting discharges. The Minneapolis Environmental Report – Towards Sustainability fosters the prohibited discharge.

The City of Minneapolis provides information regarding pesticides, fertilizers, illicit discharges, and improper disposal via the City Regulatory control and enforcement website.[4]

The City's website and ordinances provide education regarding the City's authorization to discharge stormwater via its NPDES MS4 Permit.

The City of Minneapolis - Department of Public Works administers a public education program to promote, publicize, and facilitate the proper management of storm water discharges to the storm sewer system by all the residents under their jurisdiction so as to reduce the discharge of pollutants.

The City of Minneapolis meets the Storm Water Management Requirements by providing the City website and ordinance.[1]

The City of Minneapolis provides education regarding structural controls via the City website and ordinance.[2]

The City of Minneapolis – Department of Field services provides internal training to City personnel as part of its Facilities Operation and Quality Control, Removed Substances, and Roadways plan.

The City of Minneapolis began to redevelop Heritage Park in the fall of 2000. The redevelopment is expected to be complete in December of 2009, and will include a stormwater educational component.

The City of Minneapolis website provides educational information regarding flood control. For information on flooding and safety precautions the following website can be viewed by interested parties.[3]

The City of Minneapolis – Engineering Services provides internal mentoring and training to City engineering personnel regarding the construction of storm sewers, and proper erosion and sediment control techniques.

The City of Minneapolis Public Education program educates interested parties regarding how the City advances its stormwater education. This information can be viewed at the following website.[5]

Each year the City communicates to/with interested parties that the City must make available the Stormwater Management Program for Public Participation and Input.

As a component of the City's new Stormwater Utility Fee, the City website encourages the implementation of various BMPs (Pilot Programs) that would serve to reduce the overall amount of impervious surface area throughout the City. The City also maintains a link to the following Metropolitan Council BMP website.[6] Numerous BMP suggestions are available for small scale implementation.

The City has contacted local watershed organizations, internal agencies, and other government agencies, and informed them of the City's requirements to partner with these organizations as a requirement of the City's NPDES MS4 Permit. The major changes to this year's Stormwater Management Program were to the Stormwater Education Program, and the Stormwater/Best Management Practices Monitoring Program. These changes have been documented in the NPDES Annual Report that is available for public comment; these modifications will also be noted in communications to interested parties.

The City of Minneapolis provides the following website to educate interested parties regarding the Storm Water Management Annual Report.[7]

The Minneapolis Park and Recreation Board provides a website to educate interested parties regarding the Stormwater Monitoring Program.[8]

Internet Resources

http://www.ci.minneapolis.mn.us/stormwater/ [1]

http://library.municode.com/mcc/home.htm?infobase=11490&doc_method=cleardoc [1]

http://www.ci.minneapolis.mn.us/stormwater/ [2]

http://www.ci.minneapolis.mn.us/stormwater/flood-information/index.asp#TopOfPage [3]

http://www.ci.minneapolis.mn.us/stormwater/what-we-do/water-quality-control.asp#TopOfPage [4]

http://www.ci.minneapolis.mn.us/stormwater/what-we-do/outreach.asp#TopOfPage [5]

http://www.metrocouncil.org/environment/watershed/bmp/manual.htm [6]

http://www.ci.minneapolis.mn.us/stormwater/NPDESAnnualReportDocuments.asp [7]

http://www.minneapolisparks.org/default.asp?PageID=833 [8]

http://www.ci.minneapolis.mn.us/environment

http://www.ci.minneapolis.mn.us/cso

Previous Year Activities

The Public Works Department managed the 2005 Stormwater Education Program. These efforts included community outreach programs and participation in the following educational partnerships:

In February of 2005, a brainstorming session was held with the City of Minneapolis' Communication Department regarding the 2005 Stormwater Education Program. It was agreed that the Department of Public Works would coordinate a meeting with some of the stakeholders that could potentially be involved in stormwater education. The agenda was to discuss what the City should be doing, along with what has been successful in the past. Among the attendees were:

- Mississippi Watershed Management Organization
- Minnehaha Creek Watershed District
- Minneapolis Park and Recreation Board
- Metro WaterShed Partners
- Green Institute

In August, the Pennsylvania Horticultural Society (PHS) presented "Stormwater Models for Urban Community Spaces", as a part of their "Philadelphia – Making the City Green" message. The Department of Public Works attended the event. The targeted audience was professionals, gardeners, volunteers, and supporters of community gardening and greening in urban, suburban, and rural communities. The workshop was an electronic slideshow of "Philadelphia Green", a program run by the Pennsylvania Horticultural Society (PHS). The

workshop gave a short look into the program and how it's empowering the people to turn trash-laden lots into usable green spaces, while collaborating with residents and the City of Philadelphia - Department of Recreation for the revitalization of community parks. Formal success measures were not collected to determine the success of this field activity. Some suggestive topics and mechanisms viewed at the workshop include: public maintenance of green space, integrated park landscaping (wave design), and subsidized demolition.

In August, the Department of Public Works attended the 11th Annual Latino Family Resource Fair ("La Feria"). The Department of Public Works provided the message that storm sewers drain directly into local water bodies. Latino families and other citizens attended the event. An interactive display (created by the University of Minnesota - Water Resources Center) was set-up next to the Public Works table. The display attracted mostly children, but a few adults asked questions and talked about the display with their children. The displays are available at various agencies and organizations; this particular display was borrowed from the Mississippi River Watershed Management Organization. Formal success measures were not collected to determine the success of this outreach activity, but one indicator of the success could have been measured by popularity of the display. Many children used the display and, upon observation, most were able to grasp the basic concept that the pollutants were flowing directly into local water bodies unfiltered.

In September, the Department of Public Works attended the Longfellow Business Association Tour of 7-Sigma Rain Gardens. The event message was "Stormwater Management". The new rain gardens, that had been installed in the employee parking, lot are aesthetically pleasing and capture 95% of the stormwater that previously ran-off the parking lot and into the street. They are now credited under the City's new stormwater (Utility Fee) credit program. This project received support from Longfellow Business Association and the Mississippi Watershed Management Organization. Barr Engineering and Phillips Garden designed and installed the rainwater gardens. The Department of Public Works provided a stormwater management presentation, and also discussed the City's Stormwater Utility Fee credit system.

In September, the City of Minneapolis provided a storm drain and sanitary sewer information session to the Clean Water Action (CWA). CWA is local, non-profit, environmental advocate. The session was a general explanation of Minneapolis's water infrastructure, and gave the message "When I flush or when it rains, where it goes?" The targeted audience was field and phone canvassers who interact with CWA members. The brief presentation was to give an overview of the City of Minneapolis' storm drain system. The message was to give a detailed history of the great efforts the City has put forth to improve overall water quality. Formal success

measures were not collected to determine the success of this field activity. The presentation was beneficial in that it reinforced prior knowledge, or made known the role, the City plays in improving overall water quality.

In September, the Department of Public Works attended the 8th Annual Children's Water Festival in an effort to help reinforce the message, "Water is Life." The targeted audience was fifth grade students from the seven county Metro area. Public Works attended this event as a classroom guide, and as a representative of the City's commitment to water quality education. Forty-four metro area classrooms attended the 2005 Children's Water Festival, held at the Minnesota State Fairgrounds in St. Paul. During their visit, classrooms attend six different water-related, activity-based learning stations with various water quality messages. Some examples of messages included: "The Watershed!", "Backyard Water Recycling", "Watch it Rain!", and "Learning Landscapes". The day also included a presentation for all students by the Minnesota Science Museum that teaches students about the hydrologic cycle and water conservation. Students also attended a "water arcade" with various hands-on activities and water-related themes. Formal success measures were not collected to determine the success of this outreach activity. Any outreach activity shows a commitment from the City of Minneapolis for water quality education. Many representatives from various government agencies around the Metro area participated in this event.

In 2005, Friends of the Mississippi River coordinated the stenciling of 2,298 storm drains and the distribution of 6,292 door hangers in partnership with 1,004 volunteers from school groups, community groups, and residents of the City of Minneapolis who stenciled for 3,614 volunteer hours. FMR staff maintained and stored 15 stenciling equipment kits including paint, stencils, and traffic safety cones. FMR purchased 100 stencils, 180 cans of paint, miscellaneous kit supplies, and 6,000 door hangers for use and distribution within Minneapolis city limits. FMR staff provided a 20-60 minute educational program/orientation on urban runoff pollution to each of the 34 Minneapolis stenciling groups. Following these presentations students have background to describe the difference between wastewater and stormwater, define nonpoint source pollution, list the effects of various nonpoint source pollutants, and cite ways to keep NPS pollutants off our pavement. Staff also made 19 extra education presentations to 728 students in eleven student groups from seven schools in order to provide lessons designed to enhance the educational impact of the stenciling activity.

The Minneapolis Park & Recreation Board (MPRB) continued water quality education programs throughout the City in 2005. With storm water education models and printed materials in hand, Environmental Operations Naturalist staff participated in 56 Minneapolis community

festivals (such as May Day, Stone Arch Bridge Art Festival), and events (Aquatennial, Log Rolling Championships), neighborhood celebrations (like local corn-feeds and Pageant Hill), and concert series at local water bodies (Lake Harriet, Minnehaha Park, Loring 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. Bookmarks, temporary tattoos, stickers, and water quality informational materials were also distributed at these events.

This year MPRB Naturalist staff created and piloted a new summer program series, Water Works, for children ages 6 to 12. Fifteen recreation centers* from across the city participated in this four part, four hour program series. By providing information in a series of programs, Naturalist staff helped children achieve a better understanding of storm water 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). Water Works incorporates hands-on learning activities that focus on watersheds, storm drains, pollution patrol, water quality testing, macro invertebrates, wetlands, and more. Based on participant and staff evaluation, the curriculum will be updated to improve the program for 2006 (including a catchier program title).

[*Participating recreation centers included: Bethune, Central, Folwell, Hiawatha Park School, Keeywadin, Kenwood, Lyndale Farmstead, Logan, Matthews, McRae, Pearl, Pershing, Powderhorn, and Sibley.]

Another pilot outreach focus this year was to provide hands-on water quality education programs at Mill Ruins Park which is located adjacent to St. Anthony Falls on the west bank of the Mississippi River. Programs targeted schools and other groups as well as the general public with specific programs for families and adults. Participants learned about the importance of the Mississippi River to the City of Minneapolis as power source, transportation corridor, recreation resource, wildlife habitat and our main source of drinking water. Learning just how important the River is to Minneapolis residents in so many different ways made an impression on many program participants. Large numbers of people (of all ages) were surprised (and some grossed out) to learn that Minneapolis' residents drinking water comes from the Mississippi. Based on feedback from group leaders, participants, and staff, the programs will be improved for the 2006 season. A worthy suggestion was to incorporate the messages about storm water into existing MPRB river programs such as the walking tours, lumbering and flouring programs, and Hands-On-History.

The annual Earth Day Watershed Clean-Up was held on Saturday, April 23rd. This event provided an opportunity for the MPRB and City of Minneapolis to provide information to residents regarding water quality issues and subsequently how to limit pollution from entering local lakes and streams. Over 900 Earth Day participants removed waste materials from shorelines and open space areas throughout Minneapolis' parklands. Among these parklands included the Chain of Lakes, Shingle Creek, Bassett's Creek, the Minnehaha Creek corridor, the Mississippi River corridor, Grass Lake, Lake Nokomis, Lake Hiawatha, and Powderhorn Lake.

A Citywide Earth day Education Fair sponsored by MPRB was held at Nokomis Community Center. This event included informational stations on low input lawn care, landscaping with native plants, designing a rain garden, and building a birdfeed for kids.

Education and Training of City Personnel

Public Works sent Engineers and Engineering Technicians to various Stormwater educational conferences, seminars, and presentations, including the following:

- the 4th National Conference on Nonpoint Source and Stormwater Pollution Education Programs conference in Chicago, IL
- 'Celebrating Environmental Education Together' training in Apple Valley, at the School of Environmental Studies
- The Low Impact Development (LID) tour, hosted by the Minnesota Erosion Control Association (MECA)

Erosion and Sediment Control (ESC) Education

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 One Stop, and during onsite inspections.

Public Works staff will be coordinating/providing internal ESC Training to other City personnel that will have in influence on enforcement of proper ESC measures throughout the City. Public Works staff would use an upcoming MECA conference to make some connections from vendors to describe their products and applications in addition to an overview of Minneapolis Ordinance and Federal Regulation requirements. Additionally, a product overview will be incorporated into the Sewer Design Manual discussing the various products available and possible applications.

Stormwater Utility Fee Outreach and 'Sustainability' Education

In July, the Public Works coordinated the hiring process for Stormwater Interns; two stormwater interns were hired. Public Works has since met with Minneapolis residents to discuss their concerns with the Stormwater Utility Fee. Among the complaints were: sizing lots to scale, answering questions regarding Best Management Practices (BMPs) and quality/quantity credit application terminology. In each case, verbal or written documentation was generated.
The episode was filmed in Minneapolis with a segment of the program detailing a teenager's work organizing the construction of a rain garden. Staff provided technical assistance as well as commentary during the filming.

Work Plan for 2006 Activities

The Department of Public Works has advanced several education programs for 2005, and dedicated a significant amount of time to the research and identification of Stormwater Education and Outreach partners, topics, mediums, and regulatory requirements, for its 2006 Stormwater Education Program. This information/research was then used to establish potential partnerships with multiple agencies; including, the Minneapolis Blooms Program, the Mississippi Watershed Management Organization, the Minnehaha Creek Watershed District, Friends of the Mississippi River, the Green Institute, the Department of Regulatory Services – Environmental Management, Hennepin County, the Metro WaterShed Partners, Shingle Creek Watershed Management Commission (SCWMC) Education and Public Outreach Committee (EPOC), Minneapolis Park and Recreation Board, the EPA, and private Citizens. The following proposals/partnerships are under final consideration for implementation in 2006:

- A 'Multicultural Educational Needs Assessment/Study' by Katherine Barton
- Blooms Program – Rainwater Garden workshops
- Storm Drain Stenciling/Education, Community Lawn Care Workshops, and Watershed Education Focus Areas via the Friends of the Mississippi River, and in partnership with the MWMO
- Green Institute Rainwater Garden seminars, and Utility Fee outreach to
- Minnehaha Creek Watershed District electronic kiosks
- Minneapolis Park and Recreation Board (MPRB) – Public Outreach Activities

A final Work Plan will document/identify which of these proposals will be selected to be included in the 2006 Stormwater Education Program.

Performance Measures

Water quality education unit cost:

$0.84/resident; (population of 383,000) and total program cost of $320,020.
{$155,000 for SW/BMP Monitoring and $165,020 for SW Ed Partnerships)

2005 Storm and Surface Waters Website:

Total visits: approximately 27,500

Average (/day): 75

Average visits per visitor: 2

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

Each year, the City of Minneapolis holds a public hearing at the Transportation and Public Works Council subcommittee meeting. This hearing provides an opportunity for public testimony regarding the Program and Annual Report (prior to submittal). Governmental entities that have jurisdiction over activities relating to stormwater management, and other interested parties, are notified of the public hearing date. The hearing is officially noticed in *Finance and Commerce*, and also publicized through public service announcements on the City cable television channel. The City Clerk's office also keeps copies of the Annual Report on hand for examination by the public, prior to and following, the hearing date. An electronic version of the entire report can also be obtained (on a CD) from either the City Clerk's office by calling 612-673-3136 or from Minneapolis Public Works at 612-673-3129.

All written comments received, and testimony presented, at the public hearing are recorded, and given due consideration. A response to those public comments is then included with the Annual Report. The conclusion of this process is the presentation of the Annual Report and the responses to the public comments, to the Minneapolis City Council for approval and adoption. A copy of the council resolution adopting the NPDES Stormwater Management Program and Annual Report, and the Annual Report is submitted to the MPCA by June 1st of each permit year.

Previous Year Activities

The City of Minneapolis Storm and Surface Water Management website was created in early 2004. Some of the purposes of the Website include:

- Increased awareness of stormwater management and surface water quality issues
- To provide information about City of Minneapolis programs and operations that improve surface water quality

- Explaining flooding problems and suggestions for what to do if you experience flooding problems
- Information on how to contact various City departments, who and when to call about stormwater issues
- To encourage community involvement and participation
- To help meet the public education and public involvement measures of our NPDES Stormwater Permit.
- Improvements were made to the Stormwater website throughout the year.
- The NPDES annual report will be available for viewing or downloading from the City's Stormwater Website.

Work Plan

City staff will continue to update the Storm and Surface Water Management resource Website.

Performance Measures

Unit costs are not available.

Number of interested parties that were directly notified of public hearing and Annual Report availability: 21

XIII. Coordination with Other Governmental Entities

Program Objective

The objective of this storm water management program is to maximize stormwater management efforts through coordination, and partnerships, with other governmental entities.

Program Overview

The City of Minneapolis coordinates its stormwater management efforts with local watershed organizations, MnDOT, neighboring cities, the Metropolitan Council, and various other entities. This coordination includes the joint review of projects, and sharing of costs for water quality projects, stormwater monitoring, and water quality education.

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.

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.

Coordination with the Minnehaha Creek Watershed District (MCWD)

The MCWD adopted its Second Generation Water Resources Management Plan in January 1997. The District administers state mandated wetland protection rules and DNR 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.

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 onsite detention and treatment. As 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.

Coordination with Highway Departments

The City of Minneapolis coordinates with highway departments 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 Neighboring Cities

Richfield

A residential area in southwest Minneapolis contributes stormwater runoff to Grass Lake, which in turn flows to Richfield Lake. A cooperative agreement was established which sets minimum practices that Minneapolis must maintain in order to ensure that the water quality of Grass Lake is maintained in a manner such that the water quality of Richfield Lake is not degraded. This cooperative agreement will remain in place unless otherwise terminated by the mutual agreement of the two cities.

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
- Review and comment on local government's water resource management plan.

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 watershed organizations and other governmental agencies on a number of water quality projects. Minneapolis Public Works (MPW)

maintains communications with watershed organizations. Interactions with watershed organizations take several forms to facilitate communication and provide support:

- Attend local watershed board and special issues meetings with watershed staff
- Attend Education and Public Outreach Committee (EPOC meetings
- Take part in Technical Advisory Committee (TAC) meetings
- Inform watersheds 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…

Minneapolis Regulatory Services - Environmental Services (ES) also sends staff to watershed meetings. ES coordinates (with the MPCA and the MCES) regarding investigations and enforcement efforts for incidences of illegal dumping or illicit discharges to the storm drain system.

The MPRB coordinates with watershed organizations, and the MCES, on watershed outlet monitoring. The MPRB coordinates/partners with watershed organizations on capital projects and water quality programs. The MPRB also works with the DNR, and surrounding Twin City's suburbs on various capital projects and programs.

Water Quality Monitoring Task Force

Water Monitoring Task Force was created by City Council resolution on July 15, 2003. The purpose of this task force is to:

- Oversee existing water quality monitoring data in Minneapolis
- Improve the coordination of water quality monitoring data and protocols
- Establish public health standards
- Develop strategies to reduce water quality problems identified through monitoring efforts

Public Works and the Minneapolis Park and Recreation Board (MPRB) are responsible for direction and coordination for the task force. The task force includes representatives from Minneapolis Operations & Regulatory Services, Minneapolis Health & Family Support, as well as

the four watershed management organizations within City boundaries. The Task Force meets 6 times per year. Voting members include policymakers from the City, the MPRB, and the local watersheds. Other invited guests include other governmental agencies and environmental groups. Topics in 2005 included development of water quality indicators, coordination of public education, ongoing TMDL studies, review of sustainability indicators, and review of the Met Council's draft Water Resources Management Plan.

Current Capital Project and Program Partnerships

Bassett Creek Water Management Commission (BCWMC)

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 City of Minneapolis Park Board. 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 advalorem tax. The MPRB, the City, and the BCWMC will jointly implement the recommended improvement projects.

Shingle Creek Watershed Management Commission (SCWMC)

SCWMC is currently developing a proposed Capital Improvement Program (CIP). This CIP would include CIP recommendations for the remainder of the period encompassed by the Second Generation Watershed Management Plan (through 2012). Adopting a CIP will require a major management plan amendment.

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 Near North Redevelopment project includes installation of wet ponds, infiltration basins, and rain gardens. This is a partnership with the Minneapolis City Coordinator's Office and Minneapolis Public Works (MPW). This project is scheduled for completion in 2005.
- University Industrial Park: 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 (BMP's) including the following; bio-filters, swales, filter strips, rain gardens, and linear urban wetlands. This is a partnership with Minneapolis

Community Planning and Economic Development group (MCPED), and Minneapolis Public Works. 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 Minneapolis Park and Recreation Board, 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 the next 10 years. In 2005, efforts were dedicated to the stabilization of sites along the Mississippi River at 38th Street & 44th Street at the West River Parkway. The Project was labeled 'Lower Gorge Erosion Stabilization'.
- Minnehaha Creek Watershed District (MCWD)
- The City of Minneapolis is partaking in the Minnehaha Creek Visioning Partnership that started in 2004. This partnership is a planning effort that brings together a diverse group of stakeholders that are interested in assisting with the long term vision for the Minnehaha Creek. This study is intended to generate ideas to be considered in the MCWD's next 509 plan.

- The Washburn Spillway project is a partnership between the MCWD and the City of Minneapolis for the reconstruction of the outfall on Washburn Ave (on the north side of the Minnehaha Creek). The existing outfall is a poured-in-place bituminous slab that has deteriorated, and exhibits significant undermining of soil. The proposed project will include removal of the existing bituminous slab, construction of a pretreatment device to treat stormwater runoff (prior to discharging to the creek), installation of a buried vertical drop structure (that would convey water to the creek), and re-vegetation of the surface area.

- The Blue Water Association is a non-profit organization, established in 2002 to focus on monitoring and improving the water quality in Lakes Hiawatha and Nokomis in Minneapolis. Its actions are guided by the Blue Water Commission's *Report and Recommendations,* published in May 1998. BWA 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 Sandy Colvin Roy. The BWA hopes to make all impacted residents and agencies partners in the water quality improvement process, step by step, with neighborhood funding that can be used to leverage additional dollars necessary to accomplish its goals.

Minnesota Department of Transportation

The City of Minneapolis and MnDOT are engaged in a joint study of flooding issues along the I-35W corridor. This project will include a detailed hydrologic and hydraulic modeling of the I-35W storm tunnel and its contributing drainage area. The model will be run under existing conditions and proposed development conditions, and will yield alternative solutions to solve the current under capacity problem. The study is scheduled for completion in 2006.

The Minneapolis Local Surface Water Management Plan (LSWMP)

The City of Minneapolis is in the process of developing its Local Surface Water Management Plan. The intent of this Plan is to benefit stormwater management within the City, and to improve both the coordination and effectiveness of efforts by the City, the MPRB, and the watershed organizations. This Plan will serve to meet agency review requirements, and will ultimately be adopted by the City Council. The draft of the LSWMP has been reviewed by MCES and local watershed organizations. The City is in the process of finalizing the LSWMP, and is evaluating several options at this time.

Work Plan

Coordination and partnerships on capital projects, water quality programs, and studies will continue. 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[1]

Storm event samples were collected May through October, and one snowmelt grab sample was collected in February. 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 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; all other fecal coliform samples were taken from the third composite bottle.

Sampled data for 2005 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, but all metals were well below NURP values. Most parameters were comparable to MRPB 2001-2004 data except for residential land use Pb (lead) values, which are much higher in 2005, and mixed land use TP (Total Phosphorus) and Zn (Zinc) values, which have decreased from previous years. It is important to remember that the new sites monitored in 2005 have similar, but not the same, land uses as previously monitored. 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. Data from MPRB Sites 1-5a were similar to the Sites 6-9 in 2005. Nitrogen and Pb increased while Cl (Chloride), TDS (Total Dissolved Solids), and Zn decreased.

Best Management Practices Monitoring Results[2]

Best management practices (BMPs) include procedures and structures designed to help reduce water pollution. In 2005, the MPRB monitored one of the City of Minneapolis' stormwater ponds located in north Minneapolis. The pond was designed for flood mitigation purposes and to help reduce pollutants. The stormwater pond is referred to as Logan Pond, which is located at

[1]For tables referenced in this section see National Pollutant Discharge Elimination System (NPDES) Monitoring from the *2005 Water Resources Report*, MPRB on page 15 of Appendix A.

[2] For tables referenced in this section see Logan Pond BMP Monitoring and Permeable Pavers BMP Monitoring on page 31 and 39 of Appendix A, respectively, from the *2005 Water Resources Report*, MPRB.

29th Ave. N. and Logan Ave. N. The MPRB monitored Logan Pond from June to October 2005. Samples were collected at the inlet, outlet, and two leaders located in the alleys on the east and west sides of the pond.

Nine storm events were sampled at the inlet, ten at the outlet, and six at each of the alleys. 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. *E. coli* statistics for individual sites were not calculated because there was only a single sample. Mean outlet values in Table 24B show water quality improvements for most parameters. Adding all three inlet means together showed the only parameter with increased output was Chloride. Winter salt use may be building up high levels of Chloride that flush out during the year. This may explain why the outlet has a higher value than the inlets.

When comparing the average values of the east and west alleys, it seems most of the parameters were comparable except for fecal coliform and lead. Fecal coliform and lead were more than double for the east alley. Trash cans are located in the alleys which could contribute to high pollutant concentrations. Trash cans were often seen overflowing into the alley with piles of garbage on the ground.

Total volumes recorded at each monitored location are given in Table 24C of Appendix A. The total inlet volume recorded for the sampling period 7/7/05 - 10/31/05 was 1,800,000 cubic feet (cf). The total outlet volume recorded was 1,040,000 cf. Due to pond backups, the recorded volumes for the alleys are most likely unreliable but are used to give a rough estimate of total pollutants removed in Table 24D of Appendix A. All parameters except chloride showed some water quality improvements. Fecal coliform showed the highest improvement, with 96% removal, while TDS showed the least amount captured, with 12% removal. The unusual amount of rainfall in 2005 may not have left sufficient settling time for many parameters.

Permeable pavers are a BMP designed to increase infiltration. In 2005, the MPRB monitored the permeable paver lot located at the City of Minneapolis' Animal Shelter in north Minneapolis.

Storm data are presented in Table 24G of Appendix A, including the dates of storm events, rainfall, intensity, peak levels, flow volumes, and percent infiltrated. A total of 28 storm events were recorded. A storm event is defined as having 0.10 inches of rainfall or greater. Some

events occurred with no record of rainfall and are not included in Table 24G. This may be due to the washing of trucks at the shelter, which can result in and overflow to the drain pipe.

Several large rain events occurred in 2005 resulting in pipe surcharges. Six total events surcharged resulting in inaccurate flow recordings, Table 24G. Recorded peak levels for these events were greater than 18 inches. Overflow problems generally occurred during high flow, high intensity events.

A total of 13 events showed positive treatment percentages. A total of 9 events had negative treatment percentages (not including surcharged events). Many events showed larger volumes than possible for the calculated drainage area. This generally occurred for large rain events. The drainage area could be larger than originally estimated. The known contributing drainage area was measured by MPRB staff, but there is an adjacent building west of the paver lot which has rain leaders pointed toward the lot. The leaders are approximately 25 feet west with a buffer of tall vegetation. It is currently unknown if these leaders contribute significantly to the paver lot. Also, the pipe may be backing up from downstream. Trash is often found within the pipe which may influence level readings. Further monitoring is necessary to investigate these possibilities. An area/velocity meter would be useful in determining pipe backups. Careful monitoring of the adjacent building's drainage is necessary to determine if it is contributing to the total flow of the pipe.

Minneapolis Lake Trends

In 2005, Minneapolis Park and Recreation Board 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. Cedar, Harriet and Wirth Lakes are mesotrophic with moderately clear water and some algae. Brownie, Isles, Hiawatha, Nokomis, Webber, Loring and Powderhorn Lakes are eutrophic with higher amounts of algae. Calhoun is bordering on being oligotrophic, with clear water and little algae. 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
- Wirth Lake

Lakes with stable water quality

- Brownie Lake
- Lake Nokomis
- Lake Hiawatha
- Lake of the Isles
- Powderhorn Lake
- Loring Pond
- Webber Pond

Lakes showing water quality enrichment

- Spring Lake

2005 Water Resources Report

The Minneapolis Park & Recreation Board's annual *2005 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 the Appendix A of this Annual Report. Electronic copies of the *2005 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.

2006 Monitoring Proposal

In 2005, four new sites were chosen for monitoring. MPLS Public Works Engineering Services has an initiative to use XP-SWMM modeling software to model the City's storm drain system, to analyze storm water quantity and quality, to identify problems, and to then propose some improvement solutions. This monitoring program will complement the modeling effort by gathering field data to calibrate the model to obtain a certain level of accuracy with a set of parameters.

The Pararde Stadium site underwent significant changes to its land use at the end of 2005. Therefore, we would like to propose a site change for that site to remain consistent with the designated recreational/parkland land use. We would like to propose minor changes to the parameter list, consistent with the proposed parameter list in the 8/4/04 draft NPDES permit and with the US EPA NPDES Storm Water Sampling Guidance Document (1992). The following table shows the proposed parameters.

Proposed 2006 monitoring parameters

Parameter	2001 – 2005	Proposed for 2006	Notes for 2006
BOD – 5day	X	X	
Cadmium, Total	X		Concentrations are below detection
Chloride, Total	X	X	
Copper, Total	X	X	
Fecal Coliform	X	X	grab, once per season (3x); USEPA (1992)
Lead, Total	X	X	
Nitrite + Nitrate, Total as N	X	X	
Nitrogen, Ammonia, Un-ionized	X	X	
Nitrogen, Kjeldahl, Total	X	X	
pH	X	X	grab, once per season (3x); USEPA (1992)
Phosphorus, Total	X	X	
Solids, Total Dissolved	X	X	
Solids, Total	X	X	

Suspended			
Zinc, Total	X	X	

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 storm water runoff. In 1922, the City began construction of a storm drain system, separate from the sanitary sewers, in the developing areas of the city. In older areas, sanitary sewers continued to serve as combined sewers until 1960, when the City began actively constructing storm drains in areas served by combined sewers. From 1961 to 1984, this work proceeded in conjunction with the residential paving program. In 1984, storm drain construction for sewer separation was accelerated through the inception of the Minneapolis C.S.O. Program. As of 2001, less than 1% of the City (by area) was still served by a combined sanitary/stormwater sewer. There are 556 miles of main line storm drain, and storm drain tunnels, that are currently maintained by Public Works. This total does not include some MNDOT storm drains that are located solely within MNDOT right-of-way, and that do not directly connect to the City of Minneapolis' system. The vast majority of the system (91%) is constructed of reinforced concrete pipe, with PVC and a variety of metal pipes being the most common alternate materials. The replacement cost of the known storm drain system, in 2000 dollars, would be approximately $860 million. In addition to main line storm drains, Public Works also maintains 151 miles of catch basin runs. Totals for this category were not included in previous reports because accurate information was unavailable (prior to the completion of a GIS layer for the storm drain system). Also, as a result of a recently completed survey of the former Park Board system, we now know the location of approximately 100 outfall structures not included in the previous outfall inventory. Quantification of attributes for these outfalls is underway, and when completed, the information will be added to the existing outfall inventory. The existing drainage areas will be revised to reflect these changes.

STRUCTURAL CONTROLS: The City of Minneapolis owns and maintains 25 stormwater pump stations, 109 sedimentation (grit) chambers, 387 outlets (exclusive of the added Park Board outlets noted above.), and 16 stormwater holding ponds and filtration wetlands. Grit chamber, pond, and outfall locations are displayed in Appendix B.

Drainage Areas and Discharges

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

NON-STORMWATER DISCHARGES: A map of permitted non-stormwater discharges (to the public storm drain system and registered with Minneapolis Environmental Management) is provided 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 the Appendix A. The following formula was used to calculate the total annual pollutant load. Conversion factors were used to convert acres to square meters, and to adjust the concentration data units.

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, acres

Conversion factors - 4046.9 for acres to square meters; 1000 for liters to 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. FLUX

may have been used with more data to determine with a reasonable degree of accuracy a seasonal FWMC for each site. 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	01/01/05 – 03/31/05	3.54 inches (0.090 m)
Spring	04/01/05 – 05/31/05	5.08 inches (0.129 m)
Summer	06/01/05 – 08/31/05	12.40 inches (0.315 m)
Fall	09/01/05 – 12/31/05	12.39inches (0.315 m)

XVI. Minneapolis Stormwater Utility Program

Introduction

In November of 2004 the Minneapolis City Council adopted an ordinance that authorized the creation of a Stormwater Utility. The new utility fee was imposed on most classes of developed and undeveloped land within the City of Minneapolis. The following goals and outcomes were the primary considerations in the design of the Minneapolis Stormwater Utility program:

- To implement a stormwater utility to pay for 100 percent of the City's annual stormwater management program (including all activities related to NPDES permit requirements)
- To implement the utility fee in such a manner as to reflect the impacts of different types of land use
- To aid in the development of stormwater management programs
- To distribute the costs of the stormwater management program amongst the rate payers in a fashion that is more equitable than under the previous system of billing (which was based on metered water usage)
- To attempt to implement this fee in such a manner as to be 'revenue neutral'; the amount that would be collected as the new stormwater utility fee would be offset by a reduction in the sanitary sewer charge (which had previously included the stormwater rate)
- To implement a program of quantity and quality credits (against stormwater utility fees) to encourage the adoption of best management practices (BMPs) for reduction and treatment of surface water runoff

Funding

The funding requirements of the Minneapolis stormwater management program are illustrated in the following table for the years 2005 – 2010:

	Budget 2005	Budget 2006	Plan 2007	Plan 2008	Plan 2009	Plan 2010
Operating Expenses						
Sewer Design	2,379,961	2,526,533	2,602,329	2,680,399	2,760,811	2,843,635
Sewer Maintenance	2,244,367	2,771,036	2,854,167	2,939,792	3,027,986	3,118,825
Met-Council Environ. Services	1,421,054	1,780,434	1,780,434	1,780,434	1,780,434	1,780,434
Gen. Fund Overhead	733,137	278,426	286,779	295,382	304,244	313,371
Utility Billing Overhead	687,784	819,778	844,371	869,702	895,793	922,667
Combined Sewer Overflow	2,066,175	2,284,675	2,353,215	2,423,812	2,496,526	2,571,422
Street Cleaning	6,556,393	6,124,354	6,308,085	6,497,327	6,692,247	6,893,014
Government Service Fee	1,364,519	1,973,571	2,032,778	2,093,761	2,156,574	2,221,272
Total Operating Expenses	17,453,390	18,558,807	19,062,158	19,580,610	20,114,615	20,664,641
Capital Program						
Pay As You Go Capital Costs	995,000	1,562,500	3,052,500	1,622,500	3,927,500	3,169,000
Debt Service						
Currently Structured	12,030,134	10,750,057	9,015,138	10,195,048	4,410,037	2,201,052
Proposed Future		811,735	1,641,270	3,445,163	4,989,827	5,538,530
Total Debt Service	12,030,134	11,561,792	10,656,408	13,640,211	9,399,864	7,739,581
Total Revenue Requirements	30,478,524	31,683,099	32,771,066	34,843,321	33,441,979	31,573,222

Billing

Billing for approximately 105,000 stormwater utility accounts commenced in March of 2005 and throughout the first year of operations the program has been successful. While the first several months of billing generated a large volume of requests for information, billing rates were disputed for only 1.1 percent of all accounts. The vast majority of these disputes were easily resolved. While most Stormwater Utility programs offer credits only to larger developments and commercial properties, the City of Minneapolis Stormwater Utility is innovative in making the stormwater credits program available to all property owners, including single family homes. This not only encourages wider use of stormwater BMPs, but also gives Minneapolis property owners a greater stake in stormwater management issues, and provides increased opportunities for public education.

First Year Review

A review of the first year of operations shows that the City of Minneapolis' Stormwater Utility Program is meeting the goal of providing a dedicated revenue source for stormwater management on a fair and equitable basis. In addition, the program is also a valuable tool for encouraging the use of stormwater BMPs, and for increasing public awareness of the issues surrounding the management and protection of surface water resources. The complete text of the stormwater ordinance as well as information on the stormwater utility fee program can be found in Appendices A27-A31.