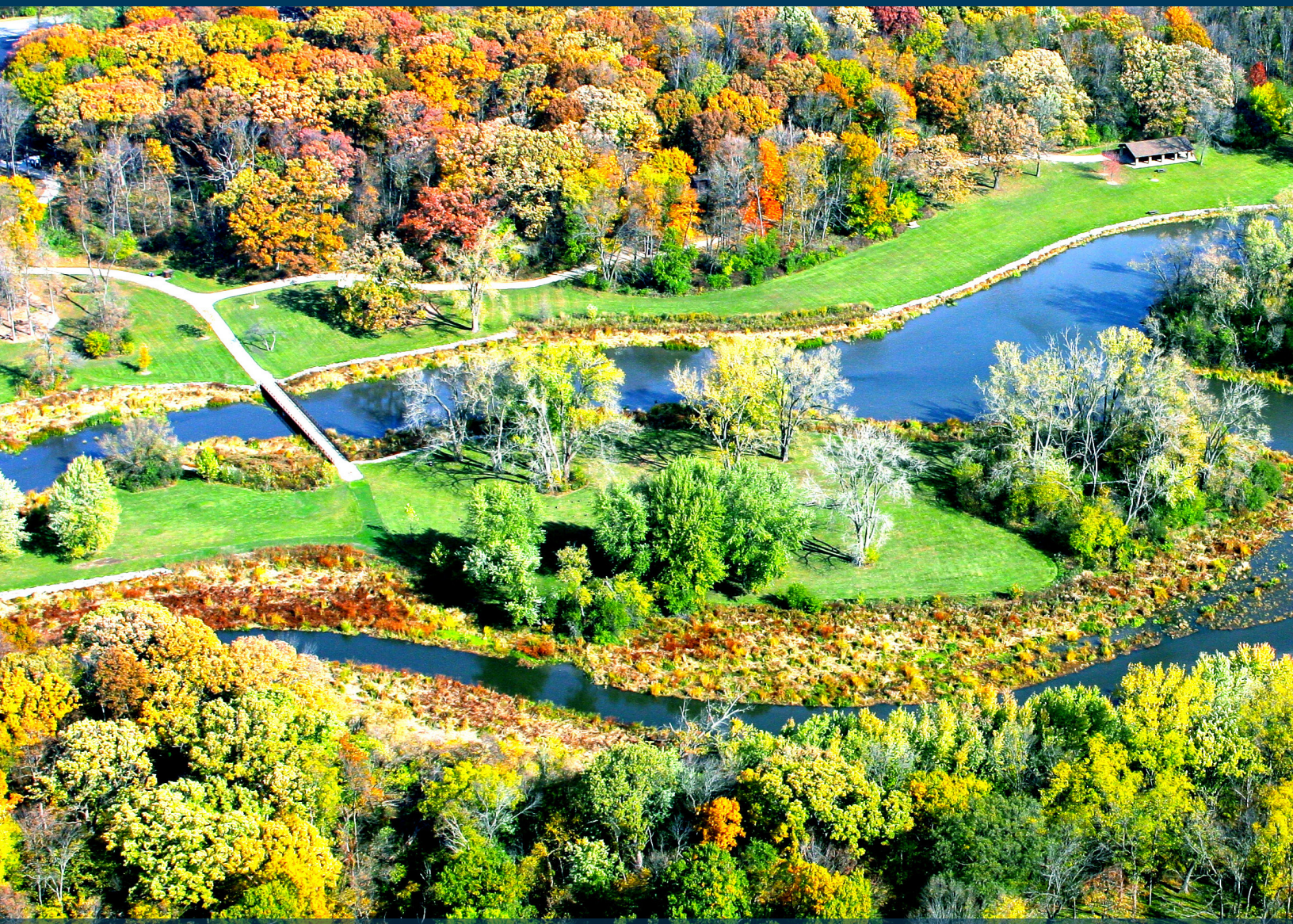
DUPAGE COUNTY



DuPage County Stormwater Management Program Plan

Plan detailing DuPage County's Countywide Water Quality Program.

January 2021

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DuPage County Stormwater Management

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Table of Contents

I. DuPage County Stormwater Management Overview

a. Mission

DuPage County Stormwater Management strives to ensure all residents are provided with regional stormwater management. Stormwater Management's goal is to mitigate the effects of urbanization on stormwater drainage, resulting in the reduction of damaging flood events and an improvement to water quality in the County's waterways.

b. Objective

DuPage County Stormwater Management aims to reduce the existing potential for stormwater damage to public health, safety, life and property; control future increases in stormwater damage; protect and enhance the quality, quantity and availability of water resources; preserve and restore existing aquatic and riparian environments; control sediment and erosion near drainage ways, developments and construction sites; and promote equitable, acceptable and legal measures for stormwater management.

c. Purpose of this Plan

The purpose of the SMPP is to meet the minimum standards required by the United States Environmental Protection Agency (USEPA) under the National Pollutant Discharge Elimination System (NPDES) Phase II program. Federal regulations through the USEPA require that all Municipal Separate Storm Sewer Systems (MS4s), partially or fully in urbanized areas based on the 2000 census, obtain stormwater permits for their discharges into receiving waters. Illinois EPA issued a new version of its MS4 Permit (Appendix X.a). This most recent version of the permit became effective on March 1, 2016 and will be reissued on March 1, 2021. According to the permit, MS4s have 180 days from the effective date of the permit to comply with any changes or new provisions contained in the permit.

The SMPP describes the procedures and practices that can be implemented by DuPage County and permit partners toward the goal of reducing the discharge of pollutants within stormwater runoff in order to comply with Federal standards. Compliance with the plan is intended to protect water quality, thus contributing to the following amenities:

- cleaner lakes and streams,
- improved recreational opportunities and tourism,
- flood damage reduction,
- better aesthetics and wildlife habitat, and
- a safer and healthier environment for the citizens.

The SMPP addresses the primary program elements, including the way the County:

- previews, permits and inspects construction activity within its limits;
- manages the planning, design and construction of projects performed within its limits;
- maintains its facilities and performs its day-to-day operations;
- works toward protecting the receiving waters from illicit discharges;
- provides public education and outreach;
- trains its employees in carrying out and reporting program activities; and
- continually monitors and evaluates the program.

d. History

- In 1972, the Federal Water Pollution Control Act Amendment began prohibiting pollutant discharge in waters throughout the United States. Currently, any discharge must be authorized by a National Pollutant Discharge Elimination System (NPDES) permit—under which DuPage County operates.
- The Clean Water Act of 1977 created a list of toxic pollutants ranked in order of priority. Additionally, it identified industries for technology-based controls.
- The 1983 Winfield Creek Pilot Study began the development of regional stormwater planning within DuPage County.
- Following historic floods in the mid-1980s throughout the Chicago Metropolitan Area, the Illinois General Assembly authorized DuPage, Kane, Lake, McHenry and Will Counties to create and fund regional stormwater management programs.
- Following Illinois' legislation in 1986, DuPage County organized a joint committee of County and municipal representatives to address stormwater issues.
- The Water Quality Act of 1987 focused on stormwater permitting requirements for municipalities and industrial activity to reduce the discharge of pollutants into Waters of the State. It required large municipalities to take steps to reduce polluted stormwater runoff, setting the groundwork for Phase I of the NPDES permitting in 1990.
- Under the authorization from state legislation, the current Stormwater Management Planning Committee was formed in 1988 to oversee Stormwater Management.
- The Stormwater Management Plan (Plan) was adopted by the DuPage County Board in 1989 (Appendix X.b). This Plan established the goals, objectives and policies for developing a successful stormwater management program. In accordance with the Plan, the DuPage County Stormwater and Floodplain Ordinance (Ordinance) was adopted in October of 1991 and went into effect in February of 1992. The Plan and the Ordinance set the foundation for the DuPage County Stormwater Management Program.

  As outlined in the Plan, the six goals guiding the Stormwater Management Program are:

  1. Reduce the existing potential for stormwater damage to public health, safety, life and property.
  2. Control future increases in stormwater damage within DuPage County and in areas of adjacent counties affected by DuPage County drainage.
  3. Protect and enhance the quality, quantity and availability of surface and groundwater resources.
  4. Preserve and enhance existing aquatic and riparian environments and encourage restoration of degraded areas.
  5. Control sediment and erosion in and from drainage ways, developments and construction sites.
  6. Promote equitable, acceptable and legal measures for stormwater management.

  Each community who has adopted the DuPage County Ordinance is required to designate a Stormwater Administrator to execute the Ordinance. In addition, Stormwater Administrators and other municipal engineers provide input in countywide regulations through the Municipal Engineers Group (MEG) and Municipal Engineers Discussion Group (MEDG), which convene monthly. The DuPage County Countywide Stormwater and Flood

Plain Ordinance (DCCSFPO) was adopted in 1991 (Appendix X.3). The principal purpose of the DCCSFPO is to promote effective, equitable, acceptable and legal stormwater management, wetland protection and water quality measures.

- In 1999, Phase II regulations expand the existing NPDES stormwater program (Phase I) by addressing stormwater discharges from small (less than 100,000 population) municipalities and construction sites disturbing between one and five acres.
- In 2001, DuPage County Stormwater Management Plan's Appendix J – Water Quality Enhancements was approved (Appendix X.c).
- The expanded Phase II program began in March 2003 with the issuance of the ILR40 Permit to Discharge Stormwater from Small Municipal Separate Storm Sewer Systems. The Permit required small MS4s in urbanized areas to obtain NPDES permits and implement six (6) minimum control measures. An urbanized area as delineated by the US Census Bureau is defined as a central place or places and the adjacent densely settled surrounding area that together have a residential population of at least 50,000 people and an overall population density of at least 500 people per square mile. Permit No. ILR40 is attached to this document as Appendix X.a.

II. Watersheds

Five major watersheds are found in DuPage County. These are the West Branch DuPage River, East Branch DuPage River, Salt Creek, Des Plaines River, and Fox River.

a. West Branch

The West Branch DuPage River is located in western DuPage County and is part of the Des Plaines River Watershed. The headwaters originate in Cook County where the waterway flows north to south through DuPage County. The watershed encompasses approximately 128 square miles. The West Branch converges with the East Branch DuPage River in Will County.

b. East Branch

The East Branch DuPage River originates in north-central DuPage County. The watershed is approximately 81 square miles. The East Branch is a tributary to the Des Plaines River and flows south through DuPage County's eastern communities and meets the West Branch to form the main stem of the DuPage River in northern Will County.

c. Salt Creek

Salt Creek is within the Des Plaines River Watershed and originates north of the DuPage County border in Cook County. The watershed is approximately 100 square miles. It runs southeast from Cook County, through DuPage County and then back east into Cook County.

d. Des Plaines

Several tributaries in DuPage County drain directly into the Des Plaines River. These include Sawmill Creek, Flagg Creek, Addison Creek, Silver Creek (Bensenville ditch), Willow Creek, Crystal Creek, and Black Partridge Creek. The Des Plaines River flows from southeastern Wisconsin

through northeastern Illinois to the confluence with the Kankakee River forming the Illinois River.

e. Fox River

Brewster Creek, Norton Creek, Wabaunsee, and Indian Creek are direct tributaries to the Fox River. The Fox River originates in Wisconsin and flows through Illinois, including DuPage County before converging with the Illinois River in Ottawa, IL.

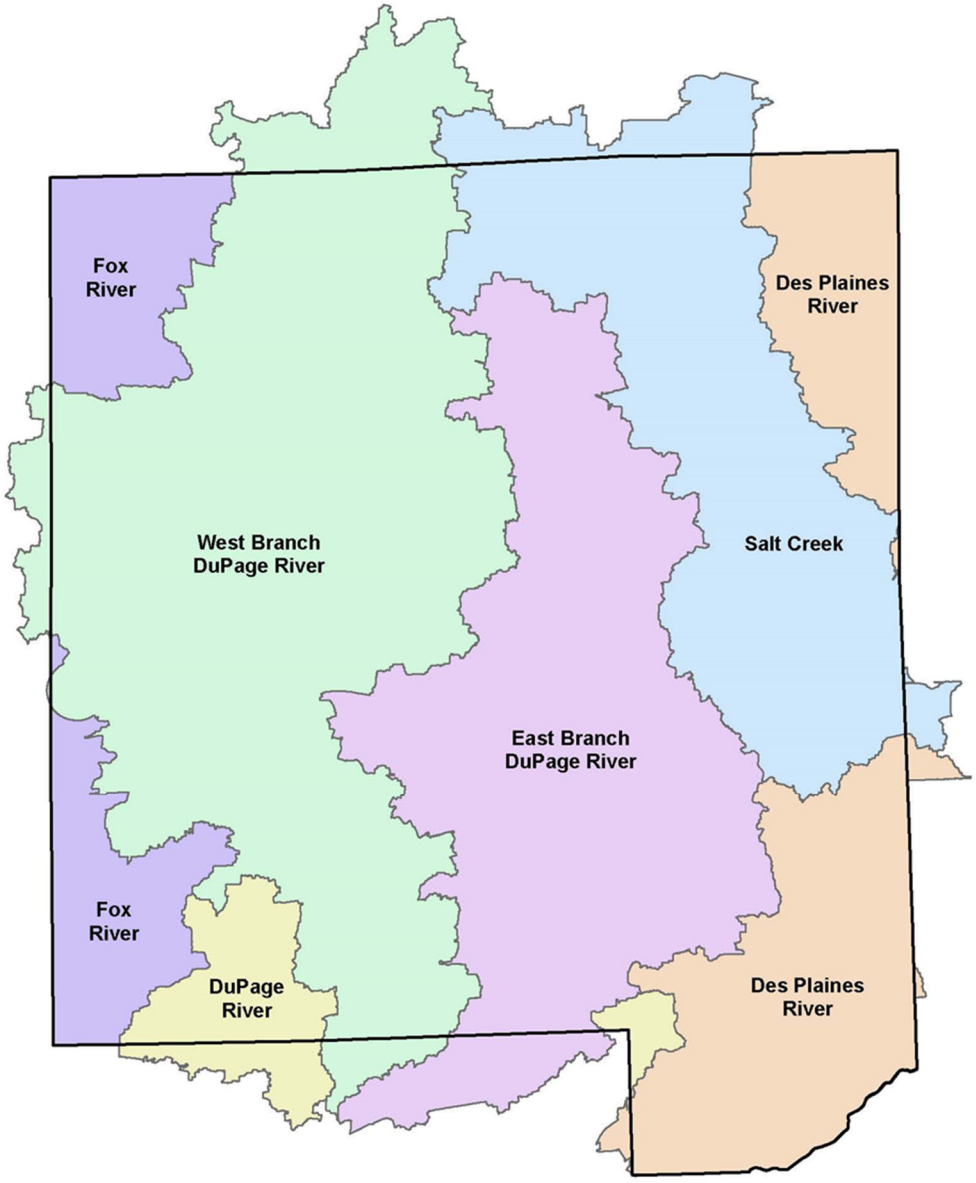

Figure 1. DuPage County Watersheds

Figure 2. DuPage County Stream System

III. Water Quality Standards

The 1987 Water Quality Act established new requirements and funding, through the Clean Water Act Section 319, for states to develop and implement nonpoint source pollution control. Specifically, Section 319 required each state to: (1) identify navigable waters that, without government action to control non-point sources of pollution, cannot be reasonably expected to maintain applicable water quality standards or goals; (2) identify nonpoint sources that add significant amounts of pollution to affected waters; and (3) develop a nonpoint source water pollution plan on a watershed-by-watershed basis. The Illinois Environmental Protection Agency (IEPA) created a program to comply with these federal regulations.

a. Total Maximum Daily Load

The Clean Water Act requires that a Total Maximum Daily Load (TMDL) be developed for each pollutant of an impaired water body. A TMDL is an estimation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. It assesses contributing point and nonpoint sources to identify pollution reductions necessary for designated use attainment. Pollutant reductions are then allocated to contributing sources, thus triggering the need for pollution control and increased management responsibilities amongst sources in the watershed. More information on TMDLs, including current reports, can be found at: https://www2.illinois.gov/epa/topics/water-quality/watershed-management/tmdls/Pages/default.aspx

b. Impaired Waterways

Every two years, in accordance with Sections 305(b) and 303(d) of the federal Clean Water Act, the Illinois Environmental Protection Agency (IEPA) must report to the U.S. Environmental Protection Agency on the quality of Illinois surface water (e.g., lakes, streams, Lake Michigan, wetlands) and groundwater resources (Section 305(b)) and provide a list of those waters where their designated uses are deemed 'impaired' (Section 303(d)). A list of impaired waterways can be found in Appendix X.d.

c. Status of Waters

Impairment status, causes, and sources of DuPage County waterways can be found in Appendix X.5 of this document.

IV. Program Management

The Illinois EPA General NPDES Permit No. ILR40 allows MS4s to partner together to implement their stormwater management program. DuPage County Stormwater Management Department has established a Countywide NPDES Program partnering with 41 municipalities and townships to achieve these goals of the ILR40 in a more cost and time efficient manner.

a. DuPage County Stormwater Management

DuPage County Stormwater Management Department was established in 1989 and is guided by the DuPage County Stormwater Management Planning Committee and Stormwater Management Plan. The Stormwater Management Planning Committee is comprised of six County Board elected officials and six municipal members from each of the County's districts. They work closely with Stormwater Management staff in both day-to-day operations and in the development of larger projects and initiatives.

b. Co-Permittees

The 41 participating co-permitees are listed in Section V. Each co-permittee (municipality or township road district) is responsible for specific duties in fulfilling NPDES permit requirements as outlined in an intergovernmental agreement with DuPage County.

V. DuPage County's Regional Permit Partnership

The DuPage County program was created to address the National Pollutant Discharge Elimination System (NPDES) Phase II permit on a regional, specifically watershed, scale to reduce redundancy in services. By mutual agreement, the program addresses the six minimum control measures, as well as provides monitoring and reporting on behalf of all participating MS4s (co-permittees). This shared responsibility reduces cost and burden on the MS4s while providing the same or better level of service. Each MS4 chooses to participate in the County's program at a specific level of service formalized in an intergovernmental agreement. A minimum level of participation is required from all municipalities in the watershed to provide a comprehensive watershed wide program. These efforts take place throughout the East Branch DuPage River, West Branch DuPage River, and Salt Creek watersheds within the DuPage County, as well as where these watersheds extend into neighboring counties and municipalities as well as within communities whose boundaries extend into the Des Plaines River and Fox River watersheds. The following MS4s are included in the DuPage County program:

Village of Addison
Addison Township
Village of Bartlett
Village of Bensenville
Village of Bloomingdale
Bloomingdale Township
Village of Burr Ridge
Village of Carol Stream
Village of Clarendon Hills
City of Darien
Village of Downers Grove
Downers Grove Township
City of Elmhurst
Village of Glen Ellyn
Village of Glendale Heights
Village of Hanover Park
Village of Hinsdale
Village of Itasca
Village of Lemont
Village of Lisle
Lisle Township
Village of Lombard
Milton Township
City of Naperville
Naperville Township
Village of Oak Brook
City of Oakbrook Terrace
Village of Roselle
Village of Villa Park
City of Warrenville
Village of Wayne
Wayne Township
City of West Chicago
Village of Westmont
City of Wheaton
Village of Willowbrook
Village of Winfield
Winfield Township
City of Wood Dale
Village of Woodridge
York Township

a. Water Quality Partners

In addition to the efforts of DuPage County, municipal, and township governments, several other organizations within DuPage County have worked to implement the pollutant reduction goals outlined in the various TMDL reports produced for Illinois' impaired waters. These organizations include the DuPage River Salt Creek Workgroup, Lower Des Plaines Ecosystem Partnership, and Fox River Ecosystem Partnership.

In response to concerns about TMDLs under development, a group of local municipalities, Publicly Owned Treatment Works (POTWs), and environmental organizations formed the DuPage River Salt Creek Workgroup (DRSCW). Beginning in 2007, DRSCW began collecting data throughout the East Branch DuPage River Watershed by establishing three monitoring stations

to gather chemical, biological, and habitat information. DRSCW then used this data to assess existing conditions by using a statistical analysis to identify which parameters are degrading aquatic life. Remediation projects were then developed to address these issues, some of which have been implemented.

VI. Implementation of this SMPP

Coordination between the DuPage County Stormwater Management and co-permittees occurs through partnership in fulfilling the Minimum Control Measures. DuPage County Stormwater Management is the primary entity responsible for meeting Public Education and Outreach, Public Participation and Involvement, and Illicit Discharge Detection and Elimination. Construction Site Runoff Control and Post-Construction Best Management Practices are administered under the DuPage County Countywide Stormwater and Floodplain Ordinance. Each MS4 is responsible for day-to-day activities involving Pollution Prevention and Good Housekeeping, however, DuPage County Stormwater Management provides staff training and guidance to co-permittees. Roles and responsibilities under the program are listed in more detail in Section VII.

At the end of the yearly reporting period (March 1 – February 28/29) a binder shall be created to document SMPP related activities to IEPA, or their authorized agent, in the case of an audit. It is anticipated that implementation of this SMPP constitutes compliance with the program. The SMPP shall be posted on the DuPage County and co-permittee websites. Annual Reports, Monitoring Data, NOI and Stormwater Management Plans shall also be posted on each MS4's website and be kept for a minimum of 5-years.

VII. Minimum Control Measures

a. Public Education & Outreach on Stormwater Impacts

DuPage County Stormwater Management conducts public education and outreach activities throughout the region on a multitude of topics, such as watershed planning efforts, water quality, and best management practices (BMPs). On staff is a full time Stormwater Communications Supervisor who is responsible for managing stormwater education and outreach. The County also contracts annually with several organizations that assist in providing additional education and outreach services pertaining to both technical and general education on stormwater impact topics.

1. Distribution of Publications. Stormwater Management has created several handouts and brochures pertaining to sources of pollutants in waterways and water quality BMPs. These, as well as handouts from other entities, are distributed at public events, at the DuPage County complex, and through municipal partners. They are also available online at https://www.dupageco.org/EDP/Stormwater_Management/1163/. Informational topics include rain barrels, rain gardens, native plants, other green infrastructure techniques, citizen monitoring of waterways and seasonal BMPs for the spring, summer, fall and winter.
2. Speaking Engagements & Community Events. Stormwater Management coordinates, hosts, and presents at many workshops and community events countywide throughout the year. Staff also invite outside speakers who are experts on particular topics to present.

These events are held for residents, community groups, professional organizations, businesses, and governmental agencies. Among the topics discussed are water quality efforts for the watersheds, methods for pollutant reduction, during and after construction BMPs, native vegetation, and green infrastructure. In accordance with NPDES requirements, presentations include information on the potential impacts and effects of stormwater discharge due to climate change. Presentations may be recorded and posted online for use by the County and municipalities for new staff or as a refresher course.

3. Public Service Announcements & Media. Stormwater Management has taken advantage of technology to enhance outreach efforts. The department runs Facebook, Twitter and YouTube pages that detail water quality trends and highlight practices that can reduce the transport of pollutants into waterways. The County promotes these informational outlets using a Stormwater Management monthly e-newsletter. In addition, Stormwater Management engages in direct media relations using press releases and advisories to promote seasonal BMPs, events, and other stormwater-related news. Stormwater Outreach Social Media Links:

   https://twitter.com/lovebluedupage
   https://www.youtube.com/user/lovebluelivegreen
   https://www.facebook.com/lovebluedupage

4. Classroom Education. In partnership with schools and local educational organizations, DuPage County students are educated on stormwater management and water quality. Using several watershed models owned or borrowed by the County, students learn how watersheds work, including the transport of pollutants from watershed-wide land uses to waterways via stormwater. The students also learn about green infrastructure, such as rain gardens, permeable pavers, green roofs, native plants, and bioswales. DuPage County also promotes water quality and environmental efforts through the Water Quality Flag program. Schools and other institutions within the area can earn a Water Quality Flag by participating in certain educational trainings, using green infrastructure as a learning opportunity, and participating in a hands-on activity.

MS4s partnering with DuPage County in an NPDES program are responsible for promoting and advertising educational events and workshops within their jurisdictions. MS4s are responsible for distributing educational materials to their residents. The MS4 is also responsible for ensuring their own staff attends workshops geared towards municipal staff on green infrastructure, good housekeeping, and other applicable topics to prevent and reduce the discharge of pollutants into waterways.

b. Public Involvement & Participation

DuPage County Stormwater aims to inform the public on watershed initiatives and engage a broad range of individuals regarding policies and projects related to the control and reduction of pollutants in stormwater runoff. This is accomplished through technical trainings, stakeholder groups, volunteer opportunities, and public meetings. The County has identified environmental justice areas within the watershed planning jurisdictions in order to ensure prioritization of efforts regarding public involvement and participation initiatives (Appendix X.e).

1. Workshops. Stormwater Management annually supports several training initiatives throughout the County, including The Conservation Foundation's Environmental Summit and biannual Beyond the Basics seminars and the DuPage River Salt Creek Workgroup's chloride reduction trainings. The purpose of the events is to engage residents, organizations, and government agencies in pollution reduction practices and volunteer opportunities.
2. Stakeholder Meetings. Stormwater Management hosts at least two regular water quality stakeholder meetings per year in each of the County's three main watersheds. These meetings address matters pertaining to pollutant reduction on a watershed level. In addition, input on water quality impairments is requested from stakeholders for incorporation into watershed planning efforts, which may cause the formation of separate stakeholder groups any given year.
3. Public Meetings & Hearings. Stormwater Management will provide opportunity for public comment at several locations throughout the watershed in order to reach all interested residents on the adequacy of its MS4 program, watershed plans, and projects. At least one public meeting or hearing also accompanies public comment periods associated with plans or projects. The County will publicize public comment periods in accordance with its education and outreach initiatives and include opportunities to comment online, in person, or by mail.
4. Program Coordination. Stormwater Management coordinates educational and public involvement strategies. To gauge their effectiveness, the County develops and distributes surveys via an email list, webpage, and on social media. These surveys measure citizen views, behaviors, and concerns pertaining to a variety of topics, including water quality, property management, flood perceptions, and residential pollutant control. County staff and/or educational partners analyze results of these surveys in order to improve and enhance the current program.
5. Volunteer Opportunities. A variety of volunteer opportunities are sponsored by Stormwater Management, including:
    - The Adopt-a-Stream program, which engages the public by providing an opportunity to pick up trash and/or monitor a stretch of waterway;
    - The DuPage River Sweep, which is an annual event that allows residents, groups, schools, and businesses to volunteer for a day to pick trash out of a section of a local waterway; and
    - The Storm Drain Medallion program, where students can apply medallions on storm drains, which notifies the public where the drains lead and why nothing should be dumped into them.

Participating MS4s are responsible for advertising and promoting meetings, hearings, and events online and within their jurisdictions. The MS4 is also responsible for ensuring attendance by their own staff, as necessary.

c. Illicit Discharge Detection & Elimination

DuPage County performs field inspections of all known MS4 outfall locations for illicit discharges (Appendix X.f). The public may report illicit discharges to the County or co-permittees directly or through the DuPage County Citizen Reporter:
https://gis.dupageco.org/CitizenReporter/index.html

DuPage County Stormwater Management conducts inspections of MS4 outfalls within one major watershed per year. Priority outfalls have been identified throughout the program area and are inspected annually.

1. The County has developed a comprehensive storm sewer atlas from information obtained from partnering permittees. This atlas identifies the location of storm sewers and the outfall point where a discharge into a Water of the State occurs. This atlas is to be regularly updated to incorporate new projects as well as when updated information is received from other agencies. The atlas is also updated as outfall locations are verified and inspected for potential illicit discharges in the field.
2. DuPage County conducts the ten-step prioritization program identified in the DuPage County IDDE Program Technical Guidance (Appendix X.f). The outfalls in each watershed are inspected according to the established schedule. Dry weather sampling is conducted throughout the watershed in order to detect any non-stormwater discharges being conveyed through the storm sewer system.
3. When a suspect illicit discharge is located during dry weather conditions, field testing of pollutants is conducted. Testing parameters include temperature, surfactants, ammonia, fluoride, specific conductance, and pH.
4. If a discharge from an outfall is suspected to be from an illicit source, the MS4 owner is notified and tracing procedures are conducted using the storm sewer atlas, as well as visual inspections of sewers in the field.
5. DuPage County offers educational resources regarding illicit discharges to residents and businesses. Information regarding the DuPage County Citizen Reporter is posted on DuPage County's website so that members of the public, residing throughout the watershed, can report suspected discharges from the storm sewer into a Water of the State. The end goal is to stop the discharge and educate the polluter on the implications of such actions. The site of the discharge is evaluated to determine any necessary remediation actions.
6. DuPage County conducts presentations to train appropriate staff members for all partnering permittees on the hazards associated with illicit discharges and the improper disposal of waste, as well as the requirement and mechanism for reporting such discharges.

Illicit source removal procedures are outlined in IDDE Ordinances, which are incorporated into and enforced through applicable County and municipal codes. Each MS4 is responsible for enforcement within their jurisdiction or may elect to have the County enforce. If an MS4 chooses to have the County enforce their IDDE ordinance, such an arrangement must be established through an intergovernmental agreement. The MS4 is also responsible for promoting use of the DuPage County Citizen Reporter by their residents and promoting education to reduce illicit discharges within their jurisdictions.

Stormwater Management also offers support to municipalities in the event of a fuel or chemical spill that has entered or has the potential to enter nearby waterbodies. Staff can distribute absorbent booms and coordinate clean up through an environmental company. See Appendix X.h and X.i for the spill response and reporting information.

d. Construction Site Storm Water Runoff Control

DuPage County has developed and enacted the DuPage County Countywide Stormwater and Floodplain Ordinance (DCCSFPO) and will continue to administer the DCCSFPO and update as necessary. The Ordinance can be found at: https://www.dupageco.org/EDP/Stormwater_Management/Stormwater_Regulatory_Services/54956/

The DCCSFPO was first adopted in 1991 and last revised in May 2019. The DCCSFPO provides regulatory authority for developments in participating communities and unincorporated DuPage County. These communities may choose to review and process all aspects of the stormwater permit (complete waiver communities), while others may choose to delegate review authority for development in wetlands, floodplain, and buffer (partial waiver communities), or the communities may allow DuPage County to review and process all aspects of the stormwater permit (non-waiver communities). Complete and partial waiver communities are responsible for reviewing sediment erosion control and post construction best management practices, unless they request DuPage County to review them on their behalf. The DCCSFPO establishes a minimum level of regulatory compliance that a municipality or unincorporated portion of the County must meet. As the DCCSFPO has been adopted into DuPage County's County Code, it serves as the regulatory mechanism for enforcement of these requirements. The DuPage County Stormwater Management Planning Committee oversees the administration and enforcement of the DCCSFPO on a countywide basis.

1. The DCCSFPO includes provisions for sediment and erosion control. Site development plans for any construction site in which ground disturbance is occurring must include a sediment and erosion control plan. Each site development plan must provide proper sediment and erosion control in order to obtain a permit. Guidance on Construction Site Runoff Control can be found in Appendix X.i and from the Illinois Urban Manual at: https://illinoisurbanmanual.org/
2. Construction sites are inspected to ensure that disturbed areas meet soil erosion and sediment control requirements as outlined in the DCCSFPO. Inspections are conducted before and during construction to ensure proper sediment and erosion control. The DCCSFPO mandates that developments disturbing one acre or greater of land shall comply with the requirements of General Permit ILR10. As-built inspections are conducted on all development sites immediately following site development to ensure that each site is properly stabilized.
3. Based on the level of service requested, the municipality shall provide one of the following:
   - If the municipality will conduct reviews of construction site runoff control on their own behalf, the municipality shall provide documentation to the County for inclusion in the annual report or upon request of the IEPA during facility inspections. This documentation should include the number of sediment and erosion control reviews and inspections conducted by the municipality for compliance with the NPDES program, as

well as any enforcement action. Additional details may be required for inclusion of future annual reports as required by the IEPA.

- If the County will perform reviews of construction site runoff control wholly or as requested on the behalf of the Municipality, the County will document all sediment and erosion control reviews and inspections conducted on behalf of the municipality for inclusion in the annual report or upon request of the IEPA during facility inspections required by General Permit ILR40.

e. Post-Construction Stormwater Management in New- & Re-Development

The DCCSFPO was revised to include post-construction Best Management Practices in 2008. In 2012, and then again in 2013 the DCCSFPO was updated to enhance the BMP section and add volume control requirements to all development sites increasing net new impervious area by 2,500 square feet or greater The Ordinance can be found at: https://www.dupageco.org/EDP/Stormwater_Management/Stormwater_Regulatory_Services/54956/

Infiltration of runoff is allowed and considered to provide both volume and pollution control when sized correctly. The DCCSFPO provides regulatory authority for developments in participating communities and unincorporated DuPage County. These communities may choose to review and process all aspects of the stormwater permit (complete waiver communities), while others may choose to delegate review authority for development in wetlands, floodplain, and buffer (partial waiver communities), or allow DuPage County to review and process all aspects of the stormwater permit (non-waiver communities). Complete and partial waiver communities are responsible for reviewing post construction best management practices, unless they request DuPage County to review them on their behalf. The DCCSFPO establishes a minimum level of regulatory compliance that a municipality or unincorporated portion of the County must meet. Inspections are conducted before, during, and after construction to ensure site stabilization. As the DCCSFPO has been adopted into the County Code, it serves as the regulatory mechanism for enforcement of these requirements. The DuPage County Stormwater Management Committee oversees the administration and enforcement of the DCCSFPO on a countywide basis.

a. The DCCSFPO requires a management and monitoring period including performance standards for BMPs utilizing native vegetation to ensure successful establishment of the planted native species. The management and monitoring period is typically 1- 3 years or until performance standards are achieved, depending on the planting plan being implemented. Post-construction inspections are conducted at all development sites utilizing native vegetation as a BMP, as well as for wetland, buffer, or riparian restoration and enhancement. These inspections are conducted by staff at least once per year for the duration of the maintenance and monitoring period or until performance standards are achieved. Long term operations and maintenance will be established in the permit for development sites utilizing native vegetation as a BMP. Development sites proposing to implement mechanical BMPs must also include long term maintenance plans to ensure that they remain functional.
b. The DCCSFPO requires that proposed BMP designs are submitted with a development permit application. BMPs are reviewed for compliance with the pollution control

requirements, as well as volume control provisions. Guidance on post construction BMPs can be found at: https://www.dupageco.org/EDP/Stormwater_Management/Water_Quality/1424/

c. Reviews of as-built details of treatment trains, infiltration, and mechanical BMPs are conducted during construction to ensure they are installed correctly. Rock size is provided for infiltration trenches, and catch basins are inspected for mechanical BMP placement. As-built inspections are conducted on all BMP development sites immediately following site development and stabilization to ensure that BMPs have been implemented according to plan.
d. BMP training is conducted as new regulations are added to the DCCSFPO. This training is offered to the public and is also specifically targeted to municipalities, developers, consultants, and others often involved in the stormwater permitting process.
e. Based on the level of service requested, the municipality shall provide one of the following:
    - If the Municipality will conduct BMP reviews on their own behalf, the Municipality will be responsible for providing documentation for inclusion in the annual report or upon request of the IEPA during facility inspections required by General Permit ILR40. This documentation should include the number of BMP permit reviews and inspections conducted by the municipality for compliance with the NPDES program, as well as any enforcement action. The municipality will be responsible for ensuring municipal staff attends training as required by the IEPA.
    - If the County will perform BMP reviews wholly or as requested on the behalf of the municipality, the County will provide documentation of BMP reviews conducted on behalf of the Municipality for inclusion in the annual report or upon request of the IEPA during facility inspections required by General Permit ILR40. The municipality will be responsible for ensuring appropriate staff attends BMP training.

f. Pollution Prevention & Good Housekeeping for Municipal Operations

On an annual basis, DuPage County organizes training in procedures and practices that will minimize the discharge of pollutants from municipal operations into the storm sewer system for County and municipal staff. Examples of training topics include automobile maintenance, hazardous material storage, landscaping and lawn care, parking lot and street cleaning, pest control, pet waste collection, road salt application and storage, roadway and bridge maintenance, spill response and prevention, and storm drain system cleaning. Many recorded trainings can be found on our YouTube page: https://www.youtube.com/user/loveblueliveGreen

While each MS4 is responsible for day to day good housekeeping and pollution prevention within their facility, the County provides guidance materials to assist County and municipal staff in following the good housekeeping measures outlined in the ILR40 permit (Appendix X.j and X.k).

DuPage County Stormwater Management can provide shared services to local communities for the maintenance of BMPs and associated infrastructure. This may include vegetation

management, storm sewer cleanout, street sweeping, and other maintenance activities. The shared services will be determined by the equipment and staff available from participating agencies.

The MS4 is responsible for ensuring that all applicable municipal staff positions attend appropriate training for their duties to prevent and minimize the discharge of pollutants into waterways. The MS4 is responsible for ensuring their staff and procedures adhere to good housekeeping measures in order to minimize the discharge of pollutants from municipal properties, infrastructure, and operations. The MS4 may choose to partner with the County to share services for maintenance of BMPs and associated infrastructure.

g. Monitoring

The County has taken the lead role in developing and implementing a monitoring and assessment program which, when completed, will include an evaluation of BMPs. The evaluation is based on published research, an inventory of the number and location of BMPs implemented as part of the NPDES program, and an estimate of pollutant reduction from the BMPs. The County requests that the MS4 provide to the County locations and details on BMPs implemented as part of the NPDES program within their jurisdictions for inclusion in the BMP inventory.

The County and MS4s support and contribute to the DuPage River Salt Creek Workgroup ambient monitoring of waterways which will be performed within 48 hours of a precipitation event greater than or equal to one quarter inch in a 24-hour period. At a minimum, analysis of storm water discharges or ambient water quality includes monitoring for total suspended solids, total nitrogen, total phosphorus, fecal coliform, chlorides, and oil and grease. In addition, monitoring is performed for any other pollutants associated with storm water runoff for which the receiving water is considered impaired pursuant to the most recently approved list under Section 303(d) of the Clean Water Act. More information on the DuPage River Salt Creek Workgroup can be found at: https://drscw.org/

h. Reporting

The County is responsible for ensuring annual reports are completed and submitted to the IEPA by June 1 of each year. Annual reports include an evaluation of each minimum control measure, as well as reporting on measurable goals. Previous DuPage County Annual Reports can be found at: https://www.dupageco.org/EDP/Stormwater_Management/1163/

Co-permitees are responsible for ensuring that DuPage County Stormwater Management has all applicable documentation for inclusion in the annual report by May 1 of each year. Documentation shall include details on how the MS4 promoted education and outreach efforts within their jurisdiction. Municipalities will also provide statistics on permits issued for and inspections of development sites including Construction Site Stormwater Runoff Control and Post-Construction Stormwater Management conducted by the municipalities, including any required enforcement efforts. MS4s will provide any documentation on IDDE enforcement. MS4s will also be responsible for providing the County with current staff headcounts for recordkeeping and reporting of good housekeeping related training.

VIII. Water Quality Improvement Program Grants

DuPage County Stormwater Management's Water Quality Improvement Grant Program provides financial assistance to projects providing a regional water quality benefit. This program is open to any organization or individual within DuPage County with an eligible water quality project. Eligible projects include stream bank stabilization involving bioengineering practices; in-stream habitat improvements; pond restoration; channel rehabilitation; riparian buffer rehabilitation; wetland creation and/or restoration; and green infrastructure to reduce or filter stormwater runoff. The County will fund up to 25% of eligible construction costs for water quality improvement projects. More information on the DuPage County Water Quality Improvement Program Grant can be found here: https://www.dupageco.org/WQIPGrant/

IX. Watershed Plans

The DuPage County Stormwater Management Planning Committee and County Board have approved watershed plans for more than 70 percent of the County. These are areas of documented flood damages and losses requiring capital measures to address the flooding problems. Stormwater Management is in the process of developing additional watershed plans and addendums to address remaining flooding problems within the watersheds, as well as update floodplain maps, recommend water quality enhancements and forecast potential flood situations. A list of completed watershed plans for DuPage County along with links to these plans can be found in the Appendices following this document as well as at: https://www.dupageco.org/EDP/Stormwater_Management/6597/

X. Appendices

a. NPDES General Permit ILR40
b. DuPage County Stormwater Management Plan 1989
c. Water Quality Enhancements. “Appendix J”
d. DuPage County Impaired Waterways
e. Environmental Justice Areas
f. IDDE Technical Guidance
g. Spill Response
h. Emergency Release Notification for Spills
i. Construction Site Runoff Guidance
j. Good Housekeeping
k. DuPage County O&M Plan

General NPDES Permit No. ILR40

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand East
P.O. Box 19276
Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

General NPDES Permit
For
Discharges from Small Municipal Separate Storm Sewer Systems

Expiration Date: February 28, 2021

Issue Date: February 10, 2016

Effective Date: March 1, 2016

In compliance with the provisions of the Illinois Environmental Protection Act, the Illinois Pollution Control Board Rules and Regulations (35 Ill. Adm. Code, Subtitle C, Chapter 1) and the Clean Water Act, the following discharges may be authorized by this permit in accordance with the conditions herein:

Discharges of only storm water from small municipal separate storm sewer systems (MS4s), as defined and limited herein. Storm water means storm water runoff, snow melt runoff, and surface runoff and drainage.

Receiving waters: Discharges may be authorized to any surface water of the State.

To receive authorization to discharge under this general permit, a facility operator must submit a Notice of Intent (NOI) as described in Part II of this permit to the Illinois Environmental Protection Agency (Illinois EPA). Authorization, if granted, will be by letter and include a copy of this permit.

Alan Keller

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

NPDES/Hutton/stormwater/MS4/MSFinal2-9-16.daa

CONTENTS OF GENERAL PERMIT ILR40

PART I. COVERAGE UNDER GENERAL PERMIT ILR40

A. Permit Area

This permit covers all areas of the State of Illinois.

B. Eligibility

1. This permit authorizes discharges of storm water from MS4s as defined in 40 CFR 122.26 (b)(16) as designated for permit authorizations pursuant to 40 CFR 122.32.

2. This permit authorizes the following non-storm water discharges provided they have been determined not to be substantial contributors of pollutants to a particular small MS4 applying for coverage under this permit:

- Water line and fire hydrant flushing,
- Landscape irrigation water,
- Rising ground waters,
- Ground water infiltration,
- Pumped ground water,
- Discharges from potable water sources, (excluding wastewater discharges from water supply treatment plants)
- Foundation drains,
- Air conditioning condensate,
- Irrigation water, (except for wastewater irrigation),
- Springs,
- Water from crawl space pumps,
- Footing drains,
- Storm sewer cleaning water,
- Water from individual residential car washing,
- Routine external building washdown which does not use detergents,
- Flows from riparian habitats and wetlands,
- Dechlorinated pH neutral swimming pool discharges,
- Residual street wash water,
- Discharges or flows from fire fighting activities
- Dechlorinated water reservoir discharges, and
- Pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed).

3. Any municipality covered by this general permit is also granted automatic coverage under Permit No. ILR10 for the discharge of storm water associated with construction site activities for municipal construction projects disturbing one acre or more. The permittee is granted automatic coverage 30 days after Agency receipt of a Notice of Intent to Discharge Storm Water from Construction Site Activities from the permittee. The Agency will provide public notification of the construction site activity and assign a unique permit number for each project during this period. The permittee shall comply with all the requirements of Permit ILR10 for all such construction projects.

C. Limitations on Coverage

The following discharges are not authorized by this permit:

1. Storm water discharges that are mixed with non-storm water or storm water associated with industrial activity unless such discharges are:

   a. In compliance with a separate NPDES permit; or

   b. Identified by and in compliance with Part I.B.2 of this permit.

2. Storm water discharges that the Agency determines are not appropriately covered by this general permit. This determination may include discharges identified in Part 1.B.2 or that introduce new or increased pollutant loading that may be a significant contributor of pollutants to the receiving waters.

3. Storm water discharges to any receiving water specified under 35 Ill. Adm. Code 302.105(d) (6).

4. The following non-storm water discharges are prohibited by this permit: concrete and wastewater from washout of concrete (unless managed by an appropriate control), drywall compound, wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials, fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance, soaps, solvents, or detergents, toxic or hazardous substances from a spill or other release, or any other pollutant that could cause or tend to cause water pollution.

5. Discharges from dewatering activities (including discharges from dewatering of trenches and excavations) are allowable if managed by appropriate controls as specified in a project's storm water pollution prevention plan, erosion and sediment control plan, or storm water management plan.

D. Obtaining Authorization

In order for storm water discharges from small MS4s to be authorized to discharge under this general permit, a discharger must:

1. Submit a Notice of Intent (NOI) in accordance with the requirements of Part II using an NOI form provided by the Agency (or a photocopy thereof).

2. Submit a new NOI in accordance with Part II within 30 days of a change in the operator or the addition of a new operator.

3. Unless notified by the Agency to the contrary, an MS4 owner submitting a complete NOI in accordance with the requirements of this permit will be authorized to discharge storm water from their small MS4s under the terms and conditions of this permit 30 days after the date that the NOI is received. Authorization will be by letter and include a copy of this permit. The Agency may deny coverage under this permit and require submittal of an application for an individual NPDES permit based on a review of the NOI or other information.

PART II. NOTICE OF INTENT (NOI) REQUIREMENTS

A. Deadlines for Notification

1. If an MS4 was automatically designated under 40 CFR 122.32(a)(1) to obtain permit coverage, then you were required to submit an NOI or apply for an individual permit by March 10, 2003.

2. If an MS4 has coverage under the previous general permit for storm water discharges from small MS4s, you must renew your permit coverage under this part. Unless previously submitted for this general permit, you must submit a new NOI within 90 days of the effective date of this reissued general permit for storm water discharges from small MS4s to renew your NPDES permit coverage. The permittee shall comply with any new provisions of this general permit within 180 days of the effective date of this permit and include modifications pursuant to the NPDES permit in its Annual Report.

3. If an MS4 is designated in writing by Illinois EPA under 40 CFR 122.32(a)(2) during the term of this general permit, then you are required to submit an NOI within 180 days of such notice.

4. MS4s are not prohibited from submitting an NOI after established deadlines for NOI submittals. If a late NOI is submitted, your authorization is only for discharges that occur after permit coverage is granted. Illinois EPA reserves the right to take appropriate enforcement actions against MS4s that have not submitted a timely NOI.

B. Contents of Notice of Intent

Dischargers seeking coverage under this permit shall submit the Illinois MS4 NOI form. The NOI shall be signed in accordance with Standard Condition 11 of this permit and shall include all of the following information:

1. The street address, county, and the latitude and longitude of the municipal office for which the notification is submitted;

2. The name, address, and telephone number of the operator(s) filing the NOI for permit coverage and the name, address, telephone number, and email address of the person(s) responsible for implementation and compliance with the MS4 Permit; and

3. The name and segment identification of the receiving water(s), whether any segments(s) is or are listed as impaired on the most recently approved list pursuant to Section 303(d) of the Clean Water Act or any currently applicable Total Maximum Daily Load (TMDL) or alternate water quality study, and the pollutants for which the segment(s) is or are impaired. The most recent 303(d) list may be found at http://www.epa.state.il.us/water/water-quality/index.html. Information regarding TMDLs may be found at http://www.epa.state.il.us/water/tmdl/.

4. The following shall be provided as an attachment to the NOI:

   a. A description of the best management practices (BMPs) to be implemented and the measurable goals for each of the storm water minimum control measures in paragraph IV. B. of this permit designed to reduce the discharge of pollutants to the maximum extent practicable;

   b. The month and year in which you implemented any BMPs of the six minimum control measures, and the month and year in which you will start and fully implement any new minimum control measures or indicate the frequency of the action;

   c. For existing permittees, provide adequate information or justification on any BMPs from previous NOIs that could not be implemented; and

   d. Identification of a local qualifying program, or any partners of the program if any.

5. For existing permittees, certification that states the permittee has implemented necessary BMPs of the six minimum control measures.

C. All required information for the NOI shall be submitted electronically and in writing to the following addresses:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Permit Section
Post Office Box 19276
Springfield, Illinois 62794-9276

epa.ms4noipermit@illinois.gov

D. Shared Responsibilities

Permittees may partner with other MS4s to develop and implement their storm water management program. Each MS4 must fill out the NOI form. MS4s may also jointly submit their individual NOI in coordination with one or more MS4s. The description of their storm water management program must clearly describe which permittees are responsible for implementing each of the control measures. Each permittee is responsible for implementation of best management practices for the Storm Water Management Program within its jurisdiction.

PART III. SPECIAL CONDITIONS

A. The Permittee's discharges, alone or in combination with other sources, shall not cause or contribute to a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302.

B. If there is evidence indicating that the storm water discharges authorized by this permit cause, or have the reasonable potential to cause or contribute to a violation of water quality standards, you may be required to obtain an individual permit or an alternative general permit or the permit may be modified to include different limitations and/or requirements.

C. If a TMDL allocation or watershed management plan is approved for any water body into which you discharge, you must review your storm water management program to determine whether the TMDL or watershed management plan includes requirements for control of storm water discharges. If you are not meeting the TMDL allocations, you must modify your storm water management program to implement the TMDL or watershed management plan within eighteen months of notification by the Agency of the TMDL or watershed management plan approval. Where a TMDL or watershed management plan is approved, the permittee must:

1. Determine whether the approved TMDL is for a pollutant likely to be found in storm water discharges from your MS4.

2. Determine whether the TMDL includes a pollutant waste load allocation (WLA) or other performance requirements specifically for storm water discharge from your MS4.

3. Determine whether the TMDL addresses a flow regime likely to occur during periods of storm water discharge.

4. After the determinations above have been made and if it is found that your MS4 must implement specific WLA provisions of the TMDL, assess whether the WLAs are being met through implementation of existing storm water control measures or if

additional control measures are necessary.

5. Document all control measures currently being implemented or planned to be implemented to comply with TMDL waste load allocation(s). Also include a schedule of implementation for all planned controls. Document the calculations or other evidence that shows that the WLA will be met.

6. Describe and implement a monitoring program to determine whether the storm water controls are adequate to meet the WLA.

7. If the evaluation shows that additional or modified controls are necessary, describe the type and schedule for the control additions/revisions.

8. Continue requirements 4 through 7 above until monitoring from two continuous NPDES permit cycles demonstrate that the WLAs or water quality standards are being met.

9. If an additional individual permit or alternative general permit includes implementation of work pursuant to an approved TMDL or alternate water quality management plan, the provisions of the individual or alternative general permit shall supersede the conditions of Part III.C. TMDL information may be found at http://www.epa.state.il.us/water/tmdl/.

D. If the permittee performs any deicing activities that can cause or contribute to a violation of an applicable State chloride water quality standard, the permittee must participate in any watershed group(s) organized to implement control measures which will reduce the chloride concentration in any receiving stream in the watershed.

E. Authorization: Owners or operators must submit either an NOI in accordance with the requirements of this permit or an application for an individual NPDES Permit to be authorized to discharge under this General Permit. Authorization, if granted will be by letter and include a copy of this Permit. Upon review of an NOI, the Illinois EPA may deny coverage under this permit and require submittal of an application for an individual NPDES permit.

1. Automatic Continuation of Expired General Permit: Except as provided in III.E.2 below, when this General Permit expires the conditions of this permit shall be administratively continued until the earliest of the following:

   a. 150 days after the new General Permit is reissued;

   b. The Permittee submits a Notice of Termination (NOT) and that notice is approved by Illinois EPA;

   c. The Permittee is authorized for coverage under an individual permit or the renewed or reissued General Permit;

   d. The Permittee's application for an individual permit for a discharge or NOI for coverage under the renewed or reissued General Permit is denied by the Illinois EPA; or

   e. Illinois EPA issues a formal permit decision not to renew or reissue this General Permit. This General Permit shall be automatically administratively continued after such formal permit decision.

2. Duty to Reapply:

   a. If the permittee wishes to continue an activity regulated by this General Permit, the permittee must apply for permit coverage before the expiration of the administratively continued period specified in III.E.1 above.

   b. If the permittee reapplies in accordance with the provisions of III.E.2.a above, the conditions of this General Permit shall continue in full force and effect under the provisions of 5 ILCS 100/10-65 until the Illinois EPA makes a final determination on the application or NOI.

   c. Standard Condition 2 of Attachment H is not applicable to this General Permit.

F. The Agency may require any person authorized to discharge by this permit to apply for and obtain either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition the Agency to take action under this paragraph. The Agency may require any owner or operator authorized to discharge under this permit to apply for an individual or alternative general NPDES permit only if the owner or operator has been notified in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the owner or operator to file the application, and a statement that on the effective date of the individual NPDES permit or the alternative general permit as it applies to the individual permittee, coverage under this general permit shall automatically terminate. The Agency may grant additional time to submit the application upon request of the applicant. If an owner or operator fails to submit in a timely manner an individual or alternative general NPDES permit application required by the Agency under this paragraph, then the applicability of this permit to the individual or alternative general NPDES permittee is automatically terminated by the date specified for application submittal.

G. Any owner or operator authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit. The owner or operator shall submit an individual application with reasons supporting the request, in accordance with the requirements of 40 CFR 122.28, to the Agency. The request will be granted by issuing an individual permit or an alternative general permit if the reasons cited by the owner are adequate to support the request.

H. When an individual NPDES permit is issued to an owner or operator otherwise subject to this permit, or the owner or operator is approved for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the issue date of the individual permit or the date of approval for coverage under the alternative general permit, whichever the case may be.

PART IV. STORM WATER MANAGEMENT PROGRAMS

A. Requirements

The permittee must develop, implement, and enforce a storm water management program designed to reduce the discharge of pollutants from their MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Illinois Pollution Control Board Rules and Regulations (35 Ill. Adm. Code, Subtitle C, Chapter 1) and the Clean Water Act. The permittee's storm water management program must include the minimum control measures described in section B of this Part. For new permittees, the permittee must develop and implement specific program requirements by the date specified in the Agency's coverage letter. The U.S. Environmental Protection Agency's National Menu of Storm Water Best Management Practices (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm) and the most recent version of the Illinois Urban Manual should be consulted regarding the selection of appropriate BMPs.

B. Minimum Control Measures

The 6 minimum control measures to be included in the permittee's storm water management program are:

1. Public Education and Outreach on Storm Water Impacts

New permittees shall develop and implement elements of their storm water management program addressing the provisions listed below. Existing permittees renewing coverage under this permit shall maintain their current programs addressing this Minimum Control Measure, updating and enhancing their storm water management programs as necessary to comply with the terms of this section.

a. Distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff. The educational materials shall include information on the potential impacts and effects on storm water discharge due to climate change. Information on climate change can be found at http://epa.gov/climatechange/. The permittee shall incorporate the following into its education materials, at a minimum:

i. Information on effective pollution prevention measures to minimize the discharge of pollutants from private property and activities into the storm sewer system, on the following topics:

A. Storage and disposal of fuels, oils and similar materials used in the operation of or leaking from, vehicles and other equipment;
B. Use of soaps, solvents or detergents used in the outdoor washing of vehicles, furniture and other property,
C. Paint and related décor;
D. Lawn and garden care; and
E. Winter de-icing material storage and use.

ii. Information about green infrastructure strategies such as green roofs, rain gardens, rain barrels, bioswales, permeable piping, dry wells, and permeable pavement that mimic natural processes and direct storm water to areas where it can be infiltrated, evaporated or reused.

iii. Information on the benefits and costs of such strategies and provide guidance to the public on how to implement them.

b. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in the permittee's storm water discharges to the maximum extent practicable; and

c. Provide an annual evaluation of public education and outreach BMPs and measurable goals. Report on this evaluation in the Annual Report pursuant to Part V.C.1.

2. Public Involvement/Participation

New permittees shall develop and implement elements of their storm water management program addressing the provisions listed below. Existing permittees renewing coverage under this permit shall maintain their current programs addressing this Minimum Control Measure, updating and enhancing their storm water management programs as necessary to comply with the terms of this section.

a. At a minimum, comply with State and local public notice requirements when implementing a public involvement/ participation program;

b. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP, which must ensure the reduction of all of the pollutants of concern in the permittee's storm water discharges to the maximum extent practicable;

c. Provide a minimum of one public meeting annually for the public to provide input as to the adequacy of the permittee's MS4 program. This requirement may be met in conjunction with or as part of a regular council or board meeting;

d. The permittee shall identify environmental justice areas within its jurisdiction and include appropriate public involvement/participation. Information on environmental justice concerns may be found at http://www.epa.gov/environmentaljustice/. This requirement may be met in conjunction with or as part of a regular council or board meeting; and

e. Provide an annual evaluation of public involvement/participation BMPs and measurable goals. Report on this evaluation in the Annual Report pursuant to Part V.C.1.

3. Illicit Discharge Detection and Elimination

New permittees shall develop and implement elements of their storm water management program addressing the provisions listed below. Existing permittees renewing coverage under this permit shall maintain their current programs addressing this Minimum Control Measure, updating and enhancing their storm water management programs as necessary to comply with the terms of this section.

a. Develop, implement, and enforce a program to detect and eliminate illicit connections or discharges into the permittee's small MS4;

b. Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and location of all waters that receive discharges from those outfalls. Existing permittees renewing coverage under this permit shall update their storm sewer system map to include any modifications to the sewer system;

c. To the extent allowable under state or local law, prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into the permittee's storm sewer system and implement appropriate enforcement procedures and actions, including enforceable requirements for the prompt reporting to the MS4 of all releases, spills and other unpermitted discharges to the separate storm sewer system, and a program to respond to such reports in a timely manner;

d. Develop and implement a plan to detect and address non-storm water discharges, including illegal dumping, to the system;

e. Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste and the requirements and mechanisms for reporting such discharges;

f. Address the categories of non-storm water discharges listed in Section I.B.2 only if you identify them as significant contributor of pollutants to your small MS4 (discharges or flows from firefighting activities are excluded from the effective prohibition against non-storm water and need only be addressed where they are identified as significant sources of pollutants to waters of the United States);

g. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your storm water discharges to the maximum extent practicable;

h. Conduct periodic inspections of the storm sewer outfalls in dry weather conditions for detection of non-storm water discharges and illegal dumping. The permittee may establish a prioritization plan for inspection of outfalls, placing priority on outfalls with the greatest potential for non-storm water discharges. Major/high priority outfalls shall be inspected at least annually; and

i. Provide an annual evaluation of illicit discharge detection and elimination BMPs and measurable goals. Report on this evaluation in the Annual Report pursuant to Part V.C.1.

4. Construction Site Storm Water Runoff Control

New permittees shall develop and implement elements of their storm water management program addressing the provisions listed below. Existing permittees renewing coverage under this permit shall maintain their current programs addressing this Minimum Control Measure, updating and enhancing their storm water management programs as necessary to comply with the terms of this section.

a. Develop, implement, and enforce a program to reduce pollutants in any storm water runoff to the permittee's small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Control of storm water discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more or has been designated by the permitting authority.

At a minimum, the permittee must develop and implement the following:

i. An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under state or local law;

ii. Erosion and Sediment Controls - The permittee shall ensure that construction activities regulated by the storm water program require the construction site owner/operator to design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed, and maintained to:

(A) Control storm water volume and velocity within the site to minimize soil erosion;
(B) Control storm water discharges, including both peak flow rates and total storm water volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion;
(C) Minimize the amount of soil exposed during construction activity;
(D) Minimize the disturbance of steep slopes;
(E) Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting storm water runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;
(F) Provide and maintain natural buffers around surface waters, direct storm water to vegetated areas to increase sediment removal, and maximize storm water infiltration, unless infeasible; and
(G) Minimize soil compaction and preserve topsoil, unless infeasible.

iii. Requirements for construction site operators to control or prohibit non-storm water discharges that would include concrete and wastewater from washout of concrete (unless managed by an appropriate control), drywall compound, wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials, fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance, soaps, solvents, or detergents, toxic or hazardous substances from a spill or other release, or any other pollutant that could cause or tend to cause water pollution;

iv. Require all regulated construction sites to have a storm water pollution prevention plan that meets the requirements of Part IV of NPDES permit No. ILR10, including management practices, controls, and other provisions at least as protective as the requirements contained in the Illinois Urban Manual, 2014, or as amended including green infrastructure techniques where appropriate and practicable;

v. Procedures for site plan reviews which incorporate consideration of potential water quality impacts and site plan review of individual pre-construction site plans by the permittee to ensure consistency with local sediment and erosion control requirements;

vi. Procedures for receipt and consideration of information submitted by the public; and

vii. Site inspections and enforcement of ordinance provisions.

b. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your storm water discharges to the maximum extent practicable.

c. Provide an annual evaluation of construction site storm water control BMPs and measureable goals in the Annual Report pursuant to Part V.C.1.

5. Post-Construction Storm Water Management in New Development and Redevelopment

New permittees shall develop and implement elements of their storm water management program addressing the provisions listed below. Existing permittees renewing coverage under this permit shall maintain their current programs addressing this Minimum Control Measure, updating and enhancing their storm water management programs, as necessary, to comply with the terms of this section.

a. Develop, implement, and enforce a program to address and minimize the volume and pollutant load of storm water runoff from projects for new development and redevelopment that disturb greater than or equal to one acre, projects less than one acre that are part of a larger common plan of development or sale or that have been designated to protect water quality, that discharge into the permittee's small MS4 within the MS4's jurisdictional control. The permittee's program must ensure that appropriate controls are in place that would protect water quality and reduce the discharge of pollutants to the maximum extent practicable. In addition, each permittee shall adopt strategies that incorporate the infiltration, reuse, and evapotranspiration of storm water into the project to the maximum extent practicable. The permittee shall also develop and implement procedures for receipt and consideration of information submitted by the public.

b. Develop and implement strategies which include a combination of structural and/or non-structural BMPs appropriate for all projects within the permittee's jurisdiction for all new development and redevelopment that disturb greater than or equal to1 acre (at a minimum) that will reduce the discharge of pollutants and the volume and velocity of storm water flow to the maximum extent practicable. These strategies shall include effective water quality and watershed protection elements and shall be amenable to modification due to climate change. Information on climate change can be found at http://www.epa.gov/climatechange/. When selecting BMPs to comply with requirements contained in this Part, the permittee shall adopt one or more of the following general strategies, listed in order of preference below. The proposal of a strategy shall include a rationale for not selecting an approach from among those with a higher preference.

   i. Preservation of the natural features of development sites, including natural storage and infiltration characteristics;

   ii. Preservation of existing natural streams, channels, and drainage ways;

   iii. Minimization of new impervious surfaces;

   iv. Conveyance of storm water in open vegetated channels;

   v. Construction of structures that provide both quantity and quality control, with structures serving multiple sites being preferable to those serving individual sites; and

   vi. Construction of structures that provide only quantity control, with structures serving multiple sites being preferable to those serving individual sites.

c. If a permittee requires new or additional approval of any development, redevelopment, linear project construction, replacement or repair on existing developed sites, or other land disturbing activity covered under this Part, the permittee shall require the person responsible for that activity to develop a long term operation and maintenance plan including the adoption of one or more of the strategies identified in Part IV.B.5.b. of this permit.

d. Develop and implement a program to minimize the volume of storm water runoff and pollutants from public highways, streets, roads, parking lots, and sidewalks (public surfaces) through the use of BMPs that alone or in combination result in physical, chemical, or biological pollutant load reduction, increased infiltration, evapotranspiration, and reuse of storm water. The program shall include, but not be limited to the following elements:

   i. Annual Training for all MS4 employees who manage or are directly involved in (or who retain others who manage or are directly involved in) the routine maintenance, repair, or replacement of public surfaces in current green infrastructure or low impact design techniques applicable to such projects; and

   ii. Annual Training for all contractors retained to manage or carry out routine maintenance, repair, or replacement of public surfaces in current green infrastructure or low impact design techniques applicable to such projects. Contractors may provide training to their employees for projects which include green infrastructure or low impact design techniques.

e. Develop and implement a program to minimize the volume of storm water runoff and pollutants from existing privately owned developed property that contributes storm water to the MS4 within the MS4 jurisdictional control. Such program must be documented and may contain the following elements:

   i. Source Identification – Establish an inventory of storm water and pollutants discharged to the MS4;

   ii. Implementation of appropriate BMPs to accomplish the following:

      A. Education on green infrastructure BMPs;
      B. Evaluation of existing flood control techniques to determine the feasibility of pollution control retrofits;
      C. Evaluation of existing flood control techniques to determine potential impacts and effects due to climate change;
      D. Implementation of additional controls for special events expected to generate significant pollution (fairs, parades, performances);
      E. Implementation of appropriate maintenance programs, (including maintenance agreements, for structural pollution control devices or systems);
      F. Management of pesticides and fertilizers; and
      G. Street cleaning in targeted areas.

f. Infiltration practices should not be implemented in any of the following circumstances:

i. Areas/sites where vehicle fueling and/or maintenance occur;

ii. Areas/sites with shallow bedrock which allow movement of pollutants into the groundwater;

iii. Areas/sites near Karst features;

iv. Areas/sites where contaminants in soil or groundwater could be mobilized by infiltration of storm water;

v. Areas/sites within a delineated source water protection area for a public drinking water supply where the potential for an introduction of pollutants into the groundwater exists. Information on groundwater protection may be found at:

http://www.epa.state.il.us/water/groundwater/index.html

vi. Areas/sites within 400 feet of a community water supply well if there is not a wellhead protection delineation area or within 200 feet of a private water supply well. Information on wellhead protection may be found at :

http://www.epa.state.il.us/water/groundwater/index.html

g. Develop and implement an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects, public surfaces, and existing developed property as set forth above to the extent allowable under state or local law.

h. Require all regulated construction sites to have post-construction management plans that meet or exceed the requirements of Part IV.D.2.h of NPDES permit No. ILR10 including management practices, controls, and other provisions at least as protective as the requirements contained in the most recent version of the Illinois Urban Manual, 2014.

i. Ensure adequate long-term operation and maintenance of BMPs.

j. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your storm water discharges to the maximum extent practicable.

k. Within 3 years of the effective date of the permit, the permittee must develop and implement a process to assess the water quality impacts in the design of all new and existing flood management projects that are associated with the permittee or that discharge to the MS4. This process must include consideration of controls that can be used to minimize the impacts to site water quality and hydrology while still meeting the project objectives. This will also include assessment of any potential impacts and effects on flood management projects due to climate change.

l. Provide an annual evaluation of post-construction storm water management BMPs and measureable goals in the Annual Report pursuant to Part V.C.1 .

6. Pollution Prevention/Good Housekeeping for Municipal Operations

New permittees shall develop and implement elements of their storm water management program addressing the provisions listed below. Existing permittees renewing coverage under this permit shall maintain their current programs addressing this Minimum Control Measure, updating and enhancing their storm water management programs as necessary to comply with the terms of this section.

a. Develop and implement an operation and maintenance program that includes an annual training component for municipal staff and contractors and is designed to prevent and reduce the discharge of pollutants to the maximum extent practicable.

b. Pollution Prevention- The permittee shall design, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants from municipal properties, infrastructure, and operations. At a minimum, such measures must be designed, installed, implemented and maintained to:

i. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;

ii. Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, chemical storage tanks, deicing material storage facilities and temporary stockpiles, detergents, sanitary waste, and other materials present on the site to precipitation and to storm water;

iii. Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures; and

iv. Provide regular inspection of municipal storm water management BMPs. Based on inspection findings, the permittee shall determine if repair, replacement, or maintenance measures are necessary in order to ensure the structural integrity, proper function, and treatment effectiveness of structural storm water BMPs. Necessary maintenance shall be completed as soon as conditions allow to prevent or reduce the discharge of pollutants to storm water.

c. Deicing material must be stored in a permanent or temporary storage structure or seasonal tarping must be utilized. If no permanent structures are owned or operated by the Permittee, new permanent deicing material storage structures shall be constructed within two years of the effective date of this permit. Storage structures or stockpiles shall be located and managed to minimize storm water pollutant runoff from the stockpiles or loading/unloading areas of the stockpiles. Stockpiles and loading/unloading areas should be located as far as practicable from any area storm sewer drains. Fertilizer, pesticides, or other chemicals shall be stored indoors to prevent any discharge of such chemicals within the storm water runoff.

d. Using training materials that are available from USEPA, the State of Illinois, or other organizations, the permittee's program must include annual employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, operation of storage yards, snow disposal, deicing material storage handling and use on roadways, new construction and land disturbances, and storm water system maintenance procedures for proper disposal of street cleaning debris and catch basin material. In addition, training should include how flood management projects impact water quality, non-point source pollution control, green infrastructure controls, and aquatic habitat.

e. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your storm water discharges to the maximum extent practicable.

f. Provide an annual evaluation of pollution prevention/good housekeeping for municipal operations and measureable goals in the Annual Report pursuant to Part V.C.1.

C. Qualifying State, County, or Local Program

If an existing qualifying local program requires a permittee to implement one or more of the minimum control measures of Part IV. B. above, the permittee may follow that qualifying program's requirements rather than the requirements of Part IV.B. above. A qualifying local program is a local, county, or state municipal storm water management program that imposes, at a minimum, the relevant requirements of Part IV. B. Any qualifying local programs that permittees intend to follow shall be specified in their storm water management program.

D. Sharing Responsibility

1. Implementation of one or more of the minimum control measures may be shared with another entity, or the entity may fully take over the control measure. A permittee may rely on another entity only if:

a. The other entity implements the control measure;

b. The particular control measure, or component of that measure is at least as stringent as the corresponding permit requirement;

c. The other entity agrees to implement any minimum control measure on the permittee's behalf. A written agreement of this obligation is recommended. This obligation must be maintained as part of the description of the permittee's Storm Water Management Program. If the other entity agrees to report on the minimum control measure, the permittee must supply the other entity with the reporting requirements contained in Part V.C of this permit. If the other entity fails to implement the minimum control measure on the permittee's behalf, then the permittee remains liable for any discharges due to that failure to implement the minimum control measure.

E. Reviewing and Updating Storm Water Management Programs

1. Storm Water Management Program Review- The permittee must perform an annual review of its Storm Water Management Program in conjunction with preparation of the annual report required under Part V.C. The permittee must include in its annual report a plan for complying with any changes or new provisions in this permit, or in any State or federal regulations. The permittee must also include in its annual report a plan for complying with all applicable TMDL Report(s) or watershed management plan(s). Information on TMDLs may be found at:

http://www.epa.state.il.us/water/tmdl/.

2. Storm Water Management Program Update - The permittee may modify its Storm Water Management Program during the life of the permit in accordance with the following procedures:

a. Modifications adding (but not subtracting or replacing) components, controls, or requirements to the Storm Water Management Program may be made at any time upon written notification to the Agency;

b. Modifications replacing an ineffective or infeasible BMP specifically identified in the Storm Water Management Program with an alternate BMP may be requested at any time. Unless denied by the Agency, modifications proposed in accordance with the criteria below shall be deemed approved and may be implemented 60 days from submittal of the request. If the request is denied, the Agency will send the permittee a written response giving a reason for the decision. The permittee's modification requests must include the following:

i. An analysis of why the BMP is ineffective or infeasible (including cost prohibitive);

ii. Expectations on the effectiveness of the replacement BMP; and

iii. An analysis of why the replacement BMP is expected to achieve the goals of the BMP to be replaced.

c. Modification of any ordinances relative to the storm water management program, provided the updated ordinance is at least as stringent as the provisions stipulated in this permit; and

d. Modification requests or notifications must be made in writing and signed in accordance with Standard Condition II of Attachment H.

3. Storm Water Management Program Updates Required by the Agency. Modifications requested by the Agency must be made in writing, set forth the time schedule for permittees to develop the modifications, and offer permittees the opportunity to propose alternative program modifications to meet the objective of the requested modification. All modifications required by the Permitting Authority will be made in accordance with 40 CFR 124.5, 40 CFR 122.62, or as appropriate 40 CFR 122.63. The Agency may require modifications to the Storm Water Management Program as needed to:

a. Address impacts on receiving water quality caused, or contributed to, by discharges from the MS4;

b. Include more stringent requirements necessary to comply with new federal or State statutory or regulatory requirements; or

c. Include such other conditions deemed necessary by the Agency to comply with the goals and requirements of the Clean Water Act.

PART V. MONITORING, RECORDKEEPING, AND REPORTING

A. Monitoring

The permittee must develop and implement a monitoring and assessment program to evaluate the effectiveness of the BMPs being implemented to reduce pollutant loadings and water quality impacts within 180 days of the effective date of this permit. The program should be tailored to the size and characteristics of the MS4 and the watershed. The permittee shall provide a justification of its monitoring and assessment program in the Annual Report. By not later than 180 days after the effective date of this permit, the permittee shall initiate an evaluation of its storm water program. The plan for monitoring/evaluation shall be described in the Annual Report. Evaluation and/or monitoring results shall be provided in the Annual Report. The monitoring and assessment program may include evaluation of BMPs and/or direct water quality monitoring as follows:

1. An evaluation of BMPs based on estimated effectiveness from published research accompanied by an inventory of the number and location of BMPs implemented as part of the permittee's program and an estimate of pollutant reduction resulting from the BMPs, or

2. Monitoring the effectiveness of storm water control measures and progress towards the MS4's goals using one or more of the following:

a. MS4 permittees serving a population of less than 25,000 may conduct visual observations of the storm water discharge documenting color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, or other obvious indicators of storm water pollution; or

b. MS4 permittees may evaluate storm water quality and impacts using one or more of the following methods;

i. Instream monitoring in the highest level hydrological unit code segment in the MS4 area. Monitoring shall include, at a minimum, quarterly monitoring of receiving waters upstream and downstream of the MS4 discharges in the designated stream(s).

ii. Measuring pollutant concentrations over time.

iii. Sediment monitoring.

iv. Short-term extensive network monitoring. Short-term sampling at the outlets of numerous drainage areas to identify water quality issues and potential storm water impacts, and may help in ranking areas for implementation priority. Data collected simultaneously across the MS4 to help characterize the geographical distribution of pollutant sources.

v. Site-specific monitoring. High-value resources such as swimming beaches, shellfish beds, or high-priority habitats could warrant specific monitoring to assess the status of use support. Similarly, known high-priority pollutant sources or impaired water bodies with contaminated aquatic sediments, an eroding stream channel threatening property, or a stream reach with a degraded fish population could be monitored to assess impacts of storm water discharges and/or to identify improvements that result from the implementation of BMPs.

vi. Assessing physical/habitat characteristics such as stream bank erosion caused by storm water discharges.

vii. Outfall/Discharge monitoring.

viii. Sewershed-focused monitoring. Monitor for pollutants in storm water produced in different areas of the MS4. For example, identify which pollutants are present in storm water from industrial areas, commercial areas, and residential areas.

ix. BMP performance monitoring. Monitoring of individual BMP performance to provide a direct measure of the pollutant reduction efficiency of these key components of a MS4 program.

x. Collaborative watershed-scale monitoring. The permittee may choose to work collaboratively with other permittees and/or a watershed group to design and implement a watershed or sub-watershed-scale monitoring program that assesses the water quality of the water bodies and the sources of pollutants. Such programs must include elements which assess the impacts of the permittee's storm water discharges and/or the effectiveness of the BMPs being implemented.

c. If ambient water quality monitoring under 2b above is performed, the monitoring of storm water discharges and ambient monitoring intended to gauge storm water impacts shall be performed within 48 hours of a precipitation event greater than or equal to one quarter inch in a 24-hour period. At a minimum, analysis of storm water discharges or ambient water quality shall include the following parameters: total suspended solids, total nitrogen, total phosphorous, fecal coliform, chlorides, and oil and grease. In addition, monitoring shall be performed for any other pollutants associated with storm water runoff for which the receiving water is considered impaired pursuant to the most recently approved list under Section 303(d) of the Clean Water Act.

B. Recordkeeping

The permittee must keep records required by this permit for 5 years after the expiration of this permit. Records to be kept under this Part include the permittee's NOI, storm water management plan, annual reports, and monitoring data. All records shall be kept onsite or locally available and shall be made accessible to the Agency for review at the time of an on-site inspection. Except as otherwise provided in this permit, permittees must submit records to the Agency only when specifically requested to do so. Permittees must post their NOI, storm water management program plan, and annual reports on the permittee's website. The permittee must make its records available to the public at reasonable times during regular business hours. The permittee may require a member of the public to provide advance notice, in accordance with the applicable Freedom of Information Act requirements. Storm sewer maps may be withheld for security reasons.

C. Reporting

The permittee must submit Annual Reports to the Agency by the first day of June for each year that this permit is in effect. If the permittee maintains a website, a copy of the Annual Report shall be posted on the website by the first day of June of each year. Each Report shall cover the period from March of the previous year through March of the current year. Annual Reports shall be maintained on the permittees' website for a period of 5 years. The Report must include:

1. An assessment of the appropriateness and effectiveness of the permittee's identified BMPs and progress towards achieving the statutory goal of reducing the discharge of pollutants to the maximum extent practicable (MEP), and the permittee's identified measurable goals for each of the minimum control measures;

2. The status of compliance with permit conditions, including a description of each incidence of non-compliance with the permit, and the permittee's plan for achieving compliance with a timeline of actions taken or to be taken;

3. Results of information collected and analyzed, including monitoring data, if any, during the reporting period;

4. A summary of the storm water activities the permittee plans to undertake during the next reporting cycle, including an implementation schedule;

5. A change in any identified BMPs or measurable goals that apply to the program elements;

6. Notice that the permittee is relying on another government entity to satisfy some of the permit obligations (if applicable);

7. Provide an updated summary of any BMP or adaptive management strategy constructed or implemented pursuant to any approved TMDL or alternate water quality management study. Use the results of your monitoring program to assess whether the WLA or other performance requirements for storm water discharges from your MS4 are being met; and

8. If a qualifying local program or programs with shared responsibilities is implementing all minimum control measures on behalf of one or more entities, then the local qualifying program or programs with shared responsibilities may submit a report on behalf of itself and any entities for which it is implementing all of the minimum control measures.

The Annual Reports shall be submitted to the following office and email addresses:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Compliance Assurance Section
Municipal Annual Inspection Report
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

epa.ms4annualinsp@illinois.gov

PART VI. DEFINITIONS AND ACRONYMS

All definitions contained in Section 502 of the Clean Water Act, 40 CFR 122, and 35 Ill. Adm. Code 309 shall apply to this permit and are incorporated herein by reference. For convenience, simplified explanations of some regulatory/statutory definitions have been provided. In the event of a conflict, the definition found in the statute or regulation takes precedence.

Best Management Practices (BMPs) means structural or nonstructural controls, schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the state. BMPs also include treatment requirements, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

BMP is an acronym for "Best Management Practices."

CFR is an acronym for "Code of Federal Regulations."

Control Measure as used in this permit refers to any Best Management Practice or other method used to prevent or reduce storm water runoff or the discharge of pollutants to waters of the State.

CWA or The Act means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483 and Pub. L. 97-117, 33 U.S.C. 1251 ET. seq.

Discharge when used without a qualifier, refers to discharge of a pollutant as defined at 40 CFR 122.2.

Environmental Justice (EJ) means the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies

Environmental Justice Area means a community with a low-income and/or minority population greater than twice the statewide average. In addition, a community may be considered a potential EJ community if the low-income and/or minority population is less than twice the state-wide average but greater than the statewide average and it has identified itself as an EJ community. If the low-income and/or minority population percentage is equal to or less than the statewide average, the community should not be considered a potential EJ community.

Flood management project means any project which is intended to control, reduce or minimize high stream flows and associated damage. This may also include projects designed to mimic or improve natural conditions in the waterway.

Green Infrastructure means wet weather management approaches and technologies that utilize, enhance or mimic the natural hydrologic cycle processes of infiltration, evapotranspiration and reuse. Green infrastructure approaches currently in use include green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, porous and permeable pavements, porous piping systems, dry wells, vegetated median strips, reforestation/revegetation, rain barrels, cisterns, and protection and enhancement of riparian buffers and floodplains.

Illicit Connection means any man-made conveyance connecting an illicit discharge directly to a municipal separate storm sewer.

Illicit Discharge is defined at 40 CFR 122.26(b)(2) and refers to any discharge to a municipal separate storm sewer that is not composed entirely of storm water, except discharges authorized under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire fighting activities.

MEP is an acronym for "Maximum Extent Practicable," the technology-based discharge standard for Municipal Separate Storm Sewer Systems to reduce pollutants in storm water discharges that was established by CWA Section 402(p). A discussion of MEP as it applies to small MS4s is found at 40 CFR 122.34.

MS4 is an acronym for "Municipal Separate Storm Sewer System" and is used to refer to a Large, Medium, or Small Municipal Separate Storm Sewer System (e.g. "the Dallas MS4"). The term is used to refer to either the system operated by a single entity or a group of systems within an area that are operated by multiple entities (e.g., the Houston MS4 includes MS4s operated by the city of Houston, the Texas Department of Transportation, the Harris County Flood Control District, Harris County, and others).

Municipal Separate Storm Sewer is defined at 40 CFR 122.26(b)(8) and means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of the CWA that discharges to waters of the United States; (ii) Designed or used for collecting or conveying storm water; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

NOI is an acronym for "Notice of Intent" to be covered by this permit and is the mechanism used to "register" for coverage under a general permit.

NPDES is an acronym for "National Pollutant Discharge Elimination System."

Outfall is defined at 40 CFR 122.26(b) (9) and means a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

Owner or Operator is defined at 40 CFR 122.2 and means the owner or operator of any "facility or activity" subject to regulation under the NPDES program.

Permitting Authority means the Illinois EPA.

Point Source is defined at 40 CFR 122.2 and means any discernable, confined and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutants of Concern means pollutants identified in a TMDL waste load allocation (WLA) or on the Section 303(d) list for the receiving water, and any of the pollutants for which water monitoring is required in Part V.A. of this permit.

Qualifying Local Program is defined at 40 CFR 122.34(c) and means a local, state, or Tribal municipal storm water management program that imposes, at a minimum, the relevant requirements of paragraph (b) of Section 122.34.

Small Municipal Separate Storm Sewer System is defined at 40 CFR 122.26(b)(16) and refers to all separate storm sewers that are owned or operated by the United States, a State [sic], city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State [sic] law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of the CWA that discharges to waters of the United States, but is not defined as "large" or "medium" municipal separate storm sewer system. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

Storm Water is defined at 40 CFR 122.26(b) (13) and means storm water runoff, snowmelt runoff, and surface runoff and drainage.

Storm Water Management Program (SWMP) refers to a comprehensive program to manage the quality of storm water discharged from the municipal separate storm sewer system.

SWMP is an acronym for "Storm Water Management Program."

TMDL is an acronym for "Total Maximum Daily Load."

Waters (also referred to as waters of the state or receiving water) is defined at Section 301.440 of Title 35: Subtitle C: Chapter I of the Illinois Pollution Control Board Regulations and means all accumulations of water, surface and underground, natural, and artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon the State of Illinois, except that sewers and treatment works are not included except as specially mentioned; provided, that nothing herein contained shall authorize the use of natural or otherwise protected waters as sewers or treatment works except that in-stream aeration under Agency permit is allowable.

"You" and "Your" as used in this permit is intended to refer to the permittee, the operator, or the discharger as the context indicates and that party's responsibilities (e.g., the city, the country, the flood control district, the U.S. Air Force, etc.).

DuPage County Stormwater Management Plan

September 1989

Prepared by
DuPage County Stormwater
Management Committee

With
DuPage County
Stormwater Management Division
and CH2M HILL

CHAPTER 1

Introduction

Background

In October 1986, the main stem of the Des Plaines River, which flows into northeastern Illinois from Wisconsin, flooded. Communities north of the Chicago area experienced a historic flooding event; many were declared disaster areas. The flood demonstrated to Illinois decisionmakers that water resource management problems were an issue that must be resolved with a more effective system than was in place at the time.

Legislation was drafted that would authorize a planning body for stormwater management in the developing counties encircling the Chicago area. The legislation was introduced into committee for discussion. In August 1987, while the legislation was under review, the tributaries to the Lower Des Plaines were hit by another devastating flood. The second storm accelerated the completion, passage, and signing of the legislation into law. A task force was convened to outline the solution procedure.

DuPage County reformulated its Stormwater Committee in accordance with the terms of the legislation and set aside startup funding to initiate the planning activities as provided within the legislation.

Purpose

The DuPage County Stormwater Management Plan consolidates the existing stormwater management practices, ordinances, and institutional framework from the various government agencies throughout the county into a united, countywide structure; sets minimum countywide standards for stormwater management; and provides for countywide coordination of the management of stormwater runoff in both natural and manmade drainageways and storage facilities.

Authority

The Plan was prepared by the DuPage County Stormwater Management Committee, which was established in accordance with Illinois Public Act 85-905, "An Act to amend certain Acts in relation to stormwater management."

Adoption of the Plan has followed procedures set forth in P.A. 85-905 and includes:

- Coordination with all adjoining counties (Cook, Kane, Kendall, and Will)
- Review by the Northeastern Illinois Planning Commission (NIPC), the Illinois Department of Transportation's Division of Water Resources (IDOT/DWR), and the Illinois Department of Conservation (IDOC)
- Dissemination of information at a Public Meeting held in Wheaton, Illinois, on June 29, 1989
- Public input obtained through a Public Hearing held July 26, 1989, in Wheaton and a subsequent public comment period
- Formal adoption by the DuPage County Stormwater Management Committee by resolution on September 15, 1989.
- Formal adoption by DuPage County Board by resolution on September 26, 1989.

Modifications of this plan following its adoption by the Committee and County Board will have to follow this same adoption process before being formally incorporated into the existing plan.

Implementation

The Plan recognizes the integrated nature of the watershed system and the need to consider stormwater management planning on a watershed basis. The basic hydrologic unit of the Stormwater Management Plan is the watershed. The watershed is a part of a larger environmental system with integrated components delicately balanced over time by the laws of nature. Land use changes influence many of these components, often disturbing that balance to produce unanticipated damage to both the human and natural environments. These damages are often most apparent and severe in the vicinity of the change both upstream and downstream. The cumulative impacts of numerous land use changes can be far reaching and significantly more severe without appropriate stormwater management planning.

The technical standards of the Plan will be implemented through ordinances and agreements formally executed by the governing bodies of DuPage County and the municipalities therein. Model ordinances and specific technical criteria necessary to achieve the standards of the Stormwater Management Plan will be developed in appendixes to this report. Each appendix will comply with the objectives, policies, and standards set forth in the Plan. Drafts of each appendix will be submitted for review to the agencies cited above in the plan adoption procedure. They will be appended to the Plan only after full consideration and formal adoption by resolution of the Committee.

Modifications

The objectives, policies, and standards described in the Plan are expected to remain essentially the same through all subsequent updates of the Plan. Any modifications of the Plan will require formal adoption according to the procedures described above. The appendices, however, are subject to modification independently of the Stormwater Management Plan so that they may be updated periodically as conditions in the county change. They may be modified separately, but only after review by the indicated agencies and formal adoption of the modifications by the Committee.

CHAPTER 2

Objectives and Policies

Introduction

This chapter establishes the meaning and relationships of the classic planning framework of objectives, policies, standards, criteria, and guidelines, and then presents objectives and policies pertinent to stormwater management in DuPage County. Stormwater management standards to achieve county objectives and policies are presented in subsequent chapters of the Plan. Technical criteria by which those standards can be measured are contained in the appendices, and guidelines for evaluating them are provided through reference to external documents (e.g., standard engineering references, technical guidance manuals).

Planning Framework

The stormwater management planning framework consists of five categories:

- **Objectives**, which is the broadest category, sets the overall goals and aims of the Stormwater Management Plan.
- **Policies** establish physical and institutional considerations that affect how objectives are achieved.
- **Standards** present the objectives in qualitative terms that allow individual stormwater management actions to be evaluated and described.
- **Criteria** are quantitative definitions of the standards.
- **Guidelines** are technical discussions that indicate how the criteria may be met and protocols that should be followed.

A planning framework facilitates the orderly development and presentation of planning objectives by enabling resolution of and concurrence on broad issues first. Specific and technical questions are postponed until general agreement is achieved regarding the aims of the Plan. In a more practical vein, such a hierarchy allows formal adoption of the Plan in progressive and constructive segments, allowing the appropriateness and acceptability of each successive planning element to be judged against the background of previously accepted or adopted segments.

The DuPage County Stormwater Management Plan was developed to allow adoption, and potential modification, in the following order:

- The Stormwater Management Plan constitutes the basic document and contains objectives, policies, and standards.
- The technical appendices develop the minimum criteria by which achievement of the standards will be judged.
- The watershed plans evaluate specific watershed conditions and refine criteria to be consistent with adopted standards and watershed needs.
- Adopted ordinances will establish a legal mandate for implementing the stormwater management standards.
- Guidelines, such as watershed plans and technical manuals, will provide detailed instructions on how the criteria may be achieved and evaluated.

Objectives

DuPage County, in cooperation with Lake County and the Northeastern Illinois Planning Commission, developed the enabling legislation that allows regional stormwater management in all northeastern Illinois counties. The plan for DuPage County responds to that enabling legislation.

The DuPage County Stormwater Management Plan recognizes the critical need to reduce the potential for recurrence of flood damage within the county. It also recognizes the need to address the historic trend of increasing flood risk and flood damage as the county develops, and to avoid further environmental degradation associated with drainage development.

The Stormwater Management Plan has defined six objectives to address these needs:

- Reduce the existing potential for stormwater damage to public health, safety, life, and property
- Control future increase in stormwater damage within DuPage County and in areas of adjacent counties affected by DuPage County drainage
- Protect and enhance the quality, quantity, and availability of surface and groundwater resources
- Preserve and enhance existing aquatic and riparian environments and encourage restoration of degraded areas
- Control sediment and erosion in and from drainageways, developments, and construction sites
- Promote equitable, acceptable, and legal measures for stormwater management

Policies

The policies developed to implement the Plan must respond to those specific characteristics that have historically contributed to flooding problems in DuPage County. The following section delineates key characteristics affecting DuPage County stormwater management and presents the policies developed to address them. Figure 2-1 illustrates the relationship between policies and the objectives of the Stormwater Management Plan.

Policies Addressing Physical Characteristics

Site Runoff Control

DuPage County is characterized by low topographical relief, high rainfall, and relatively impervious soils, meaning the county drains poorly in its natural state. Through much of the year the soils are naturally saturated, and surface depressions are filled with water. Such saturated topography conflicts with most human activity. Whether the land is developed for agriculture, residential, commercial, or industrial use, site runoff control is necessary to prevent flood damage in downstream areas.

Traditional site runoff control techniques involving grading and piping to transport stormwater from the site accomplish site drainage only at the expense of downstream drainageways and property owners. Runoff control plans for retaining much of the excess water onsite can be developed, but only for locations where they would minimally interfere with developed land uses. Such plans usually consist of site grading and piping, but may include innovative onsite runoff control techniques (infiltration swales, French drains).

1. **The DuPage County Stormwater Management Plan requires appropriate and adequate provision for site runoff control consistent with watershed plans wherever the land is developed for human activity.**

POLICIES	OBJECTIVES					
	1. Reduce existing potential for stormwater damage to public health, safety, life, and property.	2. Control future increases in stormwater damage within DuPage County and in areas of adjacent counties affected by DuPage County drainage.	3. Protect and enhance the quality, quantity, and availability of surface and groundwater resources.	4. Preserve and enhance existing aquatic and riparian environments and encourage restoration of degraded areas.	5. Control sediment and erosion in and from drainageways, developments, and construction sites.	6. Promote equitable, acceptable, and legal stormwater management measures.
PHYSICAL CHARACTERISTICS						
Site Runoff Control						
1. Require appropriate and adequate provision for site runoff control, emphasizing site runoff control wherever the land is developed for human activity.		✓				
Storage						
2. Encourage use of stormwater storage in preference to stormwater conveyance.	✓	✓				
Watershed Focus						
3. Require design and evaluation of each site runoff control plan consistent with watershed capacities.		✓	✓			
Flood Plain Management						
4. Restrict future development in flood plain to facilities that will not adversely affect flood damage potential or wetland environments, and prohibit development in the floodway unless it involves facilities that enhance flood protection.		✓	✓	✓	✓	
Wetland and Environmental Protection						
5. Require preservation of wetlands to maintain their natural flood control and environmental benefits.		✓	✓	✓	✓	
6. Incorporate water quality and habitat protection measures in all stormwater management activities within DuPage County.			✓	✓	✓	
Maintenance						
7. Require regular, planned maintenance of stormwater management facilities.	✓	✓		✓	✓	
INSTITUTIONAL CHARACTERISTICS						
Source Control						
8. Encourage control of stormwater quantity and quality at the most site-specific or local level.	✓		✓	✓	✓	✓
Jurisdictional Definition & Cooperation						
9. Define clearly the responsibilities and authorities of government entities having jurisdiction for stormwater or floodwater control within DuPage County.	✓	✓	✓	✓	✓	✓
10. Require cooperation and consistency in stormwater management activities within and between the government entities having stormwater jurisdiction.	✓	✓	✓	✓	✓	✓
11. Promote delegation of authority to the most appropriate jurisdiction level.	✓	✓				✓
Enforcement						
12. Require strict compliance and enforcement of the stormwater management policies and their implementing regulations.	✓	✓	✓	✓	✓	✓
Appropriate Technology						
13. Foster the use of simple technologies wherever appropriate and realistic, but demand use of more sophisticated techniques where necessary to ensure the adequacy of the stormwater controls.	✓				✓	✓
Cost Effectiveness						
14. Select cost-effective methods of achieving stormwater management objectives.	✓				✓	✓
15. Estimate costs of stormwater management recommendations and identify appropriate revenue sources before their adoption.	✓				✓	✓

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FIGURE 2-1

Relationship Between Objectives and Policies

When implemented, this policy will reduce future onsite flood damage and minimize the effect stormwater may have on human activities.

Storage

Stream and river channels are generally adequate to convey runoff from smaller, frequent storms. Larger, less frequent storms require the flood plains for temporary storage and additional conveyance capacity. In developed areas, frequent storms require historic flood plain areas to accommodate increased runoff rates and to compensate for watershed infiltration and storage capacity lost with development. Runoff from larger storms accordingly extends beyond normal flood plain limits.

Technology enables some improvement in the carrying capacity of drainageways. However, the financial and environmental cost of increasing channel conveyance capacity throughout the county is extremely high. Channel improvements significantly alter both aquatic and riparian environments and potentially increase stream erosion. Furthermore, efforts to increase conveyance capacity within the county would be unproductive if downstream capacity were not similarly increased. The county has only limited ability to affect conveyance beyond its borders, yet it must respond to the state mandate requiring cooperation with neighboring counties for more effective stormwater management. It is recognized that, under some circumstances, increased conveyance is the only feasible stormwater management alternative, but feasible storage is always preferable to conveyance.

2. **The DuPage County Stormwater Management Plan recognizes the inherent advantages of stormwater storage and encourages the use of storage where appropriate in preference to stormwater conveyance.**

When implemented, this policy will:

- Reduce downstream flood damages
- Minimize increases in stormwater runoff rates
- Maintain the adequacy of existing conveyance by not increasing the flows to be conveyed
- Promote stormwater infiltration and evaporation, reducing the volume of runoff
- Maintain the environmental integrity of stream channels by avoiding the need for channel modifications
- Reduce the impact of development on stream erosion rates by limiting peak flows
- Reduce the impact that nonpoint sources of pollution may have on downstream waters

Watershed Focus

Precipitation in DuPage County is usually stored naturally in the soils and surface depressions where it falls. Over time, the natural drainage system of creeks and rivers developed a capacity for conveying stormwater that is balanced with these watershed characteristics. Land development practices offset the natural balance by eliminating the naturally occurring storage, reducing the infiltration of stormwater into the ground, and generally increasing the velocity and quantity of runoff. Receiving streams and rivers do not naturally have capacity for increased flows. Downstream flooding is an expected consequence of land development unless each site runoff control plan is developed with full consideration of downstream capacities and flooding potential.

3. **The DuPage County Stormwater Management Plan requires design and evaluation of each site runoff control plan consistent with watershed capacities.**

When implemented, this policy will reduce offsite and regional flood damages.

Flood Plain Management

Most flood damages occur to development adjacent to the streams in the flood plain or floodway. Construction and development activities in the flood plain frequently disrupt riparian environments.

In the floodway, such activity often increases stream erosion, destroys aquatic habitat, and restricts flood flows, thus increasing the depth of upstream flooding. Flood plain and floodway development decreases natural overbank storage, thereby increasing peak flows in downstream areas.

However, some uses of the flood plain are necessary and desirable for the human and natural environment. Essential urban utilities, such as major arterial roadways and sanitary trunk sewers, must necessarily traverse flood plains and floodways. In such instances, mitigating measures can be employed to offset impacts. Other uses such as public recreation facilities or natural areas may be neutral to flood plain conveyance and storage or, in the case of mitigating wetlands, may enhance storage. While it is desirable to restrict or control the type of development that occurs in the flood plain, it is neither desirable nor necessary to prohibit all types of development.

4. **The DuPage County Stormwater Management Plan will restrict future development in the flood plain to facilities that will not adversely affect flood damage potential or wetland environments. Within the floodway, development will be prohibited unless it involves facilities that enhance flood protection.**

When implemented, this policy will reduce future flood damage and maintain the integrity of stream channels.

Wetland Protection

Wetlands are a significant portion of the natural watershed storage in DuPage County. Natural watershed storage has played an important role in determining the conveyance capacity of existing drainageways. By filling wetlands, the storage volume is lost and downstream reaches flood to maintain the natural watershed balance. Wetlands also promote infiltration, which reduces runoff volume and recharges groundwater supplies. They retain the pollutants contained in runoff to protect water quality, and they provide habitat for numerous species.

5. **The DuPage County Stormwater Management Plan requires preservation of wetlands to maintain their natural flood control and environmental benefits.**

When implemented, this policy will protect the natural watershed storage capacities, maintaining the integrity of existing drainageways and provide water quality and habitat protection.

Environmental Protection

Certain environmental protection measures complement good stormwater management. For example, effective erosion control is a significant nonpoint source pollution control and aquatic habitat protection measure. It is also effective in preventing excessive channel obstruction due to sedimentation. Maintaining natural stream channel cross section and alignment is important in promoting a healthy aquatic environment. It is also important to maintain the natural storage capacity and conveyance characteristics of the channel.

6. **The DuPage County Stormwater Management Plan will incorporate water quality and habitat protection measures in all stormwater management activities within DuPage County.**

Programmed Maintenance

Many existing stormwater management facilities in DuPage County function far below their potential. Culverts and drains are often choked with vegetation, debris, or sediment. Detention basins have lost capacity because of sediment buildup. Some structures have collapsed and no longer control runoff as desired. Furthermore, debris in the drainageways often leaches pollutants into the waterways.

7. **The DuPage County Stormwater Management Plan requires regular, planned maintenance of stormwater management facilities.**

When implemented, this policy will reduce flood damage and maintain the integrity of stream channels.

Policies Addressing Institutional Characteristics

Source Control

Onsite mismanagement of stormwater can exacerbate problems as the stormwater moves downstream. Problems are usually least severe and most readily controlled by structural means near the source of the runoff. This is also the case for stormwater quality concerns. If the stormwater and the pollutants it carries are controlled near their origin, then the area affected is reduced. Often source control of stormwater is more effective and less costly than downstream stormwater management.

8. **The DuPage County Stormwater Management Plan encourages control of stormwater quantity and quality at the most site-specific or local level as possible, but only where long-term maintenance is fully provided.**

When implemented, this policy will reduce flood damage and erosion from development, prevent nonpoint pollution, and minimize runoff pollution.

Jurisdictional Definition

Numerous entities, from individual developers through municipalities, county departments, and state and federal agencies, have responsibility and authority to control parts of stormwater and floodwater within DuPage County. Thus it is difficult to determine where responsibility lies, and often action is not taken on critical stormwater issues (e.g., channel maintenance).

9. **The DuPage County Stormwater Management Plan will provide clear identification of responsibilities and authorities delegated to the various agencies having jurisdiction for stormwater or floodwater control within DuPage County.**

When implemented, this policy encourages implementation of all other policies to achieve all plan objectives.

Jurisdictional Cooperation

Since stormwater recognizes no jurisdictional boundaries, management activities within any jurisdiction necessarily affect other jurisdictions in the same watershed. Inconsistencies in stormwater management standards or criteria could readily result in increased flood damage.

10. **The DuPage County Stormwater Management Plan requires cooperation and consistency in stormwater management activities within and between agencies having stormwater jurisdiction.**

The operational efficiency of the plan will be enhanced if regulatory programs are delegated to the local level.

There are often very good reasons for more stringent controls in localized areas where additional protection is needed or desired. Strong stormwater management programs exist in many jurisdictions. These programs are effective in resolving local jurisdictional stormwater management problems and are sensitive to other local issues. The strength of these programs is recognized and is considered to be an important element in the DuPage County Stormwater Management Plan.

11. **The DuPage County Stormwater Management Plan promotes delegation of authority to the most appropriate jurisdictional level.**

When implemented, these policies will reduce flood damage potential while encouraging implementation of all other policies to achieve all plan objectives.

Enforcement

Stormwater management policies and regulations can only be effective if they are implemented routinely and consistently. Since implementation must take place at many locations over long periods of time, enforcement of the regulations is difficult and often overlooked in favor of more immediate issues. Inconsistent enforcement of stormwater regulations limits their implementation and contributes substantially to the continued growth of the extent and severity of flood damage.

12. The DuPage County Stormwater Management Plan requires strict compliance and enforcement of the stormwater management policies and their implementing regulations.

When implemented, this policy will reduce opportunities to circumvent the plan and help achieve all objectives.

Appropriate Technology

The technology available to support stormwater management ranges from the simple to the complex. Simple techniques are more likely to be employed since they are widely used and easily applied. Simple technologies are often easier and less costly to maintain, but they can leave little flexibility for dealing with unusual or complex realities. Applying simple techniques can result in inappropriate and ineffective management if the problems are more complex than the solutions used. Conversely, sophisticated solutions can postpone action and increase the cost of stormwater management.

13. The DuPage County Stormwater Management Plan allows simple technologies wherever appropriate and realistic, but demands use of more sophisticated techniques where necessary to ensure the adequacy of stormwater controls.

When implemented, this policy encourages use of appropriate technology, thereby reducing the risk of inappropriate stormwater management activities. This in turn will enhance the effectiveness of the stormwater management activities undertaken to achieve Plan objectives.

Cost-Effectiveness

The cost of stormwater management projects must be justified in terms of the flood damages or environmental harm avoided. Concentrating resources on cost-effective stormwater management activities allows implementation of more controls within a limited budget. Cost-effectiveness may be judged only by definitions consistent with all stormwater management objectives, and hence must include life cycle costs, environmental costs, and both local and regional effects.

14. The DuPage County Stormwater Management Plan encourages cost-effective methods of achieving stormwater management objectives.

When implemented, this policy will reduce overall costs, allow funding of more facets of the Plan, and increase the Plan's effectiveness in achieving all goals.

Fiscal Responsibility

Recommendations of the Stormwater Management Plan will be carried out only if their costs are clearly established and understood, and a source of revenue to offset those costs is available.

15. The DuPage County Stormwater Management Plan requires the estimation of costs of stormwater management recommendations and identification of appropriate revenue sources before their adoption.

When implemented, this policy enhances the credibility and acceptability of the Plan, thereby encouraging its implementation and the achievement of all its objectives.

CHAPTER 3

Watershed Plans and Flood Maps

Introduction

Salt Creek, East Branch DuPage River, West Branch DuPage River, and Sawmill Creek (see Figure 3-1) will have major watershed plans. Cooperative plans will be developed with adjacent jurisdictions for Des Plaines River tributaries and Fox River tributaries. This chapter identifies the standard components of a watershed plan. Standards are given for:

- Jurisdictional responsibilities
- Data collection
- Hydrologic analysis
- Hydraulic analysis
- Flood mapping
- Problem identification
- Alternative analyses
- Economic analysis
- Water quality enhancements
- Wetland, wildlife, and environment protection
- Public involvement

Watershed plans will include:

- Updated and revised flood plain maps
- Recommended remedial improvement projects, both structural and nonstructural, to alleviate current and anticipated flooding problems
- Identification of natural storage areas, including wetlands
- Identification of significant natural areas
- Identification of groundwater recharge areas within the watersheds
- Recommended site runoff and watershed storage criteria balanced with the watershed capacities
- Flood forecasting recommendation
- Other

Jurisdictional Responsibilities

Jurisdictional responsibilities must be identified and assigned in accordance with the established regulatory and maintenance program standards discussed elsewhere in this document.

Each watershed plan will document the regulatory authority and maintenance responsibility for each component of the stormwater management facilities within the watershed.

L27485.A0.30 FIG 3-1 8-31-89

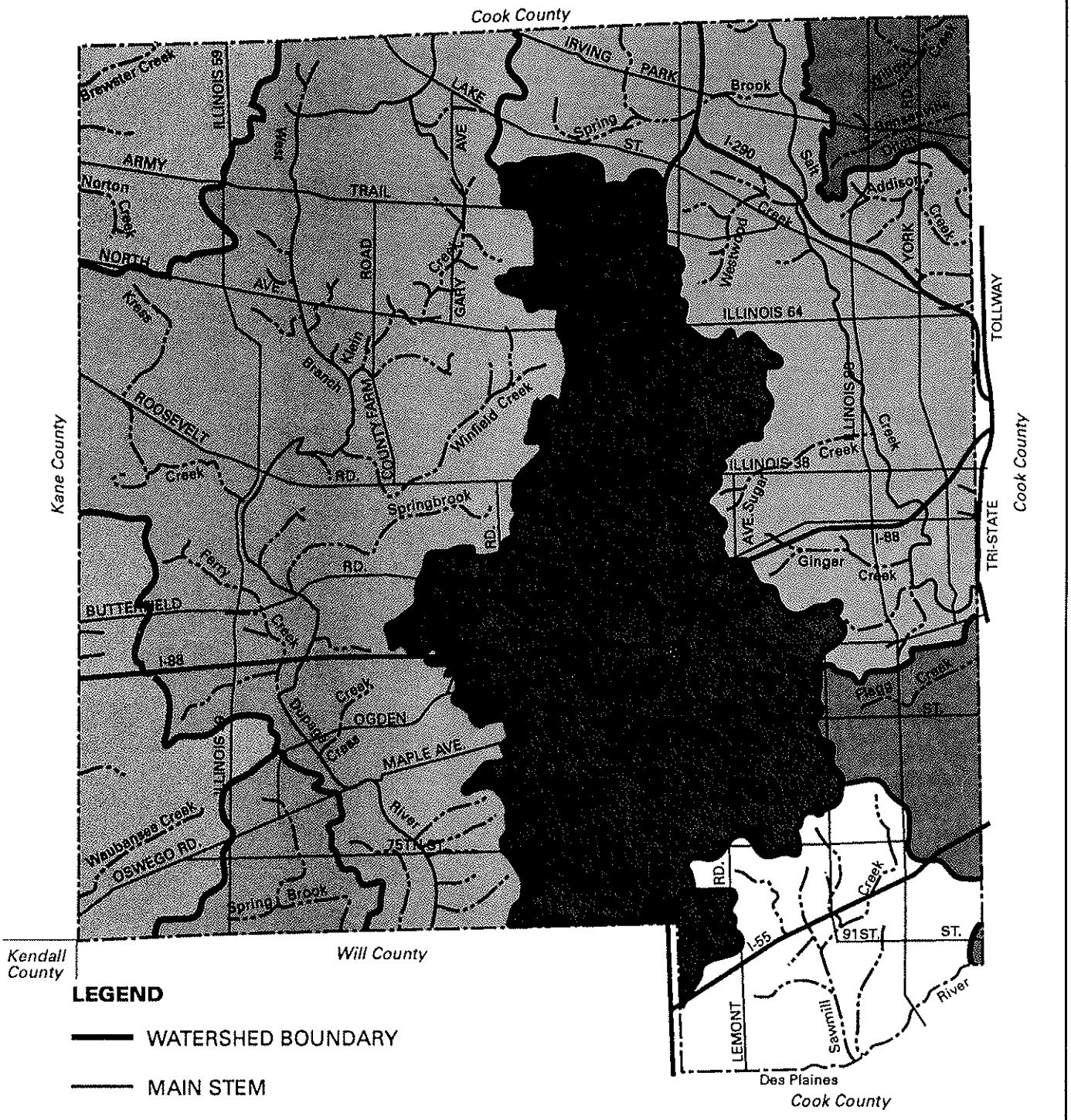

FIGURE 3-1
DuPage County Watersheds

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Data Collection

Detailed data must be collected for the protection of water quality and aquatic and riparian habitat, for accurately delineating flood plains, and for identifying flooding problems and maintenance needs. Data must be collected in accordance with the established facility and local data standards and maintenance program standards.

All existing data sources should be exhausted before undertaking new data collection or land use/population projection efforts.

Each watershed plan will include the data required to complete a detailed analysis of the hydrology and hydraulics of the watershed and all major tributary watersheds using a continuous hydrology model and a fully dynamic runoff and flood routing model.

Each watershed plan will include a schedule of inspections and monitoring necessary to identify existing stormwater management facilities that are not performing their intended function or are below capacity.

Each watershed plan will map natural storage areas including wetlands, significant aquatic and riparian environments, and groundwater recharge areas.

Hydrologic Analysis

The results of the hydrologic analysis will be coupled with those of the flood and runoff routing model to establish the regulatory flood plain within the watershed. Because of the low topographic relief, impervious soils, and changing land use within much of DuPage County, there are stringent requirements for analysis of watershed hydrology.

Hydrology for the four major watershed plans will be determined by a continuous hydrologic model that considers, at a minimum, infiltration, interflow, depressional storage, snowmelt, overland flow, nonuniform rainfall distribution, evapotranspiration, soil moisture, and changing land use. The output from the hydrologic model must be compatible with the hydraulic model.

Hydrologic analyses for the cooperative plans to be prepared for the Des Plaines and Fox River tributaries must be technically realistic in their representation of the headwaters in DuPage County. Beyond that, standards for their selection must be jointly developed with the adjacent governmental units cooperating in their development.

Hydraulic Analysis

The results of the hydraulic analysis will be used to establish the regulatory flood plain within the watershed. Because of the flat stream gradients within DuPage County and the need to evaluate the effects of flood plain encroachment and proposed stormwater management projects, a fully dynamic runoff and flood routing model is needed.

Hydraulics for the four major watershed plans will be determined by a fully dynamic runoff and flood routing model that can, at a minimum, analyze the effects of flood plain encroachment, online and offline storage, diversions, channel improvements, bridges, culverts, dams, weirs, and other impediments to flow. The input to the hydraulic model will be compatible with the output from the hydrologic model.

For the cooperative plans to be developed in basins tributary to other counties, the hydraulic analysis standards must be jointly defined with the cooperating government unit.

Flood Mapping

Up-to-date flood plain maps are important components of a watershed plan. Accurate information on flood plain location and flood levels is necessary to reduce flood damage to public health, safety, life, and property.

The developers of each watershed plan will work with IDOT/DWR and FEMA to update and possibly to revise existing flood plain maps within the watershed with the most reliable and accurate technology.

Problem Identification

As part of the effort to enhance water quality and aquatic and riparian environments and to reduce flood damage, problem areas must be identified.

Each watershed plan will use the inventory summary (Appendix C), the runoff and flood routing analysis, and any other available information to identify existing and potential flood damage areas (i.e., areas with an incompatible flood risk and land use combination). An estimate of the expected annual damage to property for each problem area will be developed.

Each watershed plan will identify areas where flood plain encroachment could significantly harm wildlife or aquatic or riparian environments.

Each watershed plan will identify areas where stormwater runoff degrades water quality to the point of harming aquatic and riparian environments.

Water Quality Enhancements

Projects, policies, and regulations that maintain or improve water quality will be formulated in accordance with Appendix J, "Water Quality Enhancements."

Each watershed plan will identify projects, policies, and regulations that will enhance water quality. The cost of any project, or secondary effects of any policy or regulation, will be tabulated along with the expected water quality benefit.

Protection of Wetlands, Riparian Environment, and Recharge Areas

Criteria for protection of wetlands, riparian environment, and recharge areas will be formulated in accordance with Appendix K, "Wetland and Riparian Environment Protection."

Each watershed plan will identify remedial measures to protect wetlands, riparian environment, and recharge areas threatened by stormwater management activities. Measures identified will be coordinated with county and municipal open-space acquisition programs for the identification of land with mutual benefits. The cost of any remedial measures will be tabulated along with the expected benefits.

Alternative Analysis

To reduce overall costs of stormwater management, it is important to develop and analyze different alternatives to solve an identified problem. This may allow funding of more facets of the watershed plan and increase its total effectiveness.

Each watershed plan will analyze several alternatives, including inaction, to address each identified problem or group of problems and develop a list of recommended

solutions. Benefits will be weighed against costs and any potential harm to water quality, aquatic or riparian environments, or recharge areas. All policies of the DuPage County Stormwater Management Plan will be considered in selecting the recommended alternative.

Economic Analysis

Economic analysis for watershed plan alternatives should recognize the full range of life cycle costs and benefits.

Project benefits will include all quantifiable monetary savings, including reduction of local and regional flood damages, as well as nonquantifiable environmental benefits.

Monetary costs should include, at a minimum, land rights, design, construction, interest, operation, maintenance, and administration. Economic benefit analyses must consider the probability and present worth of damages avoided.

Public Involvement

Public participation is a critical and necessary element in the adoption of any master plan. It is useful not only to ease the adoption of the plan but also to gather useful information and to assist in the decisionmaking process.

As part of each watershed plan, a public education and information program will be developed to inform the public of the planning efforts and to obtain public input and comment. The program will include public meetings, meetings with elected officials or their representatives, and the publication and distribution of fact sheets.

Watershed advisory committees may provide a vehicle for information exchange in the four major watersheds.

CHAPTER 4

Problems and Project Planning

Introduction

This chapter provides standards for recognizing problems that require stormwater management planning and for identifying and evaluating alternative projects to address those problems. Various phases of stormwater management problem remediation are addressed:

- Problem identification
- Alternative evaluation
- Project review
- Establishment of priorities

Consistency and equity in addressing problems and projects throughout the county will be achieved through application of the uniform standards set forth in this chapter.

Problem Identification

A stormwater management problem is defined as any inconsistency with the objectives of the Stormwater Management Plan. Problem identification involves several steps:

- Observation
- Reporting
- Investigation and evaluation

Observation

Stormwater problem observation may be either active (watershed model predicting future damages, inspection crews projecting future flooding if obstructions are not removed, etc.) or reactive (residents' complaints, flood damages, etc.). Reactive observations do not necessarily indicate the presence of a stormwater management problem. For example, sanitary sewerage system backups are often reported as stormwater problems.

The objectives and policies of the Stormwater Management Plan are best served through active observation, which allows evaluation and prevention of problems before they occur. Active observation requires that the persons responsible for the various aspects of stormwater management (planning, engineering analysis, inspection, construction, maintenance) be sufficiently trained in stormwater management to recognize potential problems.

> ***Delegation of stormwater management responsibility within the county (e.g., ordinance, intergovernmental agreement, contract) must provide that the responsible party has sufficient stormwater management training and resources to enable recognition of potential problems.***

Reporting

Anyone observing a stormwater management problem should easily be able to report it to a responsible agency so that appropriate action can be taken. Since it is unrealistic to expect all

potential observers of stormwater problems to understand the various levels and responsibilities of stormwater management within the county, it is necessary to have a well defined structure and procedure for reporting, recording, and handling problems.

The DuPage County Stormwater Management Committee has primary responsibility for coordinating overall stormwater management activity within the county. The responsibility for problems beyond local jurisdiction lies with the committee.

The Stormwater Management Committee will maintain staff and facilities to receive and record stormwater management complaints and problem observations received through local jurisdictions.

Rather than duplicating resident response facilities, initial complaint and problem observation will remain the responsibility of the municipality where the complaint or observation originates.

Investigation and Evaluation

Problem investigation and evaluation begins by determining whether a stormwater management problem truly exists. Some stormwater management problems will be of local interest only and need not be addressed by countywide policies and procedures. For a problem to be of concern to the Stormwater Management Committee:

- It must threaten achievement of one or more of the plan objectives; i.e., it must:
  - Contribute to flood damage to public health, safety, life, or property
  - Cause future increases in flood damages
  - Potentially degrade the quality or affect the quantity of surface water
  - Cause significant damage to aquatic or riparian environments
  - Contribute to soil erosion or drainageway sedimentation
- It must have a cause or impact that extends beyond the boundaries of the local jurisdiction within which the problem exists or involve a structure owned by a public entity other than the jurisdiction in which it originates.

If a problem is determined to be a local problem, then it is the responsibility of the municipality to apply local policies and standards to resolve the problem.

If the problem is determined to be a regional stormwater management problem, then it must be evaluated in accordance with the standards of the countywide Stormwater Management Plan. Several categories of problem severity are defined:

- **Emergency** - There is immediate danger to public health, safety, life, or property.
- **Critical** - If the problem remains unsolved, public health, safety, life, or property will be at risk during a major storm, or water quality, environments, or groundwater recharge areas will suffer irreparable damage.
- **Serious** - Major damage to water quality, environments, recharge areas, or drainageways will result if the problem remains unsolved.
- **Incremental** - The problem itself results in only minor inconsistencies with the Stormwater Management Plan objectives, but if combined with other similar problems could pose a serious threat.
- **Chronic** - The problem continually or frequently results in minor deviations from the Stormwater Management Plan objectives.

To assist in the evaluation of the nature and severity of a problem, the Stormwater Management Committee will periodically review and update technical guidance and criteria for evaluation of stormwater management problems.

Primary responsibility for evaluating complaints and problems will lie with the Stormwater Management Committee staff. Delegation of that responsibility will be allowed only when clearly documented and formally agreed to by both the staff and the delegate.

Alternative Evaluation

All projects proposed to alleviate actual or potential stormwater management problems must be evaluated against a set of standards consistent with the objectives and policies of the Stormwater Management Plan. Documentation must be provided with all stormwater management projects submitted for countywide Stormwater Management Committee support showing that:

- A need for the project exists.
- Project alternatives were adequately considered, and technically feasible alternatives have been evaluated against the standards cited here.
- Project effectiveness in alleviating the problem was demonstrated with techniques appropriate to the problem and consistent with the current technical guidance.
- Project impacts beyond the project site (upstream and downstream) were thoroughly investigated with methods consistent with the current technical guidance.
- The project will be consistent with the applicable watershed plan.
- Project life-cycle costs were estimated with appropriate techniques, consistent with current technical guidance, and include land rights, construction, operation, and maintenance costs.
- Project impacts on the full aquatic regime, including stormwater control, low flow frequency and velocity, water quality, groundwater, aquatic and riparian environmental mitigation, and stream erosion and stability were fully evaluated and considered in the project evaluation.
- The alternative comparison gave preference to alternatives that would best meet the policies and objectives of the Stormwater Management Plan.
- The evaluation considered all factors used in establishing project priorities for countywide Stormwater Management Plan implementation.

Each agency submitting a project for consideration by the Stormwater Management Committee is responsible for full documentation of the alternative evaluation consistent with the plan and the technical guidance. The agency may request the assistance of the Stormwater Management Committee staff in preparing the alternative evaluation, and the committee will evaluate such requests in light of the current staff time availability, severity of the problems addressed, and regional significance of the project.

Project Review

Any development, stormwater, or construction project submitted for permit review or funding consideration within DuPage County must be evaluated against standards consistent with the objectives and policies of the Stormwater Management Plan. Minimum standards for project review are summarized in Table 4-1. Criteria for evaluating compliance with these standards will be periodically reviewed and updated by the Stormwater Management Committee.

Establishing Priorities

Stormwater management project alternatives that meet the standards and criteria for countywide stormwater consideration will be funded on a priority basis as funding is available. The priorities for project funding will be reviewed regularly when the county budgets are being established.

Considerations in establishing project priorities will include:

- Regional effectiveness
- Historical significance of problems addressed

- Consistency with watershed plans
- Consistency with all stormwater management objectives
- Cost-effectiveness
- Implementation time
- Effect on risk to human health, safety, or inconvenience

The Stormwater Management Committee will periodically review and update technical guidance and criteria for applying these standards to establish project priorities.

Table 4-1 Project Review

Policy Synopsis	Related Standard
Encourage site runoff control emphasizing onsite detention or retention.	Adequate site runoff control, consistent with current technical guidance, has been provided.
	Evaluation of onsite control alternatives in developing as well as developed areas has been conducted, and offsite control alternatives have been recommended only if significantly superior to onsite alternatives.
Encourage stormwater storage, where appropriate, in preference to conveyance.	Evaluation of storage alternatives has been conducted, and conveyance alternatives have been recommended only if superior to storage alternatives.
Evaluate site runoff control plans consistent with watershed capacities.	Project runoff release rates are consistent with those recommended in the applicable watershed plan.
	If a watershed plan is not available, project release rates are less than predevelopment storm runoff rates and consistent with current technical guidance.
Restrict flood plain developments to those that do not adversely affect flood damage potential or wetland habitats, and in the floodway allow only developments that enhance flood protection.	All projects must be identified as either beyond the flood plain, in the flood plain but beyond the floodway, or within the floodway.
	If the development is within the flood plain but beyond the floodway, it must not be permitted unless it has been thoroughly evaluated, is consistent with current technical guidance, and has been demonstrated to be protected against flood damage and have no adverse flood, wetland, or habitat impact upstream, within, or downstream of the project site.
	If the development is within the floodway, it must not be permitted unless its major purpose is the enhancement of flood protection and it meets the criteria stated above for development in the flood plain.
Require regular, planned maintenance.	Projects must include maintenance plans, including statement of responsibility, consistent with the technical guidance for maintenance of the facilities included.
	All projects' specifications must include requirements for installing and maintaining construction erosion control practices consistent with technical guidance.
Encourage control of water quantity and quality at the source.	All projects must include evaluations and recommendations for minimizing pollutant runoff from the site.
Foster the use of appropriate and practical technology.	Project evaluation technology must be consistent with technical guidance and applied to the project by a qualified professional.
Encourage fiscal responsibility.	Project documentation must include a funding plan consistent with technical guidance.

CHAPTER 5

Maintenance Programs

Introduction

Stormwater and flood control facilities operate effectively only if they are properly maintained. Regular maintenance prevents system failures and decreases the risk of stormwater damage.

Inspection and maintenance programs must be established for all stormwater facilities. All jurisdictions having responsibility for stormwater facility maintenance must have programs that provide:

- Inspection and preventive maintenance
- Facility repair and replacement
- Recordkeeping
- Emergency response
- Determination of responsibilities
- Suitably trained and sufficiently available staff

Programs must address the inspection and maintenance of:

- Detention structures
- Drainageways (rivers, streams, and ditches)
- Storm sewers and culverts
- Inlets and catch basins
- Streets (sweeping)
- Retention structures
- Reservoirs
- Wetlands constructed to provide storage

Responsibilities and jurisdictions must be clearly outlined and consistent. Delegations of responsibility must include provisions for the delegating agency to enforce maintenance agreements and perform neglected maintenance at the expense of the delegate if the delegate fails to comply with current maintenance guidelines.

Inspection and Preventive Maintenance

The purpose of an inspection and preventive maintenance program is to identify and remedy potential problems before they can cause damage. The cost of a successful program may be less than costs incurred in responding to major system failures.

Inspection and maintenance programs must be required by ordinance and by covenant if assigned to a third party. For each stormwater or flood control facility, the program must specify:

- A regular inspection and maintenance schedule
- Guidelines and procedures for conducting inspection and maintenance

- Procedures to be followed for reporting, scheduling, and performing extensive maintenance
- The government entity responsible for inspection and maintenance
- Dedicated funding sources for the inspection and maintenance program

Table 5-1 lists minimum requirements of a typical inspection and preventive maintenance program for each type of stormwater or flood control facility. These requirements are discussed below. Specific details of the maintenance program for each facility component are included in Appendix I.

Detention Basin

The integrity of the detention basin depends on the proper maintenance of the retaining structure, outlet, and basin. Preventive maintenance is required to keep the outlet operational at all times. The basin should be maintained to operate at its intended storage capacity. Underground detention tanks should be inspected and maintained as indicated for storm sewers. If appropriate, inspection of detention basins shall be consistent with the Illinois dam safety program. Inspections at the end of the flood season shall identify major repairs to be completed before the next season. Wetlands constructed as mitigation or water quality projects will need special maintenance if they are to function as intended.

Table 5-1 Facilities Requiring Regularly Scheduled Inspection and Maintenance

Detention Basins	Storm Sewers and Culverts	Inlets and Catch Basins	Streams	Streets
Outlet	**Storm Sewers**	Remove debris	Visually inspect entire length	Sweep roads
Remove debris	Inspect storm sewers	Check for signs of failure	Remove debris	Sweep Parking lots
Inspect for signs of outlet failure	**Culverts**		Remove log jams	Monitor sediment and debris sources
Pumps -Test -Maintain	Remove debris		Monitor sedimentation	
Basin	Update maps/ plans		Check that only authorized structures are in flood plain	
Remove Debris	Inspect for signs of deterioration		**Long-Term Plan**	
Inspect for signs of basin failure			Update list of maintenance actions required	
Monitor sedimentation			Update emergency response plan	
Check that flood plain/ floodway and spillway are clear				
Dam/retaining structure				
Underground Detention Tanks				
Inspect				

Construction Erosion

Strict enforcement of sediment control ordinances is an important cost-saving step toward solving sedimentation problems. Since sediment in the stormwater and flood control system poses a maintenance problem, inspection and maintenance must be performed routinely to identify and control major sediment contributors. Excessive sedimentation decreases detention basin capacity, retards infiltration, and clogs streams. Major storms resuspend sediments collected on basin floors and compromise water quality both in and downstream of the basin. Dredging in wet basins, wetlands, or streams destroys habitat, creates water quality problems, and is very costly.

Drainageways

Staff who inspect and maintain drainageways should periodically walk along the entire length of the river, stream, or ditch. Debris, trash, log jams, or jams caused by debris or trash that would affect flooding must be removed.

Bank erosion should be reported but not necessarily repaired. Certain bank and channel bottom conditions are an attractive environment for many animal species. Its destruction and the decrease in water quality must be considered before any decision is made to dredge the drainageway. Habitat is usually not a concern for the dredging and cleaning of paved channels, but if the drainageway is wet at the time of dredging, downstream water quality is a concern. Certain maintenance activities may require state and federal permits.

The flood plain and floodway should be inspected to ensure that no unauthorized structures have been built. Inadequate or poorly maintained floodproofing must be recorded and the owners notified to undertake corrective action.

Storm Sewers and Culverts

All storm sewers should be inspected periodically. Television monitoring (or physical inspection if over 48 inches in diameter) should check for cracks, deterioration, or structural failure.

Storm sewer manholes must be maintained to provide ready access for necessary repairs.

Culverts should be kept clear of debris and structures should be inspected for cracks, deterioration, or structural failure (sometimes indicated by erosion and cave-ins caused by seepage). Excessive erosion around the culvert inlet and outlet will reduce the structural support and lead to failure.

Inlets and Catch Basins

Debris and trash should be cleared from all inlets and catch basins periodically. More frequent cleaning may be warranted in the autumn when leaves are falling. Excessive sediment and debris sources must be identified and recorded, with maintenance performed at the expense of the responsible party.

Inspect the inlet and catch basin structure for cracking or structural failure. All pipes leading to and from the inlet or catch basin must be operational and not clogged with debris. Problem inlets and catch basins should be more frequently cleaned and maintained.

Street Sweeping

Street sweeping enhances the maintenance of stormwater and flood control facilities. Sweeping prevents the need to remove sediments and debris from detention basin outlets, drainageways, storm sewers, culverts, inlets, or catch basins. In addition, pollutants that attach to the sediments are captured and removed before they can compromise water quality.

Streets should be swept more frequently in the spring and following snowmelt to capture the salt and sand spread on icy roads. Streets should be swept more often in the autumn, particularly in areas with mature, leafy trees. Parking lots should also be swept regularly.

Facility Repairs and Replacements

Each jurisdiction responsible for stormwater facility maintenance must maintain an active facility repair and replacement schedule. Updates should be made to the schedule after each scheduled inspection and maintenance trip.

The sequence of repairs and replacements should be consistent with the stormwater management objectives and be determined in accordance with criteria similar to those for establishing the priorities of stormwater construction projects.

The County Stormwater Management Committee will selectively acquire equipment necessary for the maintenance of major stormwater facilities. This equipment will be available to other jurisdictions within the county when not required to meet county stormwater maintenance responsibilities.

During each inspection and maintenance trip, the status of repairs and replacements should be observed and recorded. Neglected repairs, replacements, and general maintenance should be brought to the attention of the responsible jurisdiction.

Recordkeeping

Updated records must be kept of:

- Scheduled inspection and maintenance notes
- Maintenance history
- Lists of required repairs and repair dates
- Lists of required replacements and replacement dates
- Major contributors of debris and sediment, warnings, and maintenance billings

Records must be kept in a central file within either the municipal engineering or public works departments (or similar group) but not both, unless a duplicate file or common computer network is shared. Summaries of available records should be forwarded to the county annually. Record drawings of repairs or changes in the stormwater facilities should be promptly forwarded to the county. Records must include:

- Date (time if appropriate)
- Person reporting, other persons involved
- Description of type of problem, repair, replacement, map, visit, etc.
- Location and address
- Action required, if any
- Date action is to be complete, if applicable
- Quality control check initialed by municipal engineer, public works director, or other responsible party

Emergency Response

Stormwater emergency response action plans must be incorporated in each municipal emergency preparedness program. The emergency response procedures will be coordinated with the County Emergency Response and Disaster Agency. A review of the inspection and maintenance reports, repair and replacement lists, and complaint records must be made for each stormwater and flood control facility within the municipality before the approval or updating of the emergency response action plan. A public meeting or notice is required to announce emergency response actions and describe the policy for problem reporting.

The emergency response action plan should include:

- Name of person responsible for overseeing the emergency response action
- Steps to be taken to inform residents or businesses
- Information to be given to residents or businesses
- Action guidelines (what to do, who should do it, how to do it, in what order)

Responsibilities and Jurisdictions

The primary responsibility for maintenance lies with the municipality in which the stormwater or flood control facility is located; e.g., city, village, county (for unincorporated areas), Forest Preserve District (for forest preserve areas). Coordination of maintenance activities must be centralized by a single manager who will delegate responsibilities to the appropriate agencies and persons.

Delegated Responsibilities

Municipalities may delegate responsibility to subdivision or homeowners' organizations (or like) only if certain conditions are met. These conditions include:

- Designating a responsible person in the organization whose name will be kept on file
- Training of the responsible person in the proper inspection and maintenance of the stormwater or flood control facility components
- Keeping copies of all inspection and maintenance records
- Periodic inspection, with frequency determined in the agreement, of all stormwater facilities
- Retained authority to conduct required maintenance at the expense of the delegate if the delegate neglects the responsibility
- Funding

Intergovernmental Agreements

Major stormwater or flood control facilities potentially affecting multiple jurisdictions should have a negotiated agreement for inspection and maintenance. Inspection and maintenance responsibilities for rivers and streams, in particular, must be assigned through cooperative intergovernmental agreements. The agreement must:

- Designate the government entity responsible for maintenance, with the name and title of the responsible party kept on file within all jurisdictions for which the agreement holds
- Provide that copies of stormwater and flood control facility inspection and maintenance records be kept in central stormwater files of each jurisdiction involved
- Provide for periodic meetings between all participating government entities to discuss facility maintenance
- Determine financing arrangements, fee schedule and fee allotment for all participating groups

Enforcing Responsibility

Maintenance neglected by one jurisdiction may affect many others. The DuPage County Stormwater Management Committee must retain the authority to perform maintenance that if otherwise neglected compromises good stormwater management practices of the county or another community. If the county does not promptly complete the necessary maintenance, concerned municipalities can petition the DuPage County Stormwater Management Committee for appropriate response.

CHAPTER 6

Regulatory Programs

Introduction

This chapter outlines the necessary standards for the regulatory framework of the Stormwater Management Plan. Standards are given for the following regulatory functions:

- General regulatory authority and responsibility
- Establishing permitting procedures
- Setting performance criteria

Authority and Responsibility

All stormwater management policies that require a response will be mandated by ordinance. Those policies that encourage an action will not necessarily be mandated by ordinance but will be included in DuPage County projects and will be required of projects cooperatively funded by the County. DuPage County has numerous municipalities (Figure 6-1) and county, state, and federal agencies with potentially overlapping responsibility and authority for stormwater management.

> ***The stormwater management authorities of each agency must be clearly delineated in each appendix to the Stormwater Management Plan.***

The effects of activities or developments taking place in a given local jurisdiction may be felt only outside that jurisdiction, in adjoining jurisdictions or even remote jurisdictions. The local jurisdiction is thus often reluctant to control an activity that has little deleterious effect within its boundaries. However, it is in the best interests of countywide stormwater management to control activities that threaten the objectives anywhere.

> ***Ultimate regulatory authority will be at a jurisdictional level consistent with the scale of the impacts of the activity being regulated.***

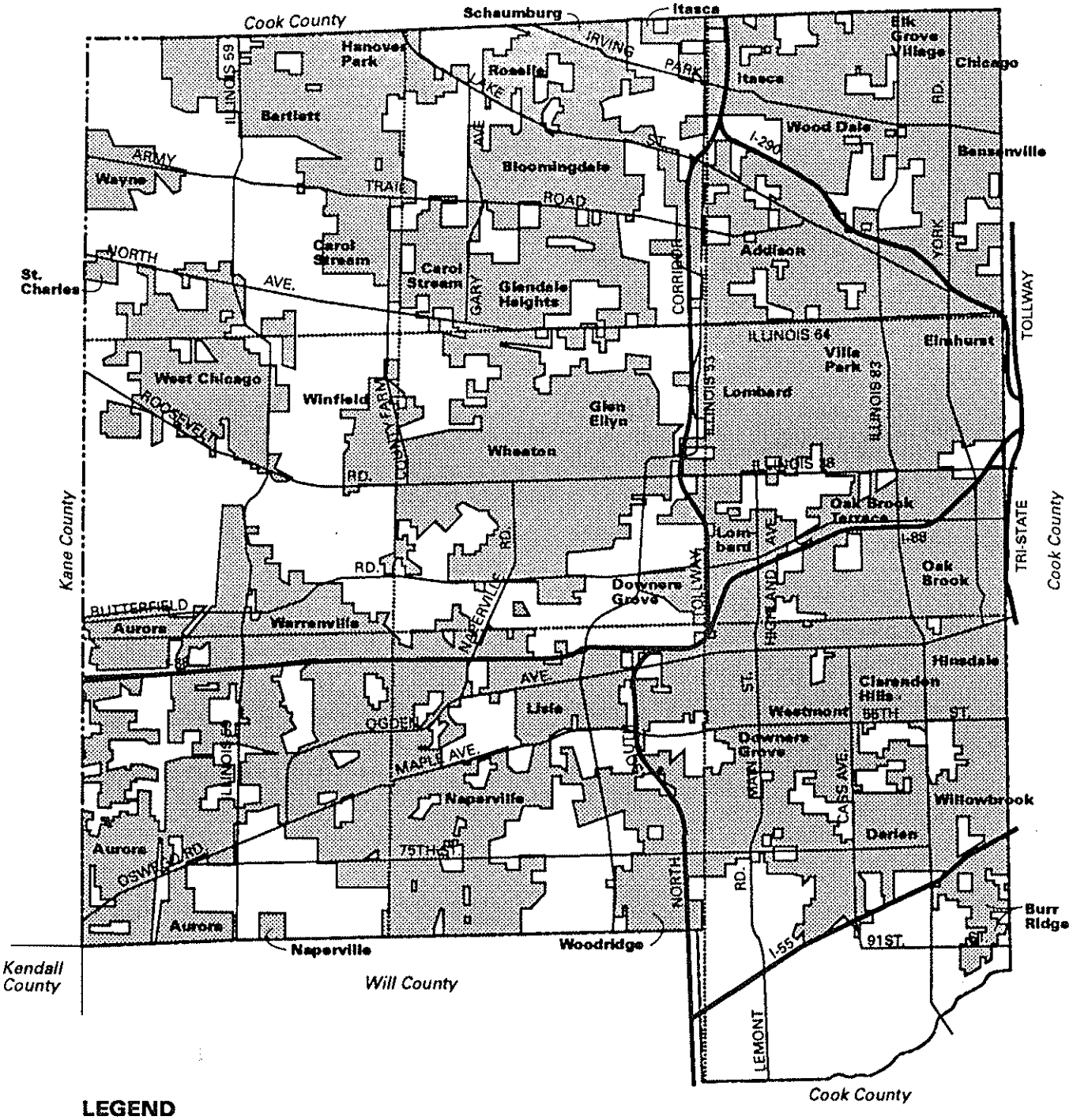
For example, the effects of improper sediment and erosion control practices are countywide because sediments are transported beyond municipal boundaries and deposited in adjoining municipalities; hence regulatory authority would appropriately be delegated beyond the municipal level. The operational efficiency of the plan may be enhanced if regulatory programs such as sediment and erosion control are delegated to a local level. Municipalities have developed staff capabilities in many of the stormwater management categories covered in the Plan and those staffs are knowledgeable of the specific localized problems in their communities. Local administration of a regulatory program will also provide a more responsive climate for the needs of citizens.

> ***Routine regulatory activities will tend toward the municipal level as much as possible, with only necessary program authorization, delegation, and review coming from broader levels.***

For example, the county could delegate sediment and erosion authority to qualifying municipalities. However, minimum, uniform standards must be incorporated and enforced in all regulatory programs if the objectives of the Plan are to be met.

> ***Delegated regulatory programs must be consistent with and at least as stringent as those of all successively broader delegating authorities.***

L27485.A0.30 FIG 6-1 6-19-89



LEGEND

- TOWNSHIP LINE
- INCORPORATED LAND
- UNINCORPORATED LAND

N

SCALE: 1" ≈ 3 MILES

FIGURE 6-1
DuPage County Municipalities

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This does not preclude a more local level from enacting and enforcing regulations more stringent than those of the broader authority.

There are often very good reasons for more stringent controls in localized areas where additional protection is needed or desired. For example, the Committee might elect to provide additional wetland protection for all priority wetlands regardless of the nature of the threatening activity. It might also be desirable for a municipality to enforce tighter stormwater runoff release rates for specific tributaries with existing or projected flooding problems. The passage of a local ordinance that meets minimum criteria might not ensure effective implementation at that level. Oversight and revocation authority are essential to the long-term effectiveness of any regulatory program.

Delegation of a regulatory program from a broader jurisdiction to a more local one must only occur with the broader jurisdiction retaining ultimate authority to provide program oversight and revoke the delegated program if deemed necessary because of lack of compliance or enforcement.

Some regulatory categories have national or statewide significance and by law cannot be totally delegated. These include the state and federal regulatory programs for protection of surface water quality, wetlands, and the state's dam safety program. IDOT/DWR floodway construction regulations also mandate the agency's continued permit involvement for certain activities in the delegated programs (defined in 92 Ill. Adm. Code 708, Section 708.90 (i)). The existence of nondelegated programs does not preclude more stringent local initiatives. Where stormwater management objectives or policies require standards more stringent than national or state standards, the county will retain jurisdictional responsibility and authority. This will not, however, supplant the required state or federal authority over their less stringent standards.

Permitting Procedures

Permitting procedures will be established following the same general standards described above for regulatory authority and responsibility. For example, the jurisdiction where the effect of the activity being permitted primarily occurs will have ultimate permit authority. Permit authority can be delegated to a more local level as long as the more local level sets the minimum criteria, provides permit program oversight, and retains authority to revoke the delegated permit program.

Whenever permit procedures are updated, pre-existing permit programs will remain in effect until the county has established new procedures. This will provide continuity from existing programs to new ones. If appropriate, pre-existing permit programs will be modified to meet the minimum criteria consistent with the Plan. Where existing programs meet minimum criteria and are being administered effectively, there will be little advantage in requiring modifications.

As is the case with responsibility, certain state and federal permit programs cannot be delegated. These include the COE Section 404 and associated IEPA water quality certification, the COE Section 10, and the IDOT/DWR dam safety permit reviews.

Performance Criteria

Specific performance criteria will provide the technical basis for effective stormwater management in DuPage County. Examples of performance criteria include release rates for runoff control, designation of appropriate flood plain uses, detention basin design parameters, minimum management practices for sediment and erosion control, and appropriate mitigation for wetland or habitat alteration. General standards for setting performance criteria include the following:

- Minimum performance criteria will be established countywide by the Stormwater Management Committee.
- Countywide criteria will be at least as stringent as related state and federal criteria.
- Municipal criteria will be at least as stringent as countywide criteria.

Specific standards to set performance criteria for components of the stormwater management system are presented in Chapter 8. The criteria are established in the technical guidance of Appendix E and periodically updated as required in Chapter 10. These criteria should be incorporated into ordinances to ensure due process and to ensure that elected officials are responsible for the decisions. Having the full force of law behind the criteria and having them clearly identified will also facilitate uniform compliance and enforcement.

Performance criteria shall be formally incorporated into regulations and ordinances.

CHAPTER 7

Facility and Local Data

Introduction

All aspects of stormwater management, from planning and analysis through design and maintenance of facilities, require compilation of and reference to detailed data describing the stormwater and flood control facilities. Watershed planning requires extensive topographic, land use, meteorologic, and hydraulic data obtained from throughout the basin. Project design requires the same data, though on a site-specific basis. Maintenance of channels and structures also requires background data in the character and function of the facilities being managed.

Since data collection is time-consuming and costly, it is essential that it be performed as efficiently as possible. Furthermore, means and locations of data storage and data updating and retrieval mechanisms must be clearly defined so that all agencies requiring data have ready access to current information.

This chapter summarizes the kinds of data required and sets standards for their collection, storage, and retrieval. Chapter 10 presents standards for updating appendixes that document facility and local data.

Data Requirements and Compilation

Stormwater management data fall into three categories:

- **Facility Data** (Table 7-1), which consist of the physical dimensions and specifications necessary to evaluate the performance of each stormwater management facility (culvert, storm sewer, channel section) or other facilities (bridge, dam)
- **Maps** (Table 7-2), which address larger scale overview information
- **Time Series Data** (Table 7-3), which include information that must be gathered over a period of time and then summarized or used in sequential time dependent calculations for stormwater evaluation

Each category has unique requirements for compilation.

Facility Data

Physical survey information is most readily compiled from record plans (i.e., plan drawings updated after construction and verified to reflect the actual in-place configuration) or field surveys of drainage facilities and structures. If record plans are not available or are out of date, then the information must be acquired through field surveys. To minimize costs and provide more timely compilation of data pertinent to each stormwater management evaluation,

> ***Each agency with primary responsibility for permit review will require submittal of fully dimensioned record plans upon completion of construction for any facility in the flood plain.***

Data from record plans will not be available for many existing facilities, and it will be necessary to use ground survey or photogrammetric techniques to acquire the data. Appendix C, "Existing Systems," summarizes the data currently available.

Table 7-1 Required Facility Data

Facility Type	Required Data
Culverts	Location, water body, owner Entrance condition Photographs Length Dimensions of opening Upstream and downstream inverts Wingwall lengths and angles Skew angle Road profile Material and condition
Bridges	Location, water body, owner Photographs Sketch Length (along flow line) Dimensions of waterway opening including low chord elevation Section across bottom of bridge opening if free span Both upstream and downstream inverts Wingwall lengths and angles Skew angle Piers (location and dimensions) Road elevation (both elevation of road directly over the structure, and the low point of the road section)
Dams and Basin Outlets	Owner, jurisdictional status, dam safety report (if required) Location (stream and river mile) Cross section, and materials Emergency spillway geometry and materials Gate or outlet control geometry Upstream and downstream inverts Flood easement description, maintenance records
Impoundments	Bottom contours Materials Embankment cross sections
Pump Stations	Location, including intake and discharge points Capacity (by pump) Control sequence/set points
Structures in Flood Plain and Floodway	High water mark Locations, age, owner Elevations Descriptions Date of storm Photographs Source of information Buildings Locations, age, owner Type, including number of stories Flood damage history Elevation of first floor Elevation of low water entry points Assessed value Permanent parcel number
Channels	Roughness coefficient (Photographs or coefficients estimated by qualified hydraulic engineer) Cross sections extending beyond flood plain, located at each significant change in channel section

Table 7-2 Required Map Data

Type	Scale	Attributes
Topographic Within Flood Plain and Floodway	1" = 200' C.I. = 1'	Contours Streams and Lakes Culverts and Bridges Roadways and Buildings Quarter Section Corners
Other Areas	1" - 2,000' C.I. = 5'	Contours Streams and Lakes Bridges Roadways and Buildings Section Lines
Land Use (County Base Map)	1" = 400'	Streams and Lakes Bridges and Roadways Major Land Use Categories Quarter Section Corners
Soils	1:15,840 Scale	Photograph Base Soil Type Codes Section Corners
Aerial Photographs (Three-Year Updates)	1" = 400'	Photograph Base Quarter Section Corners
Flood Plain	1" = 200' C.I. = 1'	Contours Streams and Lakes Culverts and Bridges Roadways and Buildings Quarter Section Corners Regulatory Flood Plain
Wetlands and Habitat Areas (County Base Map)	1" = 400'	Streams and Lakes Bridges and Roadways Quarter Section Corners Wetlands and Habitat Areas

C.I. = Contour Interval

Table 7-3 Required Time Series Data

Time Series	Minimum Requirements
Precipitation	Hourly, more frequent in small catchment areas.
Streamflow Data	Daily for extended periods, hourly or shorter time interval for critical storms.
Runoff Data in Storm Sewers	Time interval shorter than time of concentration.
Water Quality Data	Reflecting range of conditions and pollutants experienced during and between storm periods.

Appendix C will be consulted and the available data collected from the sources listed there before any field surveys are undertaken.

When necessary facility data are not included in either record plans or references cited in Appendix C, then field surveys must be conducted to gather the data. Any appropriate techniques that meet the criteria listed in Appendix E, "Technical Guidelines," may be used.

Whenever field surveys are conducted in relation to stormwater facilities, the survey will compile all pertinent stormwater data as summarized in Tables 7-1, 7-2, and 7-3 in a manner consistent with current technical guidance presented in Chapter 8.

Maps

Several maps listed in Table 7-2 as essential to good stormwater management planning, design, and evaluation are seldom compiled solely for stormwater management. Rather, they are compiled by numerous agencies for a variety of purposes and merely referenced for stormwater evaluations. A major exception is that topographic maps suitable for stormwater management use are usually more detailed (i.e., have closer contour intervals) than those compiled for other purposes.

Whenever topographic maps are compiled for stormwater management, they will meet the accuracy, scale, and contour interval criteria specified in current technical guidelines.

Flood plain maps are compiled nationwide under the auspices of the Federal Emergency Management Agency (FEMA) to support the federally subsidized flood insurance program and disaster relief activities. Because of the unusually low topographic relief of DuPage County and the rapid development that occurs there, local requirements for flood plain mapping are more stringent than those applied nationwide. For example, FEMA flood plain maps are developed assuming existing upstream development and updated on about a 5-year cycle to reflect increasing development. In DuPage County, flood plain maps must be developed with due consideration given to ultimate upstream development since the period between undeveloped and fully developed watershed status is often a matter of months rather than decades.

Flood plain maps developed by or for DuPage County and municipalities within it will comply with the criteria consistent with county drainage characteristics and stormwater management policies.

Wetland and habitat maps are normally compiled on either a very detailed, high resolution scale suitable for site-specific environmental analysis or on a low resolution scale suitable for state or federal inventories.

For countywide stormwater management purposes, DuPage County will compile and maintain wetland and habitat maps at a uniform, intermediate scale appropriate for quick reference for stormwater facility impact evaluations.

Time Series Data

The need for time series data is often met through use of data from networks established by federal and state agencies:

- The National Oceanic and Atmospheric Administration (NOAA), which collects and compiles daily, hourly, and more frequent data at several locations in and near DuPage County
- The United States Geological Survey (USGS), which collects and compiles stream stage and streamflow data at several locations where streams flow in and through the county
- The Illinois Environmental Protection Agency (IEPA), which periodically collects and compiles water quality data on several county streams

Time series data networks change constantly to meet the needs and budgets of the collecting agencies, so they should be reviewed periodically in light of the county's stormwater management needs and augmented as necessary.

The DuPage County stormwater management division will periodically review time series data networks maintained within and near the county in light of the stormwater management time series requirements and establish programs (e.g., cooperative agreements or independent data networks) to collect and monitor data consistent with the county's stormwater management needs.

There also exists a large body of time series data (see Appendix C) collected for special studies and other purposes independent of these large data networks.

To minimize cost but maximize the understanding of the range of conditions experienced in the county, the data sources will be reviewed and used to the greatest extent possible before undertaking collection of new time series data.

Compilation and collection of water quality data present unique challenges because many programs are aimed toward evaluation of background or extreme low flow conditions. Data collected for those evaluations are usually of limited value in stormwater analyses. Stormwater-related water quality evaluations must address all portions of the hydrograph, both during storms and during subsequent low flow periods when sediments and pollutants transported by stormwater exert an influence in their deposition areas.

Water quality data collection and compilation efforts undertaken for the county or municipalities will reflect the full variation of hydrometeorologic conditions affecting and affected by stormwater.

Data Storage and Retrieval

Available data can be used only if their availability is known.

The DuPage County Stormwater Management Committee will maintain a current summary of available stormwater management data by periodically updating Appendix C.

Municipalities and agencies within the county will facilitate updating by transmitting summaries of available record plans, facilities data, or time series data to the DuPage County Stormwater Management Committee whenever they obtain updates of the data.

The use of the available data will be greatly enhanced if the data are stored in consistent formats.

Stormwater management data will be compiled and stored in digital formats consistent with the technical guidelines of the DuPage County Stormwater Management Plan. Where digital formats are not feasible, reproducible hard copy formats shall be used. Maps shall be compiled at standard scales: either 1" = 200' (specific sites), 1" = 2,000' (quad scale), or 1" = 2,400' (county base map).

Accessibility of the data will be maximized if most of it is made available in one location. The DuPage County Stormwater Management Committee technical staff will require frequent access to much of the data to fulfill its mandate of stormwater management coordination throughout the county.

The DuPage County Stormwater Management Committee will maintain current files of stormwater management data available throughout the county.

Municipalities and other agencies collecting stormwater management data within the county will transmit digital or reproducible hard copies of those data to the DuPage County Stormwater Management Committee regularly.

CHAPTER 8

Technical Requirements

Introduction

Technical guidelines and criteria are necessary to define procedures and techniques that are suitable for application in DuPage County and consistent with the objectives of the Stormwater Management Plan. Together, the guidelines and criteria provide a consistent basis for evaluating, designing, and reviewing stormwater management projects and programs. With clearly documented technical requirements, watershed areas covering several jurisdictions can be treated consistently. In addition, documented technical guidelines and criteria allow efficient transfer of experience necessary for training of government staff, engineers, and others involved in stormwater management.

Guidelines

Technical guidelines must provide clear explanation of factors important to evaluating, planning, and designing stormwater management projects and programs in DuPage County. The guidelines must address all aspects of technical assessment, from calculation through effectiveness assessment to alternative comparison. Minimum factors to be addressed in the technical guidelines are listed in Table 8-1.

Technical guidance should not, however, be so specific as to limit innovation. To best achieve the Plan objectives,

> ***Technical guidance should provide minimum performance requirements for all technical procedures essential to the stormwater management process, but should not preclude use of innovative technologies that can be shown to meet the minimum requirements.***

To facilitate the review process while also enhancing the equitability of project and program evaluations,

> ***Technical guidance should be specific and detailed enough to ensure consistency in procedures being used and reviewed throughout the county.***

A prime purpose of technical guidance is provision of information to the technical community (engineers, developers, government officials, permit agencies) that will enable them to perform evaluations that are simultaneously technically sound and useful in achieving the objectives of the Stormwater Management Plan. Many commonly used technologies are inapplicable to the realities of stormwater drainage in DuPage County.

> ***The technical guidance must provide clear definition of what factors are significant in determining the appropriateness of any particular technology proposed for application in DuPage County.***

Stormwater management evaluations and designs often consider a scope more limited than that encompassed in the Stormwater Management Plan. Consequently, many common technologies ignore factors significant to achieving the Plan objectives. For example, only the more advanced texts in stormwater management address the impacts of wetland drainage on downstream flooding, yet it will not be possible to mitigate future stormwater damages in DuPage County if these impacts are not considered.

Table 8-1 Minimum Technical Guidance Considerations

Design life

Stormwater volume calculations

Calculation of release rates appropriate for the downstream drainage system

Small-scale methods to minimize increased stormwater runoff from new land development

Evaluation of water quality impacts of stormwater management and mitigation measures

Nonpoint pollution problems and the actions that can reduce the effects of runoff on water quality

Identification of major and unique environmental features potentially impacted by stormwater projects

Procedures to consider and mitigate the effects of proposed stormwater management improvements on riparian and wetland environments

Velocity limitations and energy dissipation requirements to limit stream erosion

Procedures to evaluate the natural functions of stream channels and ways to protect and maintain those functions

Evaluation of the effects of sustained increases in frequent flows on stream erosion

Data requirements and collection techniques

Hydrologic procedures:

- Design condition volume, intensity, temporal and spatial distribution
- Drainage area definition
- Land use/land surface cover representation
- Runoff calculation
- Design development conditions

Target level of protection determination

Open channel hydraulics:

- Boundary (upstream and downstream) conditions
- Selection of velocity limitations for channel lining materials
- Selection of Manning's roughness coefficient values
- Side channel flow
- Backwater computations
- Lost storage computations
- Restricted conveyance computation

Minimum easement dimensions for access to and maintenance of public stormwater facilities

Mitigation of the effects of lost flood plain storage on downstream areas

Gutter and inlet hydraulics

Storm sewer and culvert hydraulics:

- Pressure and open channel flow
- Energy loss calculation
- Tailwater conditions
- Inlet and outlet control

Bridge hydraulics:

- Scour
- Roadway overtopping
- Approach overtopping

Storage hydraulics:

- Outlet requirements
- Stage/discharge
- Stage/storage

Erosion and sediment control

Subsurface drainage:

- Recharge, infiltration, and filtering rates
- Methods for determining hydraulic conductivity values
- Groundwater contamination potential

Technical guidelines must be sufficiently comprehensive to address all of the DuPage County stormwater management objectives.

Technical guidelines, therefore, must include not only procedures for evaluating and designing flood mitigation measures, but also:

- Potential flooding impacts, both upstream and downstream
- Water quality impacts of proposed stormwater management techniques
- Impacts of changes in available storage, whether in flood plains, wetlands, or structures
- Equitability, effectiveness, costs, and legal implications of all proposed projects or programs

Criteria

Clear criteria can greatly facilitate evaluation and review of stormwater management projects and programs by enabling objective comparisons of their relationship to the standards of the Stormwater Management Plan.

Minimum technical criteria necessary to achieve stormwater management plan objectives should be clearly and objectively defined.

Overly restrictive criteria can stifle innovation. In addition, restrictive criteria may be perceived as arbitrary and subject to legal challenge. Consequently,

Technical criteria should be defined only where necessary to support achievement of the objectives.

The prime focus of the technical criteria is to provide "checklist" objective definitions of what is or is not consistent with the objectives and standards included in the Plan. At a minimum, it is necessary to define criteria that:

- Ensure consistency with watershed capacities (e.g., release rates not accumulating to exceed downstream carrying capacity)
- Provide a balance throughout the system (e.g., sufficient storage is provided to compensate for restricted downstream capacity)
- Are legally consistent (e.g., do not controvert valid intergovernmental agreements)
- Are technically achievable

CHAPTER 9

Funding

Introduction

The state-authorized adoption of a dedicated property tax levy (P.A. 85-905) to fund stormwater management activities in DuPage County provides an important source of funds for development and execution of consistent countywide procedures. However, this single source is not likely to be sufficient for all the stormwater capital, operation, and maintenance needs. As new regulations are adopted, watershed plans are developed, and facilities are constructed, new funding requirements for increased activities will result. A combination of funding options must be considered in developing and subsequently updating the Funding Plan (Appendix G).

Funding requirements will be estimated initially and periodically in the problems and projects evaluations (Appendix H), maintenance program (Appendix I), and the County Stormwater Division annual budget evaluation. The funding needs will be compared to available revenues in the initial and annual update of the Funding Plan to determine the amounts and timing requirements for additional funding.

This chapter provides a summary of funding options to consider, along with planning standards for developing and implementing the methods selected.

Funding Options

Stormwater management funding options are to be evaluated based upon the following categories:

- **Legal Impact** - How difficult, under prevailing law, would it be to implement this funding source?
- **Equity** - How well does this source distribute the costs between those contributing to the problem, those benefiting from the programs, and those paying the fees?
- **Revenue Capacity** - How much money can this source generate?
- **Complexity** - How complex are the steps necessary to develop the revenue source?
- **Ability to Fund** - Can the funding source be used to fund the major categories of stormwater management costs?

Funding options to be considered are briefly discussed below.

General fund ad valorem taxes have traditionally provided a significant source of funding for stormwater management activities. Since the money is allocated each year during the general government budgetary process, in which many activities must compete to obtain funding, the availability of funding for long-term projects is limited. Supplementing these taxes with a local option dedicated stormwater management property tax addresses this shortcoming. However, further options must now be considered to obtain more state and federal funds or otherwise subsidize the local cost for stormwater management activities.

Tax revenue from a special taxing district or special assessment district is available for use in the designated special area. This option may be suitable for specific projects in designated areas.

Revenue from permitting and inspection fees can be used to offset the cost of reviewing permit applications and inspecting stormwater construction projects. Unless fees are set high enough to cover actual costs (seldom the case), other funding sources must supplement the cost of processing permit applications.

Similar to the fees discussed above, penalties and fines provide limited revenue. Since collection of fines is dependent on enforcement actions for regulatory violations, the timing and amount of collection is uncertain.

A stormwater management utility provides funding for stormwater activities by charging service fees generally based on property contributions to runoff. Property that generates larger quantities of runoff is charged higher stormwater utility fees. Since this is not a tax, all properties pay for services, unlike the ad valorem tax, which is not charged for tax exempt property. Service fees provide a reliable, long-term dedicated source of funding that must be spent on stormwater management services.

General obligation, revenue, or special assessment bonds are sold by local governments to provide capital for large construction projects. The operation and maintenance cost of the resulting facilities can be capitalized and included in the bond request. The primary disadvantage of selling bonds is that long-term debt is incurred. On the other hand, large-scale construction projects can be initiated when improvements are needed rather than waiting to raise funds.

A homeowners' association is a private organization of residential property owners that collects an annual fee, a portion of which can be used to construct or maintain stormwater facilities in a designated residential area. This type of funding keeps the responsibility at the lowest jurisdictional level but has a limited capacity to generate money for capital improvements and may not be a constant and reliable long-term source since it covers only limited areas and generates little revenue.

Development impact fees provide an alternative for requiring developers to construct or pay for stormwater management facilities. The impact fees are usually front-end charges to allow construction of needed facilities. Site-specific charges must be determined based on the local impact of a development or contribution to watershed problems. This approach allows the local government to construct regional facilities or upgrade deficient downstream systems using an appropriate contribution from the developer. However, since the impact fee from a single development usually does not provide enough revenue to fund a regional project, an agency must fund such projects and be paid back through recapture fees. As a result, needed improvements could be delayed. In addition, this option does not directly provide for operation and maintenance funding.

The availability of state or federal cost participation is limited to specific areas for specific purposes. For example, the federal government provides Community Development Block Grant funds that can be used to pave streets and install drainage facilities in existing communities. Since this funding is subject to compliance with strict criteria and funds are limited for the many communities that apply, it cannot provide significant stormwater management funding. There is also the Corps of Engineers Water Resources Development Act, which allows cost sharing for certain project categories. Although funding potential from these sources is limited, it is important to stay familiar with them to seize any available opportunity. In particular, state and federal funding participation is often available for cooperative development of major stormwater projects to alleviate existing problems.

Planning Standards

Standards for evaluating funding options provide a basis to consider local concerns and prepare a funding plan to meet identified needs. As mentioned in the introduction, a Funding Plan will be

developed and updated. Development of the plan must be consistent with many other components of the Stormwater Management Plan that determine funding requirements, project priorities, jurisdictional responsibilities, and so on.

Because many factors and considerations are subject to change, the Funding Plan must be periodically reviewed and updated. Standards for the development, evaluation, and update of the Funding Plan are:

- Promote efficient use of public monies for stormwater construction projects
- Establish a functional drainage system that will not require excessive and costly maintenance activities; e.g., consider life cycle as well as capital costs
- Provide clear project funding priorities
- Provide sources of revenue sufficient to cover all stormwater management costs
- Provide diversity in revenue sources
- Involve the public during plan development to secure local acceptance
- Provide for long-term funding so that facilities can be maintained, repaired, and replaced
- Distribute costs so that charges are equitably assigned to those who use or benefit from the stormwater management facilities
- Account for inflation when developing long-term budgets
- Maximize the use of existing billing and collection procedures to minimize the costs of implementing and maintaining funding options
- Solicit local cooperation and participation within the watershed to fund regional projects
- Maximize capture of state and federal participation

CHAPTER 10

Implementation and Enforcement

Introduction

The successful implementation and enforcement of the DuPage County Stormwater Management Plan requires:

- Close coordination and cooperation between all municipalities and agencies having stormwater management responsibility in DuPage County
- Periodic review and update of the plan appendices to ensure their adequacy and the appropriate level of completeness
- Periodic inspection to identify deviations from the plan, followed by timely enforcement action where noncompliance is noted
- Provision of adequate funds to accomplish the implementation and enforcement

This chapter provides standards for achieving these key requirements.

Coordination and Cooperation

Coordination and cooperation between the DuPage County Stormwater Management Committee and local municipalities is the key factor in determining the achievement of the Plan objectives. All agencies or concerned persons who have authority, responsibility, or interest in DuPage County's stormwater management should be actively assisted to understand, accept, and participate in the plan. Table D-1 in Appendix D, "Institutional Programs," contains a current listing of agencies whose cooperation is actively sought.

> ***Implementation of the Stormwater Management Plan must be actively coordinated with all municipalities within DuPage County, all countywide agencies, and all adjacent counties.***

Cooperation and coordination will be achieved primarily through two programs maintained by the Stormwater Management Committee and its staff:

- Information exchange program
- Technical coordination program

Information Exchange Program

The information exchange program will include:

- Regular fact sheet mailings to cooperating agencies
- Development, updating, and dissemination of guidance documents
- Sponsorship of training programs for
  - Citizens and land owners
  - Public officials
  - Permit review and inspection personnel
  - Design engineers
  - Developers and builders associations
  - Homeowners

Information exchange is essential to disseminate the understanding necessary to foster compliance with the Stormwater Management Plan. New citizens and land owners in the county are often unaware of the dangers of flood hazard and the importance of flood preparedness.

The information exchange programs will emphasize public awareness and training regarding the importance of flood preparedness, including specific training on installation and maintenance of floodproofing techniques.

Similarly, design engineers and permit review and inspection personnel new to DuPage County are often unaware of the unique technical requirements of designing for stormwater management where onsite watershed storage is preferred to conveyance for site runoff control. They are also unaware of the major drainage system constraints imposed by the county's low relief and extensive overbank storage characteristics.

Information exchange programs will include dissemination of technical guidance and training programs to increase designer and reviewer awareness and understanding of the unique requirements of stormwater management in DuPage County.

Finally, the environmental objectives of the plan regarding water quality, habitat, and wetland enhancement require that the public and technical community be aware of the effects of their actions. For example, water quality can be greatly enhanced if property owners and designers direct runoff from their property across a strip of vegetation rather than directly into the waterways. The vegetated strip can also provide excellent wildlife habitat if properly managed. If property owners are aware of the benefits of such actions, they will be more likely to cooperate.

Information exchange programs will disseminate information on the benefits and techniques of environmental protection activities that affect water quality, quantity, and habitats.

Technical Coordination

Technical coordination will be partially achieved through dissemination of the technical guidance information. In addition, the Stormwater Management Committee will maintain staff, models, and a data repository to improve access to the understanding, tools, and data essential to good stormwater management practices in DuPage County.

Several policies and standards of the Stormwater Management Plan require that all stormwater projects be evaluated in terms of their overall watershed impacts.

The Stormwater Management Committee will maintain staff and programs to provide prompt and technically competent review of projects for consistency with the objectives of the Stormwater Management Plan and watershed plans.

The models developed as part of the watershed plans are an essential tool in making these evaluations. To avoid duplication of the extensive effort required to develop the models, they should be made available to those responsible for project evaluation.

The Stormwater Management Committee and its staff will make the watershed models available to other agencies, either through cooperative agreements to perform modeling analysis or through dissemination of program code, documentation, and input streams at cost.

The data required to design or review a particular site runoff control project or a regional stormwater project are extensive and costly to obtain. They are similar to the data required to develop good watershed plans.

The Stormwater Management Committee and its staff will compile pertinent stormwater management data while developing watershed plans and will thereafter maintain those data, updated through cooperation with other agencies, in a central data repository accessible at cost to agencies or designers involved in stormwater management in DuPage County.

Inspection and Enforcement

The DuPage County Stormwater Management Committee and its staff have primary responsibility for implementing all aspects of the Stormwater Management Plan. Because much of that responsibility is delegated to other agencies and because compliance must be maintained through all steps of development (concept, design, construction, operation, and maintenance), the Committee requires staff and programs to inspect compliance.

The Committee will maintain staff and programs sufficient to inspect compliance with the objectives of the Stormwater Management Plan.

Compliance inspection will include:

- Periodic audits of permit review, inspection, and maintenance programs of each agency delegated responsibility for implementing aspects of the Stormwater Management Plan
- Frequent inspection of all ongoing construction and development covered under the countywide stormwater management ordinances
- Prompt inspection of all problems identified as emergency, critical, or serious
- Annual inspection and status reporting on all problems identified as incremental or repetitious

Compliance with the Stormwater Management Plan will be effective only if prompt and effective enforcement action is taken in all cases where inspection reveals noncompliance. Enforcement standards for the Stormwater Management Plan are as follows:

- All ordinances enacted to implement the Stormwater Management Plan must include mandatory enforcement schedules and penalties to be imposed for noncompliance.
- The Stormwater Management Committee must be granted authority to impose the penalties specified in the countywide stormwater management ordinances.
- In all agreements, ordinances, and other delegations of authority, the Stormwater Management Committee will retain authority to withdraw delegation of responsibility in the event of inadequate compliance, inspection, maintenance, or enforcement.
- All agreements, ordinances, and other delegations of authority will provide the Stormwater Management Committee right of access to maintain facilities.
- All agreements, ordinances, and other delegations of authority will include provisions for owner reimbursement of costs incurred by the Stormwater Management Committee or its delegate in correcting violations of the provisions of the Stormwater Management Plan.

Funding

Funding for implementation of the provisions of the Stormwater Management Plan is discussed in Appendix G, "Funding Plan." A key feature of funding standards (see Chapter 9) is stressed here since the success of the implementation plan depends heavily on a well-developed and implementable funding plan.

The annual funding plan update and subsequent budget request must provide funding for Stormwater Management Committee staff sufficient to carry out its duties as specified in the implementation plan. The duties include information exchange, appendix updates, inspection, and enforcement actions.

Updates

The DuPage County Stormwater Management Plan contains objectives and standards that will seldom require updating. Aspects of stormwater management planning that are more variable are confined to the following plan appendices:

- Appendix A, "Terms and Definitions" - Lists and defines terms frequently used in stormwater management. The definitions will provide a common basis of understanding for potentially ambiguous terms.
- Appendix B, "Bibliography" - Provides bibliographic information for references used in developing the Stormwater Management Plan. It will serve as a reference for further information.
- Appendix C, "Existing Systems" - Summarizes the current status of stormwater management facilities and practices in the county. It serves as a ready reference for data or concepts necessary for further planning, evaluation, or design.
- Appendix D, "Institutional Programs" - Describes institutional structures and agreements for implementation of the Plan. It includes recommendations for modifying existing institutional arrangements as necessary to better meet Plan objectives, as well as a suggested institutional implementation plan and schedule.
- Appendix E, "Performance Criteria and Technical Guidelines" - Evaluates and recommends performance criteria to be incorporated in stormwater management ordinances, plan reviews, and design. It further suggests technical guidance methods and manuals to be used in developing plans to meet the performance criteria.
- Appendix F, "Ordinances" - Describes the development of ordinances containing the minimum criteria and standards necessary to achieve Plan objectives. It includes current copies of recommended ordinances, as well as jurisdictional recommendations for changes necessary to meet the minimum criteria of the countywide ordinances.
- Appendix G, "Funding Plan" - Estimates overall costs of the Stormwater Management Plan. It evaluates alternative methods of funding all aspects of the program and recommends how each major aspect of the program should be funded. The recommendations are specific for the near term, subject to periodic update as potential revenue sources change.
- Appendix H, "Problems, Studies and Improvement Projects" - Summarizes the current status of known stormwater management problems and efforts underway to address or alleviate those problems. It also evaluates and recommends a program for future problem recording, evaluation and response.
- Appendix I, "Maintenance Programs" - Contains criteria and guidance for maintenance of stormwater management facilities. It also contains recommendations and descriptions of cooperative programs where the municipalities and the County can share expertise or resources to improve maintenance systems.
- Appendix J, "Water Quality Enhancements" - Addresses the water quality impacts of stormwater management practices in DuPage County. It does not attempt to provide a full water quality management plan, but focuses on the impacts and enhancements possible through stormwater management. It briefly summarizes the current status of water quality in DuPage County lakes and streams, describes how stormwater management practices probably affect that quality, and makes recommendations for practice modifications to reduce adverse impacts of stormwater management and, where feasible, further enhance water quality.
- Appendix K, "Wetland and Riparian Environment Protection" - Provides identification and evaluation of wetland and riparian environment protection needs in DuPage County. It summarizes resources requiring special consideration, as well as documenting the significance of these resources to both flood control and environmental health. It includes recommendations for wetland and riparian environment protection evaluations to be included in all stormwater management evaluations.

- Appendix L, "Salt Creek Watershed Plan"
- Appendix M, "East Branch DuPage River Watershed Plan"
- Appendix N, "West Branch DuPage River Watershed Plan"
- Appendix O, "Sawmill Creek Watershed Plan"
- Appendix P, "Des Plaines River Tributaries Watershed Plan"
- Appendix Q, "Fox River Tributaries Watershed Plan"

- Contain the details of programs and projects recommended for each watershed. They summarize a comprehensive evaluation of the watershed capacities, needs and recommendations. They provide the basis, including models and specific criteria, for evaluating the overall impacts of any proposed projects or improvements within the watershed.

- Appendix R, "Training and Public Information" - Summarizes a program to keep those parties critical to the success of the Stormwater Management Plan aware of the provisions and requirements of the Plan. Programs will be directed toward at least designers and consultants, permit reviewers, public officials, and the general public.

The appendices will be periodically reviewed and updated.

Table 10-1 contains standards for the minimum update frequency of each appendix. All updates must be consistent with the objectives, policies, and standards of the Stormwater Management Plan.

The annual update of the "Existing Systems," "Problems, Studies, and Improvements Projects," and "Funding Plan" appendices will provide the basis for the stormwater management budget for the following year.

To provide continuity and consistency in the budgeting process, annual updates will include a detailed program for the following year, a 5-year program, and a reaffirmation or update of the ultimate plan.

Responsibility for maintaining the appendix update schedule lies with the Stormwater Management Committee and its staff. Review and update of each appendix will include verification that the information in the appendix is current and accurate, updating any inaccurate or outdated portions, and disseminating the updates consistent with the standards of the information dissemination program.

All updates will be subject to review and adoption by the Stormwater Management Committee. Updates that involve model ordinances or minimum criteria will be distributed to the cooperating agencies for review and comment before approval and adoption by the Stormwater Management Committee. Updates to countywide stormwater management ordinances will require adoption by the DuPage County Board.

Table 10-1 Appendix Update Frequency

Appendix		Update Frequency
A	Terminology	Every 5 years
B	Bibliography	Annually
C	Existing Systems	Annually
D	Institutional Programs	Every 5 years
E	Performance Criteria and Technical Guidelines	Every 5 years
F	Ordinances	Every 5 years
G	Funding Plan	Annually
H	Problems and Improvement Projects	Annually
I	Maintenance Programs	Every 5 years
J	Water Quality Enhancements	Every 5 years
K	Wetland, Aquatic and Riparian Environment Protection	Every 5 years
L-Q	Watershed Plans	Every 5 years

CONTENTS

Chapter

Tables

Figures

Executive Summary

Introduction

The DuPage County Stormwater Management Plan has been established in recognition of the critical need to limit the reoccurrence of extensive flood damages within the county. Development has historically caused increases in flood risk, flood damage, and environmental degradation. The county's Stormwater Management Committee seeks to reverse that trend through the implementation of the Stormwater Management Plan. The Plan responds to the opportunity inherent in State of Illinois legislation P.A. 85-905, which authorizes regional stormwater management in northeastern Illinois counties. It also recognizes the integrated nature of the watershed system and the need to consider stormwater management planning on a watershed basis. The Plan:

- Consolidates the stormwater management framework throughout DuPage County into a united, countywide structure
- Sets minimum countywide standards for flood plain and stormwater management
- Provides for countywide coordination for the management of stormwater runoff in both natural and manmade drainageways and storage

In addition, the Stormwater Management Plan establishes standards for the following Plan components:

- Objectives and Policies
- Watershed Plans and Flood Maps
- Problems and Project Planning
- Maintenance Programs
- Regulatory Programs
- Facility and Local Data
- Technical Guidelines
- Funding
- Implementation and Enforcement

Technical appendices will be developed to establish the minimum criteria by which the achievement of the standards will be judged. When ordinances are adopted, they will establish a legal mandate for implementing the stormwater management standards. Guidelines, such as watershed plans and technical manuals, provide detailed instructions on how the criteria may be achieved and evaluated.

Objectives and Policies

Six primary objectives define the direction of DuPage County stormwater management:

1. Reduce existing potential for stormwater damage to public health, safety, life, and property.
2. Control future increases in stormwater damage within DuPage County and in areas of adjacent counties affected by DuPage County drainage.
3. Protect and enhance the quality, quantity, and availability of surface and groundwater resources.

4. Preserve and enhance existing aquatic and riparian environments and encourage restoration of degraded areas.
5. Control sediment and erosion in and from drainageways, developments, and construction sites.
6. Promote equitable, acceptable, and legal stormwater management measures.

Fifteen policies define physical and institutional characteristics of stormwater management.

1. Require appropriate and adequate provision for site runoff control, emphasizing site runoff control wherever the land is developed for human activity.
2. Encourage use of stormwater storage in preference to stormwater conveyance.
3. Require design and evaluation of each site runoff control plan consistent with watershed capacities.
4. Restrict future development in the flood plain to facilities that will not adversely affect flood damage potential or wetland environments, and prohibit development in the floodway unless it involves facilities that enhance flood protection.
5. Require preservation of wetlands to maintain their natural flood control and environmental benefits.
6. Incorporate water quality and habitat protection measures in all stormwater management activities within DuPage County.
7. Require regular, planned maintenance of stormwater management facilities.
8. Encourage control of stormwater quantity and quality at the most site-specific or local level.
9. Define clearly the responsibilities and authorities of government entities having jurisdiction for stormwater or floodwater control within DuPage County.
10. Require cooperation and consistency in stormwater management activities within and between the government entities having stormwater jurisdiction.
11. Promote delegation of authority to the most appropriate jurisdictional level.
12. Require strict compliance and enforcement of the stormwater management policies and their implementing regulations.
13. Foster the use of simple technologies wherever appropriate and realistic, but demand use of more sophisticated techniques where necessary to ensure the adequacy of the storm water controls.
14. Select cost-effective methods of achieving stormwater management objectives.
15. Estimate costs of stormwater management recommendations and identify appropriate revenue sources before their adoption.

These objectives and policies provide the framework for DuPage County stormwater management standards discussed in this plan. They also provide direction for criteria, guideline, and ordinance development.

Watershed Plans and Flood Maps

Major watershed plans will be developed for:

- Salt Creek
- East Branch of the DuPage River
- West Branch of the DuPage River

- Sawmill Creek
- Des Plaines River tributaries
- Fox River tributaries

Watershed plans will include updated and revised flood plain maps; basin-specific ordinances, recommended improvement projects and programs to alleviate present and anticipated flooding problems; identification of wetlands and critical habitats; and identification of groundwater recharge areas.

Standards for watershed plans address:

- Jurisdictional responsibility
- Data collection
- Hydrologic analysis
- Hydraulic analysis
- Flood mapping
- Problem identification
- Water quality enhancements
- Wetland, wildlife, and environment protection
- Alternative analysis
- Public involvement
- Preliminary design

Problems and Project Planning

Stormwater management planning encompasses the recognition of stormwater problems and the identification and evaluation of projects and programs to address those problems. Uniform standards enable effective problem identification, alternative evaluation, project review, and establishment of priorities.

The objectives and policies of the stormwater management plan are best served through active evaluation of existing conditions and anticipation of stormwater and flood control problems before they occur. Agencies must meet minimum countywide standards for reporting, recording, and handling problems. Problems that must follow the policies and procedures of DuPage County include those that:

- Threaten achievement of one or more of the Stormwater Management Plan objectives
- Have impacts beyond the boundaries of the jurisdiction within which the problem originates

Problems are ranked as emergency, critical, serious, incremental, or chronic. Projects proposed to alleviate actual or potential stormwater management problems are evaluated against standards consistent with the goals of the Stormwater Management Plan. The project effectiveness, impacts, and life cycle costs must be evaluated, with preference given to the project alternative that best meets DuPage County's stormwater management objectives.

Maintenance Programs

Stormwater management facilities operate effectively only if they are properly maintained. Regular maintenance prevents system failures and decreases the risk of stormwater damage.

Inspection and maintenance programs must be established for all stormwater facilities. Jurisdictions having responsibility for stormwater facility maintenance must have programs that provide:

- Inspection and preventive maintenance
- Facility repair and replacement
- Recordkeeping
- Emergency response
- Definition of responsibilities

The programs must address the inspection and maintenance of detention structures, drainageways (rivers, streams, and ditches), storm sewers and culverts, inlets and catch basins, and street sweeping. Maintenance activities should be scheduled, with guidelines and procedures established for conducting and setting priorities for activities. Responsibilities should be clearly defined and funding sources specified. Records should be kept in a central location within each jurisdiction, with summaries forwarded to the DuPage County Stormwater Management Committee.

Maintenance neglected by one jurisdiction may affect many others. Provisions must allow jurisdictions to perform maintenance neglected by others at the expense of the responsible party.

Regulatory Programs

Effective implementation of stormwater regulatory programs and permitting requires clear delineation of responsibility and authority. The operational efficiency of the stormwater plan will be enhanced if regulatory programs are delegated wherever possible. Routine regulatory activities should be performed by the jurisdiction most affected by the activity, with the responsibilities of program authorization, program delegation, and program review retained by the delegating authority.

Delegated regulatory programs must be consistent with and at least as stringent as those of the higher delegating authority; the delegating authority has the right to revoke the delegated program if deemed necessary due to a lack of compliance or enforcement. Lower level jurisdictions can enact and enforce regulations more stringent than those of the higher authority.

Specific performance criteria will provide the technical basis for effective regulatory implementation in DuPage County for technical and legal adequacy and be formally incorporated into regulations and ordinances.

Facility and Local Data

Stormwater management decisions require detailed data describing stormwater and flood control facilities and conditions pertinent to the facility site. Data relating to DuPage County stormwater management must be efficiently organized so planners, engineers, and designers can readily obtain existing and updated information.

A summary of currently available stormwater management data within the county will be maintained by the DuPage County Stormwater Management Committee. Updates will be facilitated by municipal and agency transmittals to the Committee summarizing record plans, facilities data, mapping, and time series data as they become available. Digital or reproducible hard copies of stormwater management data shall be provided to the DuPage County Stormwater Management Committee upon request.

Adherence to data collection and reporting guidelines will eliminate costly recompilation of data. Before any field surveys are undertaken, existing data will be examined for suitability. If field surveys are necessary to complete informational requirements, data should be gathered according to technical guidelines.

Technical Requirements

Technical guidelines and criteria are necessary to define procedures and techniques suitable for application in DuPage County. Technical guidelines must provide a clear explanation of factors important to evaluating, planning, and designing stormwater management projects and programs. Guidelines must be supported by criteria that define what is or isn't consistent with the objectives, policies, and standards included in the Plan.

Funding

As new regulations are adopted, watershed plans developed, and stormwater and flood control facilities constructed, new funding requirements for increased construction, operation, and maintenance activities will result. Funding options may be combined to provide flexibility in financing stormwater and flood control related activities. Funding sources are often particularly suited to a specific type of stormwater activity and, while individually unable to provide the total funding needed, work well when used in conjunction with other sources. Funding options to be considered include:

- General fund ad valorem taxes
- Stormwater management property tax
- Special taxing district
- Permit and inspection fees
- Penalties and fines
- Stormwater management utility
- Bond sales
- Homeowners' association
- Impact fees
- State or federal participation

Predictability and equity are important factors to consider in weighing the specific advantages and disadvantages of each funding option. Standards are presented to govern the development, evaluation, and updating of a stormwater management funding plan.

Implementation and Enforcement

The successful implementation and enforcement of the DuPage County Stormwater Management Plan requires:

- Maintenance of close coordination and cooperation with all municipalities and other agencies having stormwater management responsibility in DuPage County
- Periodic review and update of the plan appendices to ensure their currency and completeness
- Continual inspection to identify deviations from the Plan, followed by rapid enforcement action where violations are noted
- Provision of adequate funds to accomplish the implementation and enforcement

The DuPage County Stormwater Management Committee and its staff will provide informational guidance and compliance oversight to enable successful stormwater management in DuPage County.

Glossary

Ad Valorem Tax. Applied in proportion to the value of the taxed item.

Base Flood. A flood having a 1 percent probability of being equaled or exceeded in a given year; also known as the 100-year frequency event.

Energy Dissipator. A device to reduce the energy of flowing water.

Flood Plain. That land adjacent to a body of water with ground surface elevations at or below the base flood or the 100-year frequency flood elevation.

Flood Fringe. That portion of the flood plain outside of the floodway.

Floodway. The channel and that portion of the flood plain adjacent to a stream or watercourse that is needed to store and convey the base flood discharge or the 100-year frequency flood discharge without significant increase in stage due to loss of storage or conveyance or both.

French Drain. A drainage trench backfilled with a coarse, water-transmitting material; may contain a perforated pipe.

Hydraulics. A branch of science that deals with the practical application of the mechanics of water movement.

Hydrograph. A graph showing for a given point on a stream, drainage basin, or a lake the discharge, stage (depth), velocity, or other property of water with respect to time.

Hydrology. The science of the behavior of water in the atmosphere, on the surface of the earth, and underground.

Hydrometeorologic. Water related meteorologic data such as rainfall or runoff.

Infiltration. Passage or movement of water into the soil.

Infiltration Swales. A depressed earthen area that is designed to promote infiltration.

Life Cycle Cost. Cost based on the total cost incurred over the system life including research, development, testing, production, construction, operation, and maintenance. Costs are normally determined on present worth or equivalent annual cost basis.

Manning Roughness Coefficient. A dimensionless coefficient used in the Manning's equation to account for frictional losses in steady uniform flow.

Nonpoint Source Pollution. Pollution that enters a water body from diffused origins on the watershed or drainage basin and does not result from discernible, confined, or discrete conveyances.

100-Year Frequency Flood. A flood having a 1 percent probability of being equaled or exceeded in a given year; also known as the base flood event.

Open Channels. Open channels include not only those which are completely open overhead, but also closed conduits which are flowing partly full. Examples of such closed conduits are tunnels, storm sewers, sanitary sewers, and various types of pipelines. Flow in open channels involves a free surface.

Photogrammetric Techniques. Techniques available in the making of measurements by using aerial photographs.

Regional Stormwater Problem. A problem having a cause or impact that extends beyond the boundaries of the local jurisdiction within which the problem exists, or a problem involving a structure owned by a public entity other than the jurisdiction in which it exists.

Riparian Land. A narrow strip of land that borders a stream or river, and often coincides with the maximum water surface elevation of the 100 year storm.

Runoff. The waters derived from melting snow or rain falling within a tributary drainage basin that exceed the infiltration capacity of the soils of that basin, flow over the surface of the ground, or are collected in channels or conduits.

Scour. The clearing and digging action of flowing water.

Storage. Depressions, basins, or other areas that normally stand empty or partially empty, but fill during storms to hold runoff and reduce downstream flow rates.

Stormwater Management. The practice of controlling precipitation derived runoff to positively reduce damages and maximize use of water resources.

Watershed. The area drained by or contributing water to a stream, lake, or other body of water.

Wetlands. Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

DUPAGE COUNTY STORMWATER MANAGEMENT PLAN

APPENDIX J

WATER QUALITY ENHANCEMENTS

LAST REVISED
NOVEMBER 2001

GENERAL INFORMATION

APPENDIX J
TABLE OF CONTENTS

LIST OF TABLES

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Water Quality Inlet (Profile only) USEPA. 1999. “Water Quality Inlet.” *Storm Water Technology Fact Sheet.* Office of Water. EPA 832-F-99-029. Washington, D.C. Figure 1 “Profile of a Typical Water Quality Inlet.” Source: Berg, 1991.
(http://www.epa.gov/owm/mtbfact.htm)

DEFINITIONS

303(d): The section of the Clean Water Act that requires a listing by states, territories, and authorized tribes of impaired waters that do not meet the water quality standards that have been set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology.

305(b): The section of the Clean Water Act that requires the Environmental Protection Agency to assemble and submit a report to Congress on the condition of all water bodies across the country as determined by a biennial collection of data and other information by States and Tribes.

Best Management Practices (BMPs): Practices and activities designed to prevent or reduce the pollution of waters and minimize the impacts of development by nonstructural and structural devices. Includes prevention activities, treatment requirements, operating procedures, maintenance practices, and educational programs. Can be applied before, during, and after pollution producing activities to reduce or eliminate the introduction of pollutants into receiving waters. Most structural BMPs are designed to detain runoff until pollutants are able to settle out or infiltrate through the underlying soil.

Berm: An earthen mound used to direct the flow of runoff around or through a BMP.

Biochemical Oxygen Demand (BOD): The quantity of dissolved oxygen used in the biochemical oxidation of organic and inorganic matter.

Bioengineering (Green Engineering): Bioengineering integrates engineering principles with the use of natural construction materials in place of traditional, permanent structural materials in the design and construction of best management practices. The use of structural components is limited to cases in which a bioengineered component does not exist or is not appropriate for the desired application.

Channelization: To straighten a stream by means of a channel.

Channel Erosion: The widening, deepening, and/or headward cutting of channels and waterways due to the entrainment, transportation, and deposition of channel bed, bank, and overbank particles as a result of gravitational and chemical stresses primarily applied by water and air movement over these particles.

Check Dam: A small temporary dam constructed of rocks, logs, or timbers placed across a channel or drainage swale used to reduce water velocity, promote sediment deposition, and enhance filtration.

Daylighting: The conversion of storm sewers into open drainageways.

Design Life: The period of time for which a facility is expected to perform its intended function.

Design Storm: A rainfall event of specified size and return frequency that is used to calculate the runoff volume and peak discharge rate.

Designated Uses: Classification given to water bodies by the state Environmental Protection Agency that describes the water quality conditions. Designated uses take into consideration the use and value of a water body for: public water supply, propagation of fish, shellfish, and wildlife, and recreational, agricultural, industrial, and navigational purposes. In Illinois, water bodies designated uses are: general use, public and food processing water supplies, secondary contact, and indigenous aquatic life. Water quality conditions are described in terms of the degree to which a water body attains its designated uses. The degrees of use are determined using physical, chemical, and biochemical data. These ratings are: "good", "fair", and "poor"; refer to these definitions.

Detention: Temporarily storing stormwater runoff, typically in a detention basin or reservoir, prior to gradually releasing the runoff into the receiving waters; the flowrate of stormwater exiting the detention area is typically controlled by a restricted outflow structure that limits the flowrate of water exiting the detention area.

Detention Time: The amount of time that stormwater is actually present in a detention facility.

Development: Any activity, excavation or fill, alteration, subdivision, change in land use, or practice, undertaken by private or public entities that affects the discharge of stormwater; or substantial improvement to any portion of a building in the flood plain. The term 'development' does not include maintenance of stormwater facilities.

Emergency Spillway: A channel used to safely convey flood discharges in excess of the capacity of the principal spillway.

Extended Detention: A stormwater design feature that provides for the detention and gradual release of a volume of water over a specified period of time to increase the settling of urban pollutants and to protect the channel from frequent flooding.

Fair: As it relates to the designated use of a water body, this rating indicates that the water quality of a stream, river, or lake has been impaired and therefore meets some, but not all, of its designated uses and the water body can partially support aquatic life.

Fecal Coliform: A common type of water-borne bacteria that is transported primarily through animal feces. Often is an indicator of other potentially serious water-borne viruses and parasites.

Filter Fabric: A temporary barrier of permeable fabric designed to intercept and slow the flow of sediment-laden stormwater runoff; traps sediment and sediment bound pollutants while allowing the stormwater runoff to permeate through the fabric.

First Flush: The initial amount of runoff from a storm event which flushes a disproportionate amount of pollutants from impervious areas. The first flush is used to size infiltration facilities and is considered the first half-inch of runoff for water quality purposes.

Flood Plain: The area typically adjacent to and including a body of water where ground surface elevations are at or below a specified flood elevation.

Floodway: The channel and that portion of the flood plain adjacent to a stream or watercourse that is needed to convey the base flood.

General Use: Standard set by the EPA for a body of water to protect aquatic life, wildlife, agriculture, and most industrial uses and ensure the aesthetic quality of the State's aquatic environment.

Good: As it relates to the designated use of a water body, this rating indicates that the water quality of a stream, river, or lake meets the needs of all designated uses and the water body can fully support aquatic life.

Illicit Discharge: Any discharge to a municipal separate storm sewer system that is not composed entirely of storm water, with some exceptions. These exceptions include discharges from NPDES-permitted industrial sources and discharges from fire-fighting activities.

Impervious Surface: Land area that has been altered so that the permeability of the surface is decreased to the extent that it does not readily absorb or retain water, generating surface runoff even during small rainfall events; most stormwater runs off rather than infiltrating.

Infiltration: The gradual, downward movement of water from the surface into the subsoil by entering, permeating, or passing through the pore space of the soil in response to the pull of gravity.

Infiltration Rate: The rate at which a land surface or soil surface can absorb rainfall. It is a dynamic phenomenon subject to change with time and prevailing conditions.

Level Spreader: A device used to spread out stormwater runoff uniformly over the ground surface as sheet flow. The purpose of a level spreader is to prevent concentrated, erosive flows from occurring thereby increasing the potential for infiltration.

National Pollutant Discharge Elimination System (NPDES) Phase II Permit: Permitting program set up by the Clean Water Act to regulate stormwater discharges from small municipal separate storm sewer systems and small construction sites.

Non-point Source Pollution (NPS): Pollution that typically arises over an extensive area of land from many diffuse sources. Non-point source pollution enters the receiving waters in a diffuse manner at intermittent intervals that are typically related to meteorological events when rainfall or snowmelt, moving over the ground, picks up and transports natural and man-made pollutants that are present at or near the land surface. The most important pollutants from non-

point sources subject to management and control measures are suspended solids, nutrients, and toxic compounds.

Nutrients: Elements or substances, such as nitrogen and phosphorus, that are necessary for plant growth. Large amounts of these substances entering into water bodies can create a nuisance by promoting excessive plant and algal growth which can lead to eutrophic conditions.

Outfall: The point, location, or structure where stormwater runoff discharges from a stormwater facility to a receiving body of water.

Peak Flow/Discharge: The maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event.

Permeable: Having pores or openings that permit liquids or gases to pass through.

Point Source Pollution: Pollution that enters the receiving waters at a discernable single or multi-point location that can usually be measured. Major point sources include but are not limited to municipal wastewater effluents, runoff from solid waste disposal sites, combined sewer overflows, etc.

Poor: As it relates to the designated use of a water body, this rating indicates that the water quality of a stream, river, or lake is severely impaired and the water body cannot support aquatic life to any degree.

Retention: Storing stormwater runoff in a natural or man-made depressional area without an outlet structure to allow for the release of stormwater runoff from the area. Runoff exits retention areas through infiltration and evapotranspiration.

Recharge: Replenishment of groundwater reservoirs by infiltration through permeable soils.

Retrofit: A stormwater best management practice installed after development has occurred to improve water quality and meet other watershed restoration objectives.

Riparian: Land bordering a special management area that provides habitat or unique amenities dependant on the proximity to water. The riparian boundary is generally defined by the maximum water surface elevation of the 100-year storm.

Riprap: Stone of a nominal diameter between 6-inches and 24-inches often placed in areas of high velocity flow to prevent erosion of the underlying soil particles.

Riser: A vertical pipe extending from the bottom of a pond BMP that is used to control the discharge rate from a BMP for a specified design storm.

Secondary Contact: Standard set by the EPA to identify waters that are not suited for general use activities but which will be appropriate for all secondary contact activities (boat traffic).

Sedimentation: The action or process of depositing sediment. Heavier suspended materials settle to the bottom of a water body as the water's velocity decreases. The heavier materials settle out first while lighter materials may take more time and/or slower velocities.

Sediment Forebay: Stormwater design feature that employ the use of a small settling basin to settle out incoming sediments before they are delivered to a stormwater BMP.

Siltation: To become choked, filled, covered, or obstructed with silt or mud.

Special Management Area: Regulatory flood plains, wetlands, and riparian areas as defined in the DuPage Countywide Stormwater and Flood Plain Ordinance.

Streambank Stabilization: The use of best management practices and/or bioengineering methods to minimize streambank erosion by reducing shear stress on the streambank and increasing the stability of the streambank.

Total Maximum Daily Load (TMDL): A calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. It is the total of the allowable loads of a single pollutant from all contributing point and non-point sources, and includes a margin of safety and consideration of seasonal variations.

Urban Runoff: Surface runoff originating from an urban drainage area including streets, parking lots, and roof tops.

Water Quality Volume: The volume equal to the first half-inch of stormwater runoff from the total impervious areas of a development site.

Weir: A barrier placed in a channel to constrict flow and cause it to fall over a crest. The flowrate over the crest during rainfall events can be regulated by shaping the weir opening to give the desired head-discharge relationship.

Wetland: Area where the soil is saturated by surface or ground water at a frequency and duration sufficient to support plants and/or animals that have adapted to persistent wet conditions. Wetlands are further defined in Article 10 of the DuPage Countywide Stormwater and Flood Plain Ordinance.

LIST OF ABBREVIATIONS

BMPs: Best Management Practices

BOD: Biochemical Oxygen Demand

CFDA: Catalog of Federal Domestic Assistance

CSOs: Combined Sewer Overflows

CWA: Clean Water Act

DPC: DuPage County

DPCSFPO: DuPage County Stormwater and Flood Plain Ordinance

DPCSMP: DuPage County Stormwater Management Plan

EPA: [US] Environmental Protection Agency

IDOT: Illinois Department of Transportation

IEPA: Illinois Environmental Protection Agency

ISTEA: Intermodal Surface Transportation Efficiency Act

MS4s: Municipal Separate Storm Sewer Systems

NA: Not Applicable/Available

NIPC: Northeastern Illinois Planning Commission

NPDES: National Pollutant Discharge Elimination System

NPS: Non-point Source Pollution

NRCS: Natural Resource Conservation Service

SFPO: [DuPage County] Stormwater and Flood Plain Ordinance

SMP: [DuPage County] Stormwater Management Plan

SSOs: Sanitary Sewer Overflows

RGS: Resources for Global Sustainability

TMDL: Total Maximum Daily Load

USDA: United States Department of Agriculture

USDI: United States Department of Interior

US EPA: United States Environmental Protection Agency

WQIs: Water Quality Inlets

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EXECUTIVE SUMMARY

Through the development of the DuPage County Stormwater Management Plan (SMP) in 1989 and with federal regulations pending for new water quality programs, DuPage County has taken the initiative and created a comprehensive approach to water quality management in Appendix J of the SMP, "Water Quality Enhancement". Appendix J is the platform for addressing water quality in DuPage County with respect to non-point source pollution control. This document is not a regulatory document, but is DuPage County's water quality management vision, incorporating the hard work and determination of many different groups, organizations, committees, and stakeholders from across DuPage County and the State of Illinois.

The SMP provides a clear goal of water quality for DuPage County and has specific action items supporting the development of that goal. These items have become the primary focus of Appendix J and provide the outline for this document. Secondary goals of Appendix J target federal programs and the County's administration of water quality funds.

Only by looking at the history of water quality, state and federal regulations, and the current condition of DuPage County's lakes, rivers, and streams, can a system for improving water quality be properly addressed. This system, the "Three-Tiered Approach," not only addresses the water quality impairments found in the "Existing Conditions," but also meets the minimum requirements of the National Pollutant Discharge Elimination System (NPDES) Phase II and the Total Maximum Daily Load (TMDL) programs. This system is based on a belief that many non-point source problems are best addressed through the cooperation of the state, county, municipalities, and ultimately, the public-at-large. ***The Three-Tiered Approach assigns water quality responsibilities, with each increasing tier representing an increasing level of governmental involvement.*** It is important to understand that the specific conditions of each activity or issue will determine what level or levels of governmental involvement that are necessary to achieve and maintain compliance.

- ***Tier One*** represents the lowest level of government involvement with a "self-determined" approach to implementation and is based on expected and enhanced good behavior with regards to water quality issues. This section also determines distinct responsibilities for both public individuals and government agencies with the intent of reducing as much pollution as possible generated by their own activities.

- ***Tier Two*** involves more governmental influence through encouragement and requirement of water quality Best Management Practices (BMPs) within development, redevelopment, and retrofitting. Through the permitting process, DuPage County can propose areas of water quality improvement as needed in the SMP Appendices L through Q – the Watershed Management Plans.

- ***Tier Three*** is presented as the highest level of government involvement through the enforcement of Tiers One and Two. It is to be used when all else fails to remedy a water quality impairment/issue and legal action is needed.

The integrity of Appendix J and the effectiveness of the "Three-Tiered Approach" need to be assessed during its implementation through monitoring. It is uncertain at this point the degree of monitoring that will be needed to properly assess the effectiveness of Appendix J, but some form of monitoring will be needed. A thorough explanation justifying monitoring as well as suggestions of monitoring practices is examined in "Water Quality Monitoring."

To perform any water quality work requires capital expenditures. Projects involving creation of wetlands, streambank stabilization, low water quality infrastructure removal, habitat enhancement, public water quality education or awareness, monitoring, and water quality maintenance all require dedicated funding, as described in "Capital Requirements". There are many supplemental funding sources for water quality improvement activities, but nearly all such sources require local funding as a match.

INTRODUCTION

Water quality enhancement is important to maintain an effective stormwater drainage system and to preserve the natural characteristics and integrity of riparian lands. These attributes promote the value of adjacent properties and surrounding communities because they provide stable flood protection, healthy aquatic and riparian environments, and aesthetic and recreational opportunities. DuPage County views water quality enhancements as being any significant improvement of current water quality conditions through structural and non-structural best management practices.

High population densities, as experienced in Chicago and its surrounding counties, place considerable stress on the drainage systems and aquatic environment. Channelized streams and rivers with denuded banks are a common sight in urban settings, severely eroding upstream properties, and depositing sediment in low flow areas. Storm drainage systems in urban areas are rarely constructed to filter out sediments and pollutants before entering the system, where water is then conveyed directly to the river. The more populous an area, the more work that is needed to assure that the drainage system does not adversely affect the water quality.

DuPage County water quality, as discussed in this appendix, involves several other appendices, such as Appendix E – The Stormwater and Flood Plain Technical Guidance Document, Appendix F – The DuPage County Stormwater and Flood plain Ordinance, and Appendices L-Q – the individual DuPage County Watershed Plans.

National and DuPage County Water Quality History

The Clean Water Act (CWA) of 1972 had the primary objective to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental national goals:

- Eliminate the discharge of pollutants into the nation's waters, and
- Achieve water quality levels that are fishable / swimmable.

The Clean Water Act focuses on improving the quality of the nation's waters. It provides a comprehensive framework of standards, technical tools, and financial assistance to address many of the causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. For example, the Clean Water Act:

- Requires major industries and municipal wastewater treatment facilities to meet performance standards to ensure pollution control;
- Charges states and tribes with setting specific water quality criteria appropriate for their waters and developing pollution control programs to meet them;
- Provides funding to states and communities to help them meet their clean water infrastructure needs;

- Protects valuable wetlands and other aquatic habitats through a permitting process that ensures development and other activities are conducted in an environmentally sound manner.

As a result of two significant flood events along Salt Creek and the Des Plaines River in 1986 and 1987, legislation was drafted to authorize a planning body for stormwater management in the six collar counties that surround Chicago. As a result of this legislation, DuPage County's Stormwater Management Committee was formed and a funding mechanism was put into place for stormwater planning activities.

Since the adoption of the DuPage County Stormwater Management Plan in 1989, DuPage County has made great improvements in controlling site runoff from new development, preserving flood plain storage, mitigating impacted wetland areas, and developing more accurate flood plain maps. Much of the work that has been done focused on quantity control, but acknowledgements of water quality-related goals are taking shape. As DuPage County investigates the importance of water quality in its watersheds, it is increasingly apparent that the relationship between water quality and quantity is deeply intertwined and is one that would be very difficult to separate.

On April 5, 1994, DuPage County instituted the Countywide Buyout Plan, approved by the Stormwater Management Committee. The goal of this program is to buyout flood damaged structures that meet the County buyout criteria, provided that funds are available. The buyout program has an added benefit to water quality, as many of these buyout-eligible structures are located in the flood plain. The removal of structures in the flood plain will improve wetland and riparian areas, further increasing the potential to remove pollutants of concern. Individuals owning residential structures in flood prone areas whom are interested in the buyout program must voluntarily submit to the County for eligibility. Before being approved for buyout by the County, residential structures must demonstrate eligibility according to the provisions of the plan. The program has already found nearly one hundred residences eligible for buyout in watersheds with approved watershed management plans.

Since 1995, the DuPage County Streambank Stabilization Program, an offshoot of the County's Stream Maintenance Program, has offered design assistance to any individual or group for streambank stabilization projects in which bioengineering solutions were used. This program was initially developed with water quantity intent, as sediment washed from eroded banks and carried in floodwaters could cause significant sedimentation problems in flood control structures. However, the Streambank Stabilization Program is equally a water quality improvement program by providing such benefits as reducing water turbidity, filtering out some non-point source pollutants, and creating a habitat suitable for more aquatic life. In the year 2000, the Stormwater Management Committee officially renamed the Streambank Stabilization Program "The Water Quality Improvement Program", thus including greater diversity in water quality-based projects such as wetland creation and storm sewer daylighting.

Increasing public awareness with regards to water quality concerns and impending federal water quality regulations have resulted in the formation of non-for profit groups such as The Conservation Foundation, the Lower Des Plaines River Alliance, and the Salt Creek Watershed

Network. These groups have already made headway in their respective watershed areas by setting water quality goals and determining the proper methods of attaining those goals. It is DuPage County's intent to always work with this concerned citizen base.

Statement of Purpose

The primary goal of the DuPage County Stormwater Management Plan's Appendix J is to address the water quality impacts of stormwater management practices in DuPage County through:

- Summarizing the current status of water quality in DuPage County lakes and streams,
- Describing how stormwater management practices probably affect that quality,
- Making recommendations for practice modifications to reduce adverse impacts of stormwater management, and
- Where feasible, further enhancing water quality.

The secondary goals of the DuPage County Stormwater Management Plan's Appendix J are:

- To establish a mechanism through which DuPage County water quality project funds can be prioritized and administered, and
- To create a format that focuses on non-point source pollution and will be cohesive with the National Pollutant Discharge Elimination System (NPDES) Phase II permitting process and the Total Maximum Daily Load (TMDL) program.

Appendix J's Relationship to the Stormwater Management Plan

Three of the six objectives found in the DuPage County Stormwater Management Plan are water quality based and should, where possible, be incorporated into development, re-development, and retrofitting projects:

- Protect and enhance the quality, quantity, and availability of surface and groundwater resources,
- Preserve and enhance existing aquatic and riparian environments and encourage restoration of degraded areas, and
- Control sediment and erosion in and from drainageways, developments, and construction sites.

Several policies based on the given water quality objectives have been adopted by DuPage County:

- Require design and evaluation of each site's runoff control plan consistent with watershed capacities,

- Restrict future development in flood plain to facilities that will not adversely affect flood damage potential or wetland environments, and prohibit development in the floodway unless it involves facilities that enhance flood protection,
- Require preservation of wetlands to maintain their natural flood control and environmental benefits,
- Incorporate water quality and habitat protection measures in all stormwater management activities within DuPage County,
- Require regular, planned maintenance of all stormwater management facilities,
- Encourage control of stormwater quantity and quality at the most site-specific or local level,
- Define clearly the responsibilities and authorities of government entities having jurisdiction for stormwater or floodwater control within DuPage County,
- Require cooperation and consistency in stormwater management activities within and between the government entities having stormwater jurisdiction,
- Require strict compliance and enforcement of the stormwater management policies and their implementing regulations,
- Foster the use of simple technologies wherever appropriate and realistic, but demand use of more sophisticated techniques where necessary, to ensure the adequacy of the stormwater controls,
- Select cost-effective methods of achieving stormwater management activities, and
- Estimate costs of stormwater management recommendations and identify appropriate revenue sources before their adoption.

Appendix J's Relationship to Other Stormwater Management Plan Appendices

Other DuPage County Appendices contain guidelines that contribute to improving water quality through erosion control, flood plain regulations, and wetland protection. These appendices detail practices that enhance water quality for land development, drainage, and stormwater management projects. Some or all of the following documents will need to be changed to incorporate the suggestions presented in this document.

Appendix F – DuPage County Countywide Stormwater and Flood Plain Ordinance

Appendix J offers guidance on how the County and its municipalities should manage its water quality. Appendix J creates the framework for the County to act on behalf of water quality protection and enhancement. It is through Appendix F, the Stormwater and Flood Plain Ordinance, where this approach becomes a regulatory reality. Even though Appendix J makes more suggestions than are currently provided for in the Stormwater and Flood Plain Ordinance, it is through this ordinance where all development affecting surface waters is regulated. Without Appendix F's regulatory enforcement, many of Appendix J's goals are unobtainable ideals.

Appendix E – DuPage County Technical Guidance to the Stormwater and Flood Plain Ordinance

Appendix E supports the Ordinance (Appendix F) with all the technical documentation regarding development in the flood plain, stormwater detention, and riparian and wetland protection. Appendix J includes some technical items regarding structural best management practices (BMPs), which will be duplicated in Appendix E to be further expanded. No regulatory technical guidance shall be permitted from Appendix J; only the technical guidance for BMPs written in Appendix E shall be used in the permit process. Since this document supports the Stormwater and Flood Plain Ordinance, it will not include Appendix J information regarding the NPDES permitting process or the best management practices encouraged on a non-regulatory level.

Appendices L-Q – DuPage County Watershed Plans

The continued development of DuPage County's watershed plans will incorporate a summary of potential water quality projects. This may take into account water quality sampling data, streambank erosion problems that should be addressed, and any other source of water quality impairment.

Appendix J's Relationship to Other DuPage County Ordinances

There are several ordinances that enable DuPage County and its municipalities to affect water quality enhancements throughout the conception, planning, and construction stages of development. Zoning, building, stormwater and flood plain, health, transportation, and municipal waiver ordinances all influence the product that is development. Appendix J is directly linked to the DuPage County Stormwater and Flood Plain Ordinance through the DuPage County Stormwater Management Plan; all of these documents should be consistent and up-to-date. Likewise, this Appendix strongly recommends that other ordinances, such as zoning, building, and transportation ordinances, follow key principles found within this Appendix in order to protect water quality.

STATE & FEDERAL WATER QUALITY REGULATIONS AND STANDARDS

The standards for water quality set by DuPage County are never to conflict with current state or federal water quality legislation, but DuPage County reserves the right to set more restrictive standards than those established by the state or federal government. The following information details the current state and federal legislation dealing with water quality standards.

Illinois Water Quality Standards – Designated Uses

The Illinois Environmental Protection Agency's water quality program is designed to protect the "designated uses" of the water resources of Illinois. Designated uses take into consideration the use and value of the water body for public water supply; for propagation of fish, shellfish, and wildlife; and for recreational, agricultural, industrial, and navigational purposes. In Illinois, water bodies have been classified for a variety of designated uses that include: general use, public and food processing water supplies, secondary contact, and indigenous aquatic life. The water quality conditions of Illinois waters are described in terms of the degree to which the waters attain the designated uses. Water quality is rated as "good", "fair", or "poor". A "good" rating means a river or lake meets the needs of all designated uses. "Fair" means water quality has been impaired but meets the needs of its designated use most of the time. A water body that is rated as "poor" has severely impaired water quality and cannot support a designated use to any degree.

All Illinois rivers and streams are designated "general use", with the exception of the North Shore Channel, Sanitary and Ship Canal, Cal-Sag shipping lanes, and portions of the lower Des Plaines River, which are designated "secondary contact". Within the designation of "general use" certain quantifiable criteria must be met and maintained.

National Pollutant Discharge Elimination System (NPDES)

The National Pollutant Discharge Elimination System (NPDES) Program was established as the fundamental regulatory mechanism of the 1972 Clean Water Act (CWA), requiring all point sources discharging pollutants into waters of the United States to obtain a permit. This legislation initially targeted wastewater dischargers from private industries and discharges from municipal wastewater treatment facilities. The implementation of this permitting program along with federal funding under section 208 of the Clean Water Act for wastewater treatment plants has, in turn, resulted in tremendous improvement to the quality of water resources.

Several studies since the noted improvements resulting from the original NPDES program have shown that pollution from diffuse (non-point) sources – such as stormwater runoff from urban areas, agricultural areas, construction sites, land disposal, and resources extraction (mining) – are now the leading cause of water quality impairment. This prompted the 1987 Section 402(p) amendments to the Clean Water Act, requiring the Environmental Protection Agency (EPA) to

develop a comprehensive phased program to regulate stormwater discharges under the NPDES program.

National Pollutant Discharge Elimination System (NPDES) Phase I

The Phase I program created in 1990 addressed sources of stormwater runoff that had the greatest potential to negatively impact water quality. Under Phase I, the EPA required the NPDES permit coverage for stormwater discharges from:

- "Medium" and "large" Municipal Separate Storm Sewer Systems (MS4s) located in incorporated places or counties with populations of 100,000 or more; and
- Eleven categories of industrial activity, one of which is construction activity that disturbs five or more acres of land.

National Pollutant Discharge Elimination System (NPDES) Phase II

The EPA Administrator signed the NPDES Phase II rule on December 8, 1999, addressing stormwater discharges from:

- Construction activities disturbing less than five acres but more than or equal to one acre,
- "Light" industrial activities not exposed to stormwater,
- Municipal Separate Storm Sewer Systems (MS4s) located in urbanized areas not covered under Phase I, and
- Municipally owned industrial facilities that were addressed under Phase I but granted an extension under the Intermodal Surface Transportation Efficiency Act (ISTEA);

The permit submittal date for the NPDES Phase II regulated communities is March 8, 2003.

All municipalities, counties, and tribes with regulated MS4s must establish a stormwater management program that meets the requirements of six minimum control measures. These measures are:

- Public Education,
- Public involvement / participation,
- Illicit discharge detection and elimination,
- Construction site controls,
- Post-construction controls, and
- Pollution prevention / good housekeeping for municipal operations.

For each measure listed above, the NPDES permitting authority requires further definition. Each control measure is broken down into:

- Best Management Practices,
- Measurable goals,

- Implementation schedule,
- Responsible parties,
- Evaluation and assessment,
- Record keeping, and
- Annual Report.

Total Maximum Daily Loads (TMDLs)

Another program that was initiated through the Clean Water Act of 1972, Section 303, was the Total Maximum Daily Load program, causing states to identify lakes, rivers, and streams for which the local wastewater discharge limits are not stringent enough to achieve water quality standards. For each of these water bodies, a state is required to set a Total Maximum Daily Load (TMDL) of pollutants at a level necessary to ensure that applicable water quality standards can be attained and maintained. A TMDL is the sum total of the allowable loads of a single pollutant from all contributing point and non-point sources, including a margin of safety and consideration for seasonal variations. It also consists of the reduction needed to meet water quality standards and allocates the reductions throughout the sources in a watershed.

State non-point source management programs, as well as federal laws and requirements, state laws, and regional watershed management programs all have authority to implement TMDLs.

The East Branch DuPage River and Salt Creek watersheds are scheduled for year 2001 TMDL determination completion. The West Branch DuPage River has a year 2002 completion date. It is still unknown when or to what extent TMDLs will be enforced to control non-point source pollution. It is known that Illinois Environmental Protection Agency (IEPA) has made the goal of developing all TMDLs for Illinois and to have at least started the implementation plans by 2015. This goal is in the draft of the most recent Nonpoint Source Management Plan by IEPA and is contingent upon federal legislation. It is possible that the published TMDLs for the watersheds in DuPage County may change the NPDES Phase I and II permits to require more / less stringent requirements on discharges.

EXISTING CONDITIONS

The logical beginning for a water quality program is to address the current state of the water bodies. The present condition of streams, rivers, and lakes is the result of all past conditions. Water quality existing conditions are determined through a series of methodical steps: search for impacted areas in the waterbodies, find the pollutants responsible for such impacts, and eventually identify the source of such pollutants. Identifying the existing water quality conditions of water bodies will provide a measure for which future conditions can be compared, thus illustrating progress. Currently there are many existing studies and reports that are a sound basis for initially assessing water bodies.

Non-Point Source Impacts to Water Bodies

Non-point pollutants are a result of stormwater runoff that picks up and transports natural and man-made substances into receiving waters. Many factors contribute to water quality concerns in DuPage County lakes, rivers, and streams to include: combined sewer overflows and sanitary sewer overflows, failing septic systems, and upstream pollution. For the sources and impacts of these non-point pollutants see Table 1.

Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs)

Combined sewer systems are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. Most of the time combined sewer systems transport all of their wastewater to a sewage treatment plant, where it is treated and then discharged to a water body. During periods of heavy rainfall or snowmelt, however, the wastewater volume in a combined sewer system can exceed the capacity of the sewer system or treatment plant. For this reason, combined sewer systems are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, or other water bodies. These overflows, called combined sewer overflows (CSOs), not only contain stormwater, but also contain untreated human and industrial waste, toxic materials, and debris. These contaminants can elevate bacteria levels and reduce oxygen in the water, creating water conditions harmful to aquatic habitats, aquatic life, and humans.

Properly designed, operated, and maintained sanitary sewer systems are meant to collect and transport all of the sewage that flows into them to a publicly owned treatment works (POTW). However, occasional unintentional discharges of raw sewage from municipal sanitary sewers occur in almost every system. These types of discharges are called sanitary sewer overflows (SSOs). SSOs have a variety of causes, including but not limited to severe weather, improper system operation and maintenance, and vandalism. The untreated sewage from these overflows can contaminate our waters, causing serious water quality problems. It can also back-up into basements, causing property damage and threatening public health.

In DuPage County there have been extensive efforts to remove combined sewers and change those systems into separate sewer systems so that the adverse effects from CSOs will not pollute

rivers or streams. The separate sewer system utilizes water treatment facilities to treat the raw sewage for harmful contaminants before discharging to rivers and streams, but typically the stormwater sewer system discharges without treatment.

Table 1: Common Pollutants in Urban Runoff and Associated Impacts

Pollutant	Sources	Impacts
Solids (Suspended Sediment, Floatables, Dissolved Chloride, Sulfates)	Litter, road runoff, soil erosion from construction, streambanks, croplands and untreated sites; cleared vegetation, human & animal waste, vehicle fuels & fluids, vehicle wear, industrial/household chemicals, industrial processes, pool water discharged improperly, road salt used for de-icing, snow runoff	Increased turbity, reduced light penetration, impaired respiration for aquatic life, impairment of fishing resources, degradation of reefs, increased sedimentation, toxic to aquatic life, prevents vertical spring mixing
Biochemical Oxygen Demand	Decaying vegetation, excessive growth of vegetation; soil erosion, human & animal waste, road runoff, vehicle fuels & fluids, vehicle wear, industrial/household chemicals, industrial processes, pesticides	Kills aquatic life
Metals (Cadmium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Silver, Zinc)	Road runoff, tire wear, wear of clutch and brake linings; soil erosion, vehicle fuels & fluids, vehicle wear, industrial/household chemicals, industrial processes, paints, pesticides	Toxic to aquatic life, potential for ground water contamination, accumulates in fish and shellfish tissues that may be consumed by humans
Pathogens (Bacteria, Fecal Coliform)	Septic tank overflows/leaks/failures, illicit discharge from sanitary sewers into storm sewers, sanitary sewer overflows, untreated or inadequately treated sewage, animal waste	Unsafe conditions for human contact/swimming, closed beaches, contaminated ground and drinking water, shellfish bed closings
Oil (Oil, Grease, Fuels, Lubricants)	Industrial spills, runoff from streets, gas stations, & parking lots, improper disposal of used oil into storm drains, business districts, shopping centers, office parks, vehicle fuels & fluids, fuel combustion, industrial/household chemicals, industrial processes, paints	Kills aquatic life, builds up in sediment and remains for a long time
Nutrients (Nitrogen, Phosphorus)	Agriculture, improper composting and yard waste disposal, septic tanks, soil erosion, cleared vegetation, fertilizers, animal waste, fuel combustion, industrial/household chemicals, industrial processes, atmospheric deposition onto impervious surfaces that become runoff	Depressed dissolved oxygen levels, elevated phytoplankton populations, fish kills by hypoxia & anoxia, surface algal scum, water discoloration, release of toxins from sediments, decreased fisheries yields, may contaminate ground water, excessive plant growth
Nitrates (Fertilizers, Herbicides, Insecticides, Pesticides)	Improper or excessive use of lawn fertilizers, pesticides, agriculture	Algae blooms, fish kills

Failing Septic Systems

Septic systems can have numerous impacts on the quality of ground and surface water supplies. Improperly located or failing systems can discharge inadequately treated sewage that may pond on the ground and runoff into surface waters. Septic systems inappropriately located near groundwater can result in contamination of water supply wells. The wastewater and sewage that may be discharged from failing an on-site system will contain bacteria and viruses that present

problems for the health of both humans and aquatic organisms. Additionally, excess nitrogen and phosphorus present in discharges can cause algal blooms, which reduces available oxygen levels in the water and prevents sunlight from reaching desirable submerged aquatic vegetation.

There still remain many septic systems in use within DuPage County that have the potential to fail and cause impairments to nearby streams and rivers. Please refer to 'TIER ONE: SELF-DETERMINED BEST MANAGEMENT PRACTICES' for responsibilities concerning septic systems.

Upstream Pollution

It will be important to maintain a good relationship with the surrounding Counties to ensure that the water coming into DuPage County meets proper water quality standards. Likewise, the water leaving DuPage County must meet proper water quality standards.

Water Quality Studies

Water quality has been classified by the EPA as "good", "fair", or "poor", based on physical, chemical, and biochemical data, for determining which activities the water body can support. The assessment of water quality can employ several indices, such as the Index of Biotic Integrity, Invertebrate Community Index, Macro Invertebrate Biotic Index, Index of Well-Being, aquatic habitat, pollutant constituent indicators, and stream geometry. These indices are all capable of measuring how well a water body can support aquatic life. A "good" rating indicates that the water body can fully support aquatic life as well as meet the needs of all designated uses. "Fair" means that the water quality has been impaired and meets some, but not all, of its designated uses and indicates partial support of aquatic life. A water body that has been rated "poor" is severely impaired and cannot support aquatic life to any degree. Refer to the Illinois Water Quality Standards – Designated Uses section for information pertaining to designated uses of water resources.

The EPA Bureau of Water assesses rivers and streams on a two-year cycle to comply with the Clean Water Act 305(b) reporting requirements. As part of the 305(b) assessment, the Illinois Environmental Protection Agency (IEPA) differentiates and reports the use impairments from point sources only, non-point sources only, and both point and non-point sources. For every impaired water body on the 305(b) List, a further breakdown of the specific impairments is included in the 303(d) List. The 303(d) List reports the impaired water bodies by segments and their pollutants of concern. Please refer to the IEPA for the updated 303(d) List.

County Rivers and Streams

The IEPA Bureau of Water assessed 15,304 miles of rivers and streams in Illinois for the year 2000 water quality report. Of the assessed miles, 62.5 percent rated as "good", 36.1 percent rated as "fair", and 1.4 percent rated as "poor" for overall resource quality. The study reported that overall stream water quality has steadily improved over the past twenty-five years. The principal causes of impairment in Illinois' rivers and streams were found to be nutrients, habitat alterations, low dissolved oxygen, and siltation. Table two summarizes the 1998 303(d) List of pollutants concerning the rivers and streams in DuPage County.

Table 2: 303(d) List for Rivers and Streams in DuPage County

Watershed	Segment ID	Ammonia	Chlorine	Flow Alteration	Habitat Alterations	Low Dissolved Oxygen / Organic Enrichment	Metals	Nutrients	Pathogens	Salinity / Dissolved Solids / Chlorides	Siltation	Suspended Solids
Des Plaines River												
Des Plaines River ILG11	G03						X	**X**		X	X	
Des Plaines River ILG11	G18			X	X		X	**X**		X	X	
Addison Creek ILGLA01	GLA03			**X**	**X**	X		**X**	**X**	X	X	
Flagg Creek ILGK03	GK03		**X**		**X**	X	X	**X**	X	X		
East Branch DuPage River												
East Branch DuPage River ILGBL10	GBL02				X			**X**		**X**	X	
East Branch DuPage River ILGBL10	GBL05				**X**			**X**	X	**X**	X	
East Branch DuPage River ILGBL10	GBL08		**X**		**X**			**X**		**X**		
East Branch DuPage River ILGBL10	GBL10				**X**			**X**		**X**	X	
East Branch DuPage River ILGBL10	GBL11				**X**			**X**		X		
Lacey Creek ILGBL10	GBLC				X			X				
St. Joseph Creek ILGBL10	GBLB				X			X		X		
Salt Creek												
Salt Creek ILGL09	GL03					X	X	**X**	**X**	**X**	X	
Salt Creek ILGL09	GL09						X	**X**	**X**	X	X	
Salt Creek ILGL09	GL10							**X**	**X**	X		
Meacham Creek ILGL09	GLBA			X	X	X						
Spring Brook Creek ILGL09	GLB01			X	X	X	X	**X**	**X**	X		
West Branch DuPage River												
West Branch DuPage River ILGBK05	GBK05	X						**X**		X	X	
West Branch DuPage River ILGBK05	GBK07	X			X			**X**		X	X	
West Branch DuPage River ILGBK05	GBK09	X			**X**			**X**	**X**	X	X	
West Branch DuPage River ILGBK05	GBK11	X			X		X	**X**			X	
West Branch DuPage River ILGBK05	GBK12							**X**	X	X	X	X

Notes for Table 2: Bolded "X"s are "Threatened" or "High" pollutants of concern, as classified by the IEPA.

County Lakes

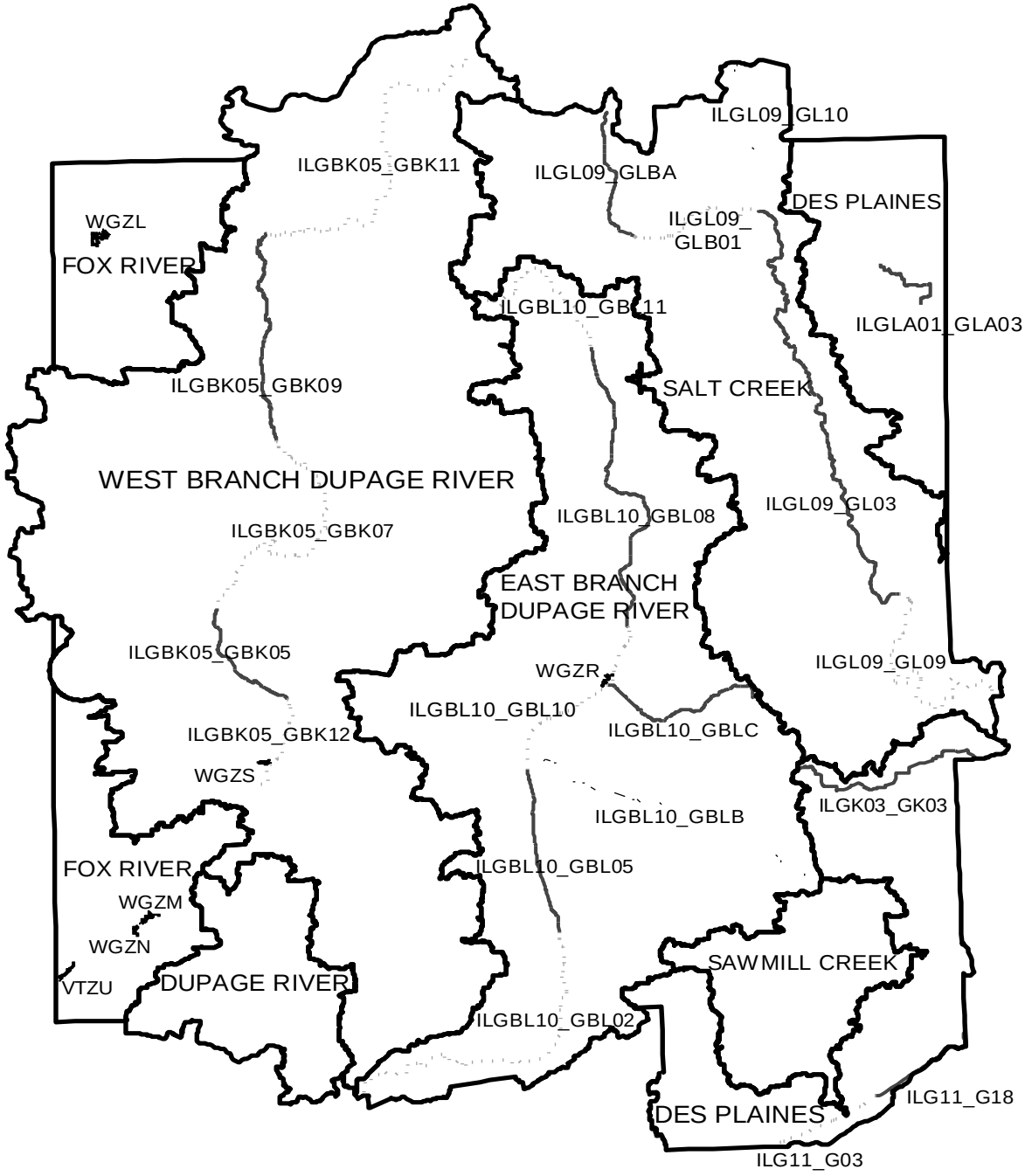
In addition to rivers and streams, the IEPA Bureau of Water also assessed 348 Illinois inland lakes totaling 154,795 acres. Lakes included in this assessment were publicly-owned lakes greater than twenty acres in size and non-public lakes in the Illinois EPA's Volunteer Lake Monitoring Program. Of the assessed lakes, 40.5 percent rated "good", 56.6 percent rated "fair", and 2.9 percent rated "poor" for overall resource quality. The study identified nutrients, siltation, and suspended solids as the principal causes of lake impairment. In 1995, a major effort to improve inland lakes in Illinois began with the passage of Conservation 2000, which provides monies to the IEPA to implement education, assistance, incentive, and monitoring programs for lake management. Table three summarizes the 1998 findings relevant to DuPage County's lakes. Lakes not shown in the table were not impaired by the IEPA's standards.

Table 3: 303(d) List for Lakes in DuPage County

Lake	ID	Dissolved Oxygen / Organic Enrichment	Noxious Aquatic Plants	Nutrients	Siltation	Suspended Solids
Hidden	WGZR	**X**	**X**	**X**	X	**X**
Mud	WGZS	**X**	**X**	**X**		**X**
Pickerel	WGZL	**X**	**X**	**X**	**X**	**X**
Spring	WGZM	**X**	**X**	**X**	**X**	**X**
Waubonsie	VTZU	X	X	X	X	**X**
Willow	WGZN	X	**X**	X	X	**X**

Notes for Table 3: Bolded "X"s are "Threatened" or "High" pollutants of concern, as classified by the IEPA.

Figure 1: DuPage County's Impaired Rivers, Streams, and Lakes



Notes for Figure 1:

- Highlighted segments are classified as "impaired" by the IEPA's 1998 303(d) List.
- Shading of highlighted segments does not represent any particular impairments or degree of impairments.

THE DUPAGE COUNTY THREE-TIERED APPROACH TO WATER QUALITY ENHANCEMENTS

Appendix J utilizes a Three-Tiered Approach to Water Quality responsibilities. Each increasing tier represents an increasing level of government involvement.

Elements of the Three-Tiered Approach

Through the "Three-Tiered Approach", the Stormwater Management Plan (SMP) recognizes that many non-point source problems are best addressed through the self-determined cooperation of stakeholders (Tier 1). However, non-point source water quality problems that cannot be effectively resolved through self-determined actions will need to be addressed through applicable regulatory programs and authorities (Tier 2 and Tier 3). If the severity of the non-point source pollution problem is great, enforcement actions may be enabled immediately.

All three tiers implement Best Management Practices (BMPs). BMPs include, but are not limited to, structural and nonstructural controls, as well as operation and maintenance procedures. BMPs can be applied before, during, and after pollution producing activities to reduce or eliminate the introduction of pollutants into receiving waters. BMPs are a means of achieving certain management measures.

It will be the responsibility of the County along with the cooperation of the municipalities to establish implementation schedules and measurable goals for each Tier, depending on the Best Management Practices selected to control water quality impairments.

Tier One: Self-Determined Best Management Practices

Tier One's water quality goal is to achieve as many water quality enhancements through the cooperation of the state, the county, the municipalities, and ultimately, the public-at-large. A "self-determined" or "voluntary" approach to the implementation of BMPs is central to the success of any water quality program. However, the Tier One approach is not only a voluntary choice, but also a mixture of accountability and distinct responsibility. For example, property owners may implement BMPs through their own initiative or self-determination, but a municipality does not have the voluntary choice to inspect or not to inspect its storm sewer systems for illegal connections. The concept of "self-determined" non-point source pollution control measures acknowledges the potential capability of landowners and resource managers to develop and implement workable solutions for non-point source pollution control, and affords them the opportunity to solve their own problems before more stringent regulatory actions are taken.

Self-determined implementation can be encouraged through education, financial assistance, technical assistance, and demonstration projects. A self-determined approach would take advantage of the expertise and incentives offered by a variety of existing local, state, and federal programs that are geared to promoting private actions that could have water quality benefits.

Tier Two: Regulatory Best Management Practices

In general, DuPage County cannot specify the exact manner of compliance with water quality standards, however the County is able to encourage the use of water quality BMPs within all development and redevelopment permits. DuPage County is able to indicate or suggest areas of needed water quality improvements in the SMP Appendices L through Q – the Watershed Management Plans. The Watershed Management Plans will not be able to get into detailed specifics about the design of water quality improvement measures, but will reinforce the need to install BMPs in these particular areas. Once permitted, the County and its municipalities are required to monitor the success of the BMP and act accordingly when BMP effectiveness is not sufficient.

Implementation of BMPs will normally include: (1) specific site conditions; (2) monitoring to ensure that practices are properly applied and are effective; (3) immediate mitigation of a problem where the practices are not effective (including regulatory action if necessary); and (4) improvement of an approved BMP or implementation of additional BMPs when needed to resolve a deficiency.

Tier Three: Enforcement

Tiers One and Two describe a system where the local government and the public educate each ~~an~~other, routinely perform certain housekeeping operations, and permit new construction, all to benefit and enhance water quality. However, without the ability to enforce these tiers, there is no certain way to guarantee that set water quality goals will be achievable. Ultimately, it is the decision of the elected officials to determine the importance of water quality issues in today's society and whether to enforce and set water quality standards.

To enforce water quality under established DuPage County regulations would not be difficult. The current DuPage County Stormwater and Flood Plain Ordinance (DPCSFPO), known as Appendix F of the Stormwater Management Plan, can very easily absorb both Tiers One and Two into the enforcement section, but effective enforcement will require a commitment of resources by the County.

TIER ONE: SELF-DETERMINED BEST MANAGEMENT PRACTICES

Tier One is based on expected and enhanced good behavior with regards to water quality issues: both on a public and government scale. This is the lowest level of government involvement.

Public Participation

Ultimately it is the responsibility of the local governing bodies to achieve proper water quality standards, but it is the individual residents that can most effectively influence the final results. It is critical to the success of the Stormwater Management Plan and specifically, water quality, that residents of DuPage County understand how their daily actions affect water quality. It is vital that each individual governing body take it upon themselves to educate individuals within their jurisdiction about the following impacts:

1) ***Lawn Maintenance*** – Apply little or no fertilizers and pesticides to lawns or use lawn clippings as a natural fertilizer. Plant native species of trees, shrubs, and groundcover. Properly maintain land that is adjacent to streams, lakes, ponds, and wetlands. Use lawns for absorbing runoff from roofs.

2) ***Proper Use of Household Chemicals*** – Properly dispose of yard waste, oil, antifreeze, pet waste, and other household wastes. Reduce the amount of salt used on driveways and walkways. Wash cars less frequently and on grassy areas using phosphate-free detergents or at commercial car washes.

3) ***Septic Systems*** – Inspect septic systems annually in addition to pumping them out regularly.

While all of the examples listed above are self-determined actions for the public-at-large, it should be noted that many of these impacts are enforceable through local ordinances or governmental agencies (i.e., IEPA, IDOT, and DuPage Health Department). Although small infractions may go unnoticed, it is the accumulation and neglect of these acts that lead to poor water quality. This ultimately will lead to: decreased property value, reduced flood protection, degraded aquatic and riparian environments, and lost aesthetic and recreational opportunities.

The public needs encouragement and reminders to act in a manner that will benefit water quality. Suggestions of activities to be encouraged and supported by the County and its municipalities for public water quality awareness are:

- Water Quality Public Education / Awareness Campaigns,
- Volunteer Water Quality Biological Monitoring,
- Adopt-A-Highway and Adopt-A-Stream programs,
- DuPage River Sweep,
- Storm Sewer Stenciling,
- DuPage County Solid Waste Reuse and Recycling newsletters,
- Signage describing water quality improvement projects, and

- Annual public meetings discussing the state of water quality in DuPage County.

Government Responsibility

As a public servant, government has the responsibility to: reduce as much pollution as possible originating from public facilities; maintain the infrastructure that supports pollutant removal; and provide assistance to parties participating in water quality enhancement. In addition to reducing the impacts listed in the public participation section and exploring water quality beneficial alternatives to common practices (i.e., roadway salt), it is imperative that the State, County, and its municipalities support Tier One in the following ways:

1) ***Good Housekeeping Measures*** –All State, DuPage County, municipal, and township Highways and Public Works departments must develop a schedule to perform regular street sweeping, catch basin cleaning, drainage swale mowing, stormwater basin/wetland maintenance, and leaf litter and brush pickup. These measures will reduce sediment, nutrient, and litter load on the stream systems.

2) ***Illicit Discharge Detection and Elimination*** – All storm sewer systems will require periodic checking for illicit discharges. Illicit discharges include illegal connections from sanitary sewer overflows or any other liquid that must be processed either through a septic field, sanitary treatment plant, or hazardous waste facility.

3) ***Best Management Practices Maintenance*** – All Best Management Practices (BMPs) require regular inspection and maintenance. Lack of routine maintenance may compromise the effectiveness of the BMP. BMPs require: replacing filters, gravel, and vegetation; dredging ponds; and updating educational programs. Water quality monitoring may be required to evaluate the effectiveness of BMPs; please refer to the 'WATER QUALITY MONITORING' section for more information.

4) ***Enhancements to Existing Stormwater Facilities*** – Any stormwater structure that conveys surface water may be voluntarily retrofitted with a number of Best Management Practices to improve water quality. Common enhancements include: converting conventional turf landscapes to native vegetation, stabilizing eroding and/or channelized streams and rivers, retrofitting stormwater detention basins, and converting storm sewers to open drainageways (storm sewer daylighting). Enhancements can be accomplished through many different forms of assistance provided by the County, i.e., cost sharing, technical guidance, or planning. Please refer to 'CAPITAL REQUIREMENTS' for financial assistance information.

Capital Considerations

Public education and awareness programs, good housekeeping measures, BMP maintenance, illicit discharge detection and elimination, and voluntary water quality enhancements will require dedicated sources of capital. This is further detailed in the 'CAPITAL REQUIREMENTS' section.

Table 4: Tier One Responsibilities

TIER ONE RESPONSIBILITIES Action	Responsible Parties State	County	Municipalities	Individuals
Water Quality Public Education/Awareness Programs				
Aim programs at those activities that pose the most significant sources of pollutants (automotive recyclers, developers/contractors, transportation facilities, heavy manufacturing, and the food industry).		X	X	
Educate municipalities, developers, landowners, and the public to better understand the relationship between water quality and land use.	X	X	X	
Educate private sector allies including lawn care companies and lawn and garden centers on proper landscaping practices and pesticide and fertilizer use.		X	X	
Educate streamside and pond shoreline landowners on appropriate preservation techniques, environmentally-friendly maintenance, and the use of native landscaping in buffers.		X	X	
Educate the public on the proper disposal of all household wastes.	X	X	X	
Encourage landscaping practices such as reducing soil compaction, using native plants, and reducing the excessive amount of pesticides, herbicides, and fertilizers used.	X	X	X	
Expand participation in volunteer programs, such as Illinois River Watch, DuPage River Care, Storm Drain Stenciling, River Sentinels, Biological Monitoring, Adopt-A-Stream, and River Sweep.		X	X	
Increase awareness of landowners on how yard management practices can affect water quality and the health of the watershed.		X	X	
Use neighborhood newspapers and direct mailings to target commercial, industrial, institutional entities, and homeowners.		X	X	
Good Housekeeping Measures				
Perform regular street sweeping, catch basin cleaning, drainage swale mowing, stormwater basin/wetland maintenance, pond/streamside maintenance, and leaf litter/brush pickup.	X	X	X	
Illicit Discharge Detection and Elimination				
Address all illicit discharge violations and summarize in reports.	X	X	X	
Create storm sewer system maps for each community.	X	X	X	
Identify and address Combined Sewer Overflow (CSO) and Sanitary Sewer Overflow (SSO) problem sites.		X	X	
Prepare a regular schedule to inspect all storm sewer systems and stormwater management facilities.		X	X	
Self-Determined Actions				
Apply little or no fertilizers and pesticides to lawns, or use slow-release fertilizers in the correct season.	X	X	X	X
Avoid using hoses and leaf-blowers near the storm drain.	X	X	X	X
Create a water quality monitoring program.		X		
Create measurable goals and an implementation plan for the water quality program.		X	X	
Develop a plan of action to protect existing high-quality wetlands and promote wetland restoration.		X		
Develop and implement a reference stream study to collect comparative data on hydrology, water quality, and aquatic life and to provide targets for improvement of the rivers and tributaries.	X	X		

Table 4: Tier One Responsibilities (Continued)

TIER ONE RESPONSIBILITIES (Continued) Action	Responsible Parties			
	State	County	Municipalities	Individuals
Self-Determined Actions (Continued)				
Identify opportunities to retrofit existing detention basins and storm water facilities to improve water quality in the watershed and identify willing participants, such as municipalities, homeowners' associations, and private entities.		X	X	
Inspect septic systems annually, pump them out regularly, and repair or correct any deficiencies as soon as possible.				X
Inventory all streambank and shoreline erosion sites in the watersheds and repair or correct deficiencies as soon as possible.		X	X	
Leave grass clippings on lawns as a natural fertilizer.	X	X	X	X
Maintain and monitor current BMPs such as buffers and swales.	X	X	X	X
Plant native species of trees, shrubs, and ground coverings.	X	X	X	X
Promote the Water Quality Improvement Program to replace existing infrastructures with better water quality Best Management Practices.	X	X	X	
Properly dispose of leaves, oil, anti-freeze, pet waste, and other household hazardous wastes.	X	X	X	X
Protect, maintain, and restore the land along the streams, lakes, ponds, and wetlands.	X	X	X	X
Reduce the amount of salt used on roadways and promote the use of alternate de-icing agents.	X	X	X	X
Support and participate in water quality education and volunteer programs.	X	X	X	X
Sweep driveways and walkways.	X	X	X	X
Use lawns for absorbing runoff from roofs.	X	X	X	X
Wash cars less frequently and on grassy areas using phosphate-free detergents or at commercial car wash facilities.	X	X	X	X

TIER TWO: REGULATORY BEST MANAGEMENT PRACTICES

Tier Two of the DuPage County water quality improvement approach increases the level of government involvement through the permitting process for all development. By introducing a steadfast approach to all development projects, in conjunction with referencing the most appropriate Best Management Practices (BMPs) for each project, the County and its municipalities will have an enormous impact on water quality.

New Development and Redevelopment Approach to Water Quality

Appendix J brings together those programs and ordinances influencing water quality in DuPage County, either directly or indirectly. One of the activities greatly influencing water quality is construction, including new and redevelopment. It should be noted that even though the County has been addressing sediment and erosion (SE) control in all development permits for several years, a goal of Appendix J is to go beyond standard SE control with better development BMPs and better enforcement.

DuPage County and its municipalities enable several ordinances during the conception, planning and construction stages of development. Zoning, building, stormwater and flood plain, health, and transportation ordinances all influence the product that is development. Appendix J is directly linked to the DuPage County Stormwater and Flood Plain Ordinance through the DuPage County Stormwater Management Plan and all of these documents should be unified and up-to-date. Likewise, this Appendix strongly recommends that other ordinances, such as zoning, building, and transportation ordinances, follow key principles found within this Appendix in order to protect water quality.

Using the Upper DuPage River Watershed Implementation Plan as established by the Conservation Foundation and the Strategic Plan for Water Resource Management as drafted by the Northeastern Illinois Planning Commission, Appendix J sets forth the following principles:

- ***Know the watershed in which you are working***. Before design, identify potentially critical water quality zones and determine activities that could influence water quality. Determine if the nearby water body is an impaired water body and if Total Maximum Daily Loads (TMDLs) have been or are being established for it.

- ***Incorporate as many Best Management Practices as possible both during and post-construction, to maximize pollutant reduction and runoff infiltration***. Water quality should be protected to the maximum extent practicable.

- ***Reduce the amount of impervious surfaces where practicable***. Consider the usage needs of the development and build to suit those needs. Estimation of needs based on little available data should be avoided.

- ***Educate the public and private sectors about the importance of water quality***. The public has the capability to enhance, or harm, the success of a project's water quality goals depending on the degree to which the public is educated about water quality.

- ***Encourage sustainable, low maintenance water quality improvement operations wherever practicable***. The ease to which water quality improvement areas can be maintained is essential to the overall success of the development.

Considerations for Best Management Practices

When implementing BMPs to improve water quality, there are many items to consider, such as design, maintenance, cost, and advantages. ***Structural Best Management Practices are site specific.*** Design is a key component for successful BMPs and needs to be determined by engineers and permit reviewers. While bioengineering techniques are preferred, it is acknowledged that harder, structural engineering measures may be required if the project's conditions warrant such measures.

BMP selection should be determined by: the type and density of development, the area available for the BMP, the receiving water body, the drainage area, the design life of the BMP, the design storm, the pollutants of concern, the pollutant removal rates, and volume reduction benefits. Some situations call for a combination of BMPs in succession to achieve desired results.

As more studies and reporting of BMPs effectiveness come about, better and more specific recommendations can be made. It is expected that inspections of water quality BMPs will be part of the permitting process. In some instances, due to the conditions of a project or a suggested BMP, the developer may be required to perform water quality monitoring. Please refer to the 'WATER QUALITY MONITORING' section of this document for more information. BMPs must be properly maintained in order to be effective in removing pollutants; therefore, it is essential to implement a maintenance schedule and arrange for the necessary upkeep funding.

Appendix E - Technical Guidance will be updated to include more individual BMP design details, maintenance practices, and costs, as well as an evaluation of BMPs that give greater emphasis to local conditions.

Best Management Practices

Certain types of development activity can take advantage of Best Management Practices (BMPs) to better maintain the quality of DuPage County watercourses. Citing the Urban Stormwater BMP guidance established by the Northeastern Illinois Planning Commission (NIPC) in 1993 and Storm Water Technology Fact Sheets from the U.S. Environmental Protection Agency (US EPA) Office of Water in 1999, the following is not a complete list of approved BMPs, but are recommended for use in any and all situations where considered practicable.

Filter Strips

General Description: Vegetated filter strips are used to convey sheet runoff from impervious surfaces, such as parking lots and rooftops, to drainage swales or other conveyance devices. A well-vegetated lawn, as well as buffer zones of native vegetation, can suit the purposes of stormwater filtering. Filter strips are the recommended means to achieve disconnection of impervious surfaces from storm sewers and channels.

BMP Effectiveness: The pollutant removal effectiveness of filter strips, relative to curb and gutter systems, is greatest for small runoff events. It is expected that ½ inch of rainfall will be immediately infiltrated in the filter strip. Effective pollutant removal for small events approaches 100%. Ultimate pollutant removal efficiency depends on the length and slope of the filter strip, the permeability of the soils, the tributary drainage area, the health and density of the vegetation, and on the prevention of concentrated flow through spreading of the flow through the filter strip. Pollutant removal will be lower for dissolved constituents.

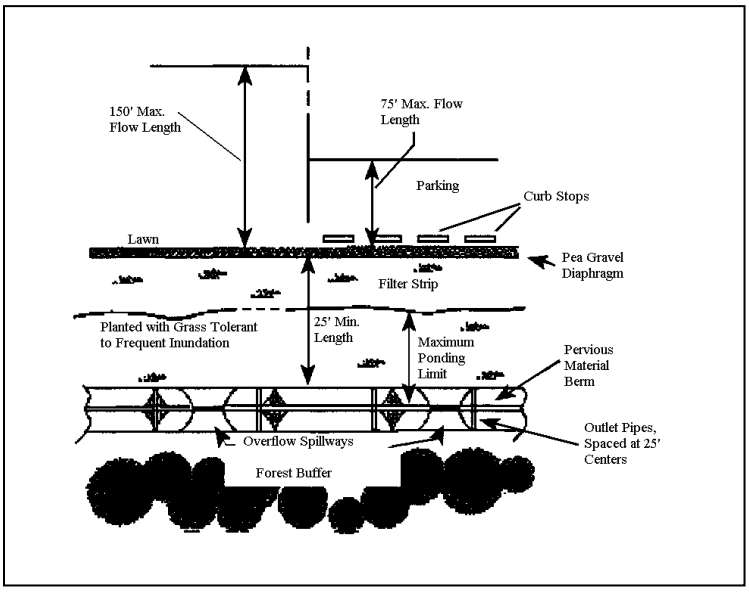


Figure 2: Filter Strip Example *Plan View*

BMP Suitability: In general, filter strips are used to disconnect or partially disconnect impervious areas. Filter strips are particularly well suited for residential developments and campus type commercial and industrial developments with slopes generally less than five percent. Slopes greater than five percent can utilize filter strips, but must contain deep-rooted vegetation. For optimal effectiveness, filter strips should drain relatively small tributary areas. Filter strips can be used for larger areas by interspersing filter strips between impervious surfaces.

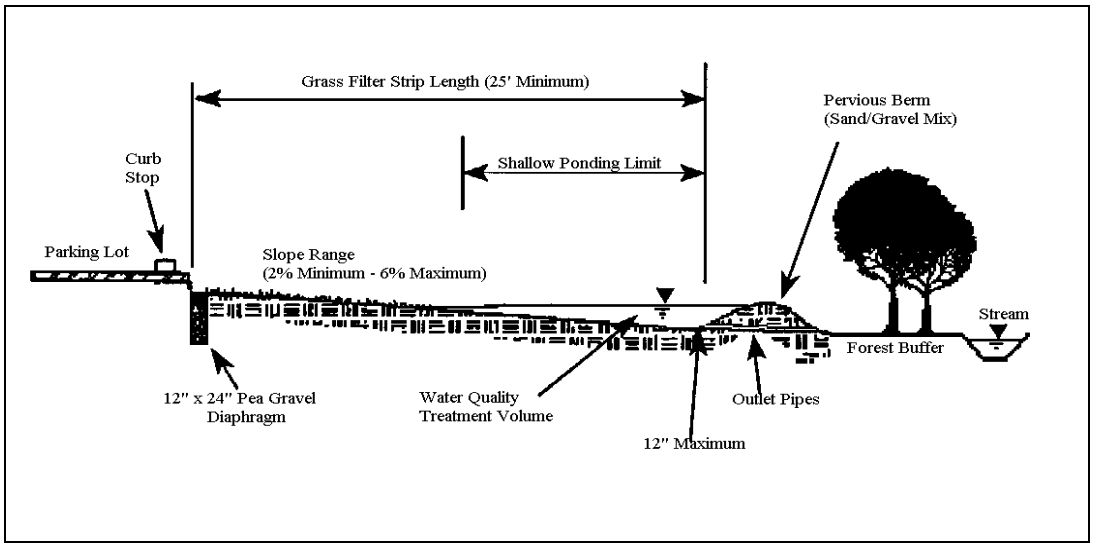


Figure 3: Filter Strip Example *Profile View*

Vegetated Swales

General Description: Vegetated swales are constructed open channel drainageways. Swales are used as an alternative to, or an enhancement of, conventional storm sewers. Swales vegetated with grass or other suitable vegetation are useful as both runoff conveyance facilities and as pollutant filtering and infiltration devices.

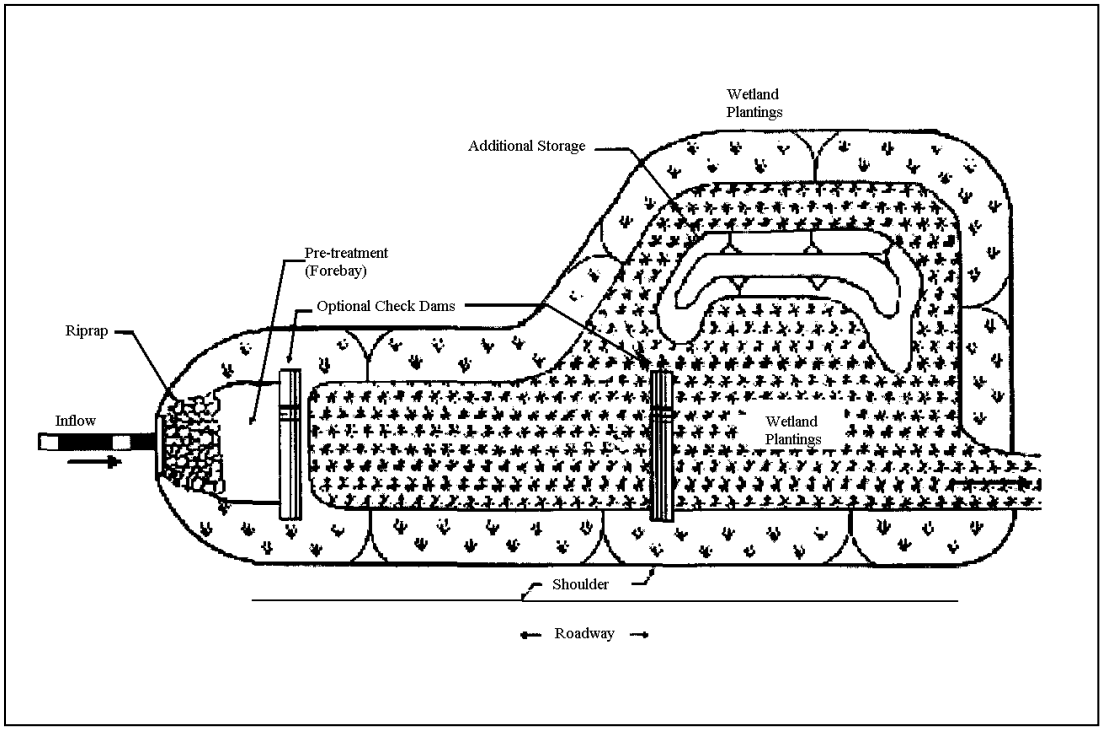


Figure 4: Vegetated Swale Example *Plan View*

BMP Effectiveness: In comparison with curb and gutter/storm sewer systems, vegetated swales have: lower peak runoff rates due to greater roughness, lower annual surface runoff volumes through infiltration, reduced "flashiness" in small storms that cause habitat disruption and bank erosion, and increased pollutant removal. The effectiveness of the swale for both runoff volume reduction and pollutant removal is a function of the drainage area, the level of imperviousness, the slope and cross-section of the swale, the permeability of the soils, and the density and type of vegetation in the swales. Removal rates for settleable solids and the pollutants attached to them may approach 70 percent for properly designed swales. Removal rates will be substantially reduced if the vegetation in the swale is not maintained or the sediment load is sufficiently high that it buries the vegetation and is readily resuspended during subsequent events.

BMP Suitability: Swales are suitable for many types of development, but are probably most practical on large lot residential sites and campus-type developments. They can be used as an alternative to conventional storm sewers along streets and highways, particularly in locations with few roadway or driveway crossings, and along back lot lines and property boundaries. Given the site constraints, constructed swales should be located to conform with and use natural drainageways.

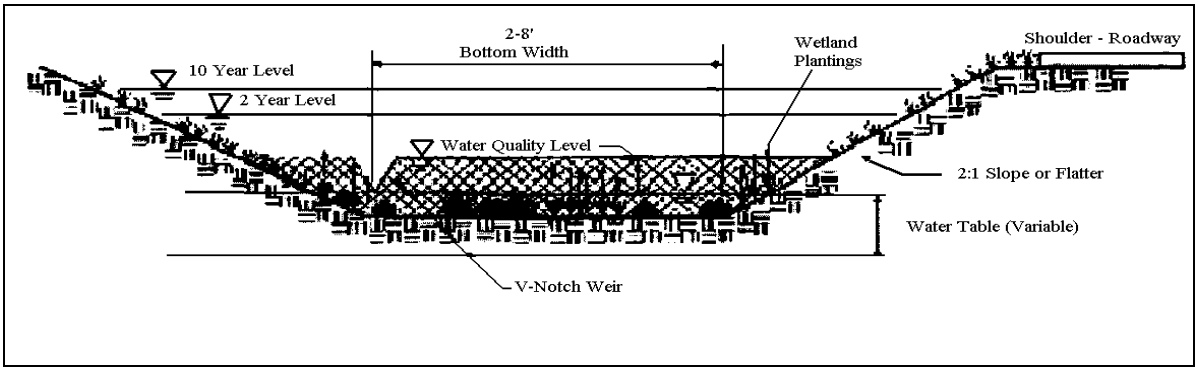


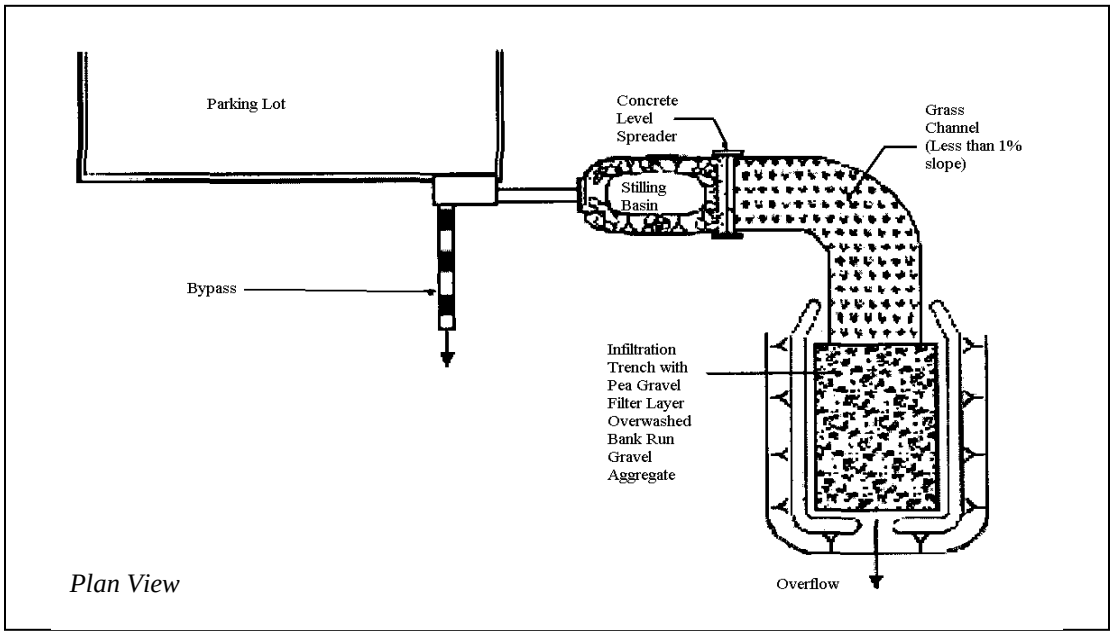
Figure 5: Vegetated Swale Example *Profile View*

Infiltration Devices

General Description: Infiltration devices are similar in concept to detention basins since they temporarily store and release runoff over time with the important difference being that infiltration devices discharge the runoff into the soil and ultimately to groundwater rather than surface waters. Infiltration basins are constructed surface depressions that look very much like detention basins except they only have an overflow outlet and no low flow outlet. The water in the basin below the crest of the overflow outlet drains from the basin through the bottom and sides.

BMP Effectiveness: Infiltration trenches and basins reduce surface runoff from all storms, up to the design storm, to zero thus decreasing both peak runoff rates and runoff volumes. Stormwater pollutant loadings to receiving waters are reduced by an amount proportional to the portion of

the annual runoff volume detained. Infiltration devices with sufficient capacity to contain the runoff volume from a 2-inch design rainfall can be expected to achieve approximately 90 percent removal of all pollutants in stormwater runoff. Based on experiences in other parts of the country, infiltration trenches and basins have the highest rate of failure of any non-mechanical BMP. The primary reason for failure of these devices is clogging due to inadequate control of sediment entering the device.



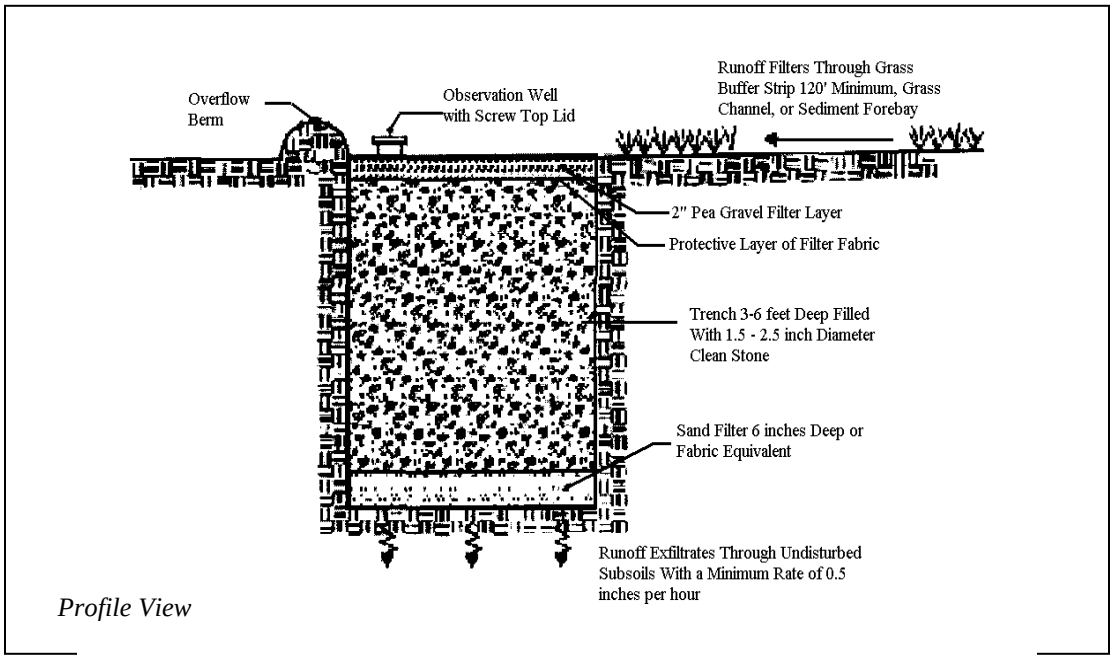
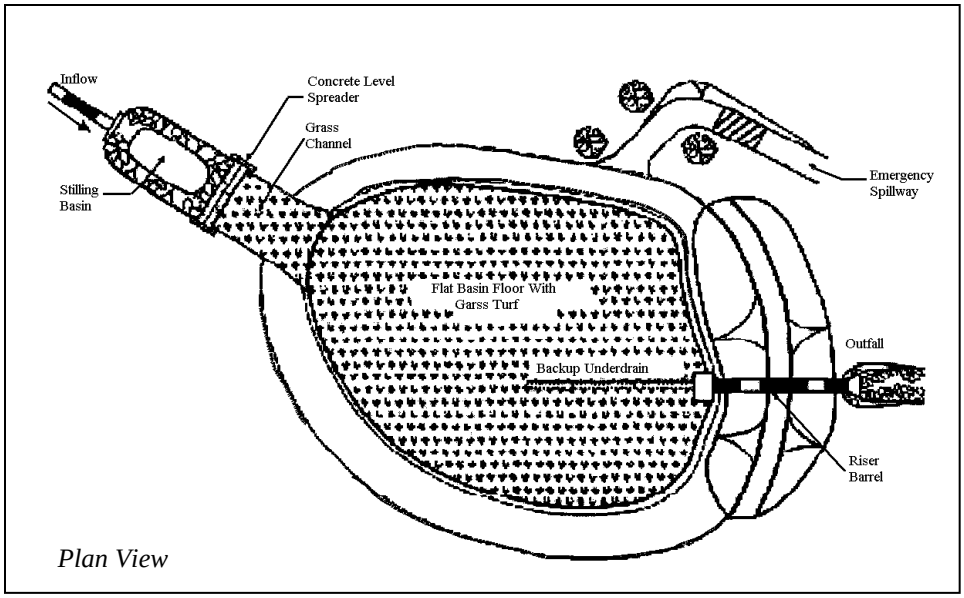


Figure 6: Infiltration Trench Example



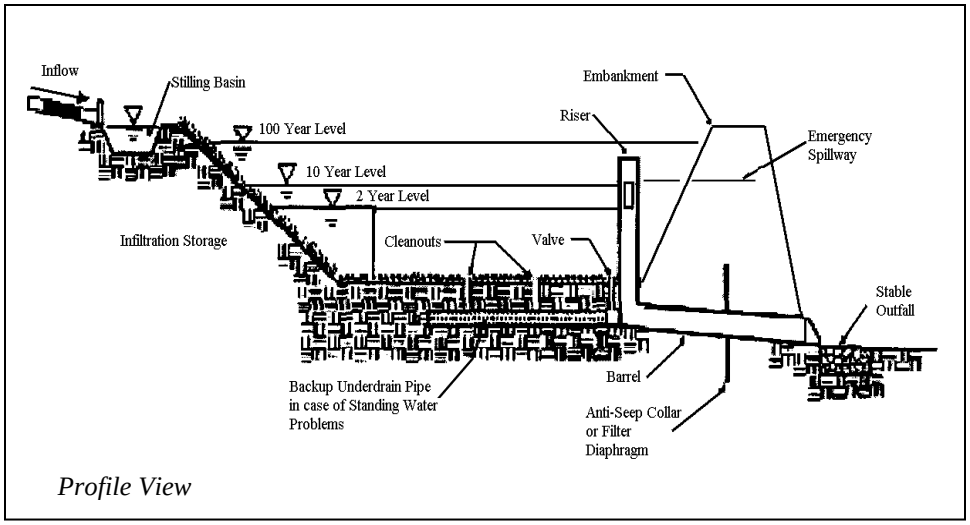


Figure 7: Infiltration Basin Example

BMP Suitability: Infiltration trenches are ideal for small drainage areas as complements to filter strips and swales. To avoid hydraulic overload, infiltration trenches are generally most appropriate for drainage areas less than 5 acres. Infiltration basins are appropriate for both large and small sites as an alternative or supplement to detention basins. Infiltration dry wells are appropriate for roof drainage since sediment loads from roof runoff and the resultant potential for clogging should be low.

Detention Basins

General Description: Detention basins are constructed depressions with outflow capacities sufficiently restricted to store stormwater and gradually release it to the downstream drainage system. For the purpose of controlling both quantity and quality, either wet detention basins or dry detention basins can be effective. To enhance pollutant removal and better stabilize discharge rates, it is recommended that extended detention times be provided for routine events.

BMP Effectiveness: Detention basins rely primarily on settling to remove pollutants. Additional removal can occur through biologic uptake and transformation by aquatic organisms and wetland vegetation. While dry detention basins may capture settleable solids through sedimentation, their effectiveness is substantially reduced by resuspension of previously settled material and by short-circuiting due to low flow channels and bypass pipes. Annual pollutant removal rates for dry bottom basins are generally very low (less than 30 percent for settleable solids and less than 5 percent for dissolved constituents).

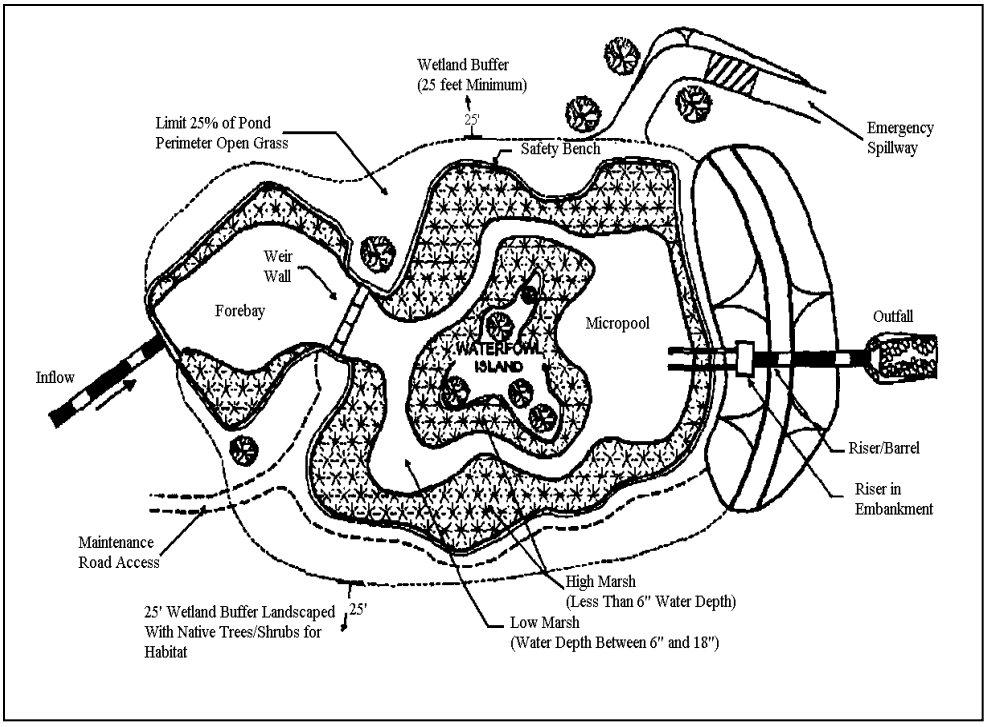


Figure 8: Wetland Detention Pond Example *Plan View*

Wet or wetland detention basins are much more effective in reducing pollutant loads than completely dry basins. Wet detention basins, because of the volume of the wet pool, have larger average detention times than dry ponds with a similar active storage volume. Furthermore, wet pools maintain a "seed" of active biota available to initiate biologic uptake of pollutants in storm-water remaining in the passive storage area. Annual sediment pollutant removal with a well designed, well maintained wet or partially wet detention basin may be 90 percent or greater in removal of dissolved nutrients; biochemical oxygen demand (BOD) may be as high as 60 percent.

BMP Suitability: Detention is a requirement under the DuPage County Stormwater and Flood Plain Ordinance for all development greater than 1 acre. Wet detention basins can be designed as lakes, they are ideal where the additional purposes of aesthetic enhancement, and water related recreation are desired. Extended dry basins that include a small permanent pool are ideal where more active recreational uses are desired. The upper level of the basin, which is not subject to frequent and extended inundation, can be developed as a recreational field.

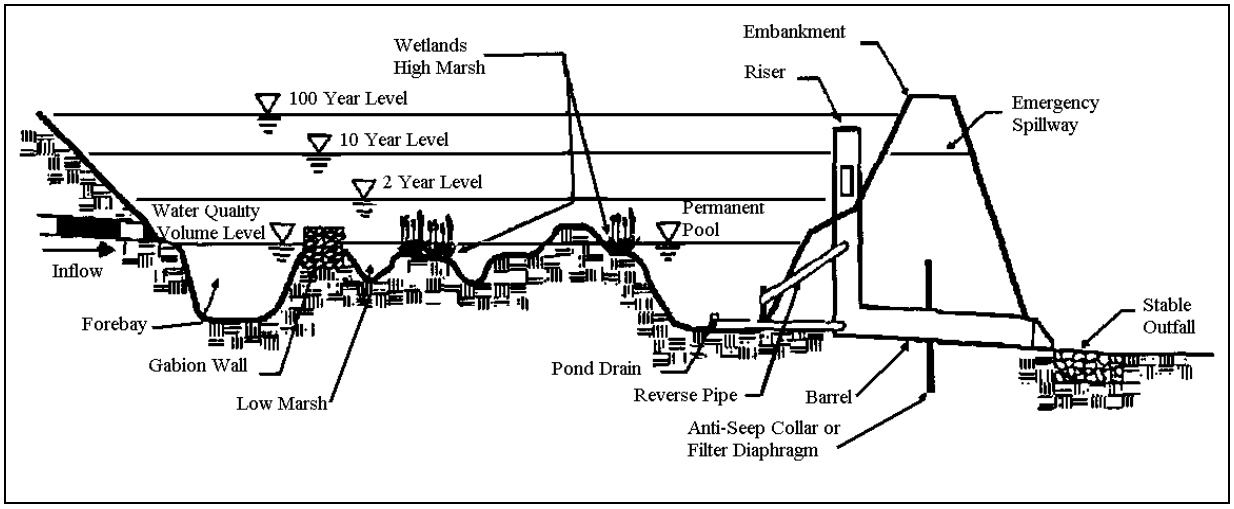


Figure 9: Wetland Detention Facility Example *Profile*

Settling Basins

General Description: Settling basins trap sediments in a location from which the sediments can readily be removed. They are usually more compact than detention basins. The primary purpose of settling basins is to capture settleable solids, provide velocity dissipation, and in some cases provide hydrologic stabilization. Settling basins protect downstream facilities from sedimentation and reduce costs for sediment removal.

BMP Effectiveness: Properly maintained settling basins are very effective at protecting downstream stormwater facilities and natural areas from sedimentation, debris clogging and scour. Between 50 and 90 percent settleable solid removal is expected. Most settling basins will be quite effective at removing large particulates and pollutants attached to them. Most settling basins will generally not be very effective at removing soluble pollutants since the primary pollutant removal mechanism is settling.

BMP Suitability: Settling basins should be considered at the entrance to most detention basins to accomplish both solids removal and velocity dissipation. Use of settling basins as pretreatment systems will reduce costs for future sediment and debris removal while maintaining the aesthetic appeal of the detention basin. Settling basins should virtually always be used as pretreatment for infiltration basins and for existing wetlands that will be receiving stormwater discharges from development, particularly if no other BMPs are being used. Settling basins also are recommended upstream of infiltration devices.

Porous Pavement

General Description: Porous pavement is a special type of pavement that allows rain and snowmelt to pass through it, and if properly maintained, filters out some pollutants. There are three types of porous pavement: porous asphalt, pervious concrete, and grass pavers. Common modifications in designing these systems are 1) varying the amount of storage in the stone reservoir beneath the pavement; 2) adding perforated pipes near the top of the reservoir to discharge excess stormwater after the reservoir has been filled; and 3) adding stormwater reservoirs (in addition to stone reservoirs) beneath the pavement to provide for infiltration through the underlying subsoil. Grass pavers are generally concrete grids with large openings that can support grass or other vegetation. Porous pavement can reduce the runoff generated by impervious surfaces and the need for curb and storm sewers.

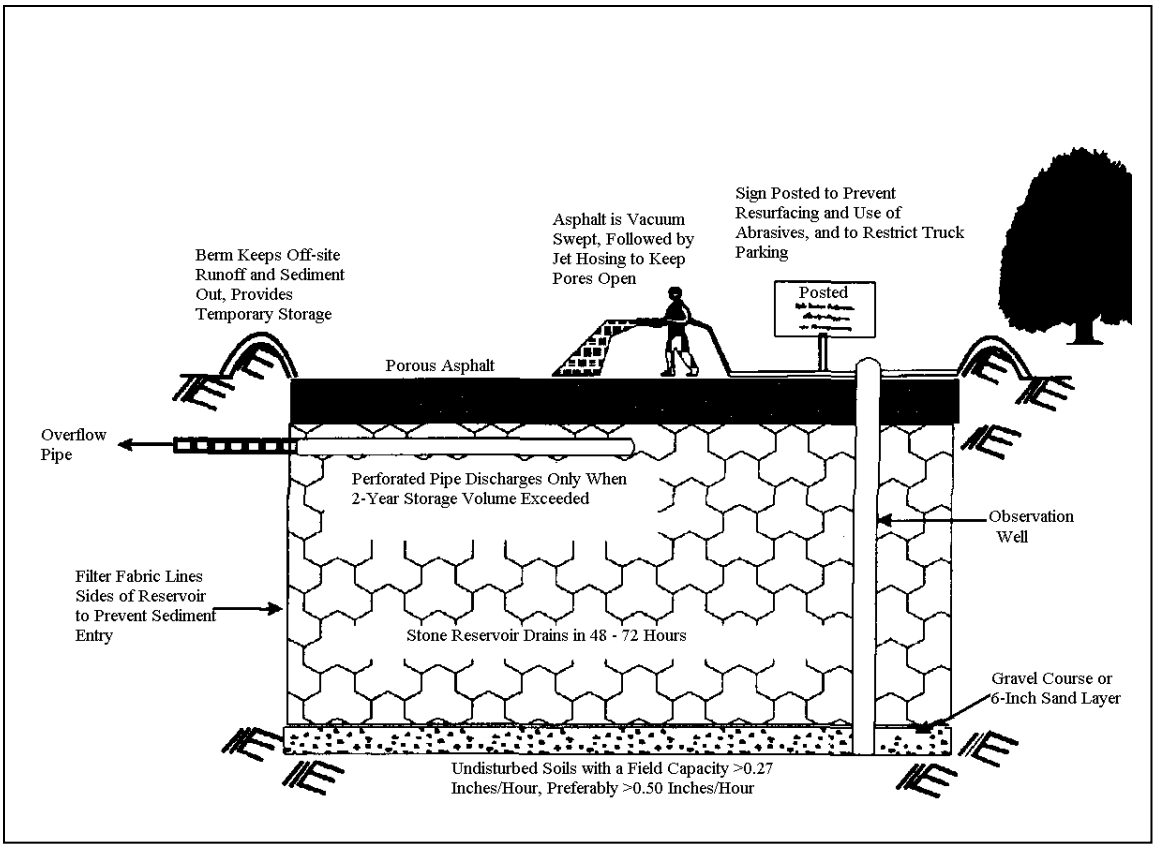


Figure 10: Porous Pavement Example *Profile View*

BMP Effectiveness: Depending on design and maintenance, porous pavement can remove 50 to 95 percent of suspended sediment, phosphorus, nitrogen, BOD, trace metals, and bacteria.

BMP Suitability: Porous pavement can be used in areas that have little or no slope, highly permeable soils, and low-intensity traffic. Porous pavement is not suitable for areas that have traffic of heavy vehicles, potential for chemical and oil leaks, and repeat snow removal including the use of de-icing chemicals and sand. As a BMP, porous pavement has a high rate of failure attributed to poor design, inadequate construction techniques, and unsuitable uses.

Media Filters

General Description: Media filters, also known as sand filters, consist of multiple chambers to remove pollutants. The first chamber removes floatables and heavy sediments, while the second chamber filters the run-off through a sand bed (or alternate material) to remove smaller pollutants. Media filters have a variety of different designs to accommodate for the site location (Delaware/perimeter, Austin, Denver, Washington, D.C., organic, and zeolite designs) and can be located above or below ground.

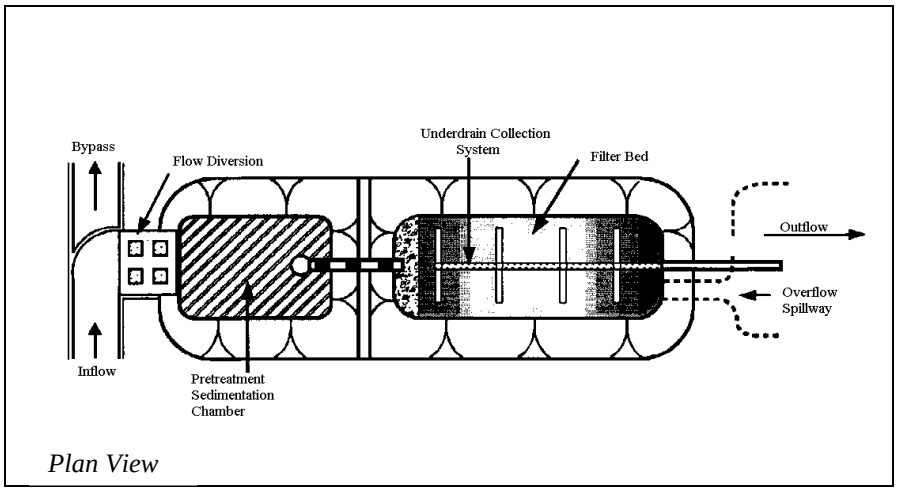


Figure 11: Surface Sand Filter Example

BMP Effectiveness: Most sand filters achieve high removal rates for sediment, BOD, and bacteria and moderate removal rates of metals, although the size, characteristics, and pollutant loading will determine the effectiveness of the system. Routine maintenance of the sand filter system to prevent sediment build-up from clogging the filter is absolutely necessary to sustain its effectiveness as a BMP. Since sand filters do not control stormwater flow, they do not prevent downstream streambank and channel erosion.

BMP Suitability: Sand filters are relatively small and can be used on highly developed sites as well as steep slopes. Different designs accommodate the drainage area and the quantity of runoff that can be treated. Climatic conditions may limit the filter's performance, although it is not known how well sand filters operate in freezing conditions. Sand filters are frequently used as a BMP to treat runoff contaminated with oil and grease from drainage areas with heavy vehicle usage.

Water Quality Inlets

General Description: Water Quality Inlets (WQIs), commonly called oil-water-debris separators, consist of a series of underground retention chambers that promote sedimentation of suspended materials and separation of free oil from stormwater. Most recent designs of WQIs include a coalescing unit that promotes oil separation while greatly reducing the size of the unit. WQIs are commonly designed in low flow conditions, but some are capable of receiving all runoff. WQIs can be purchased as pre-manufactured units or constructed on site.

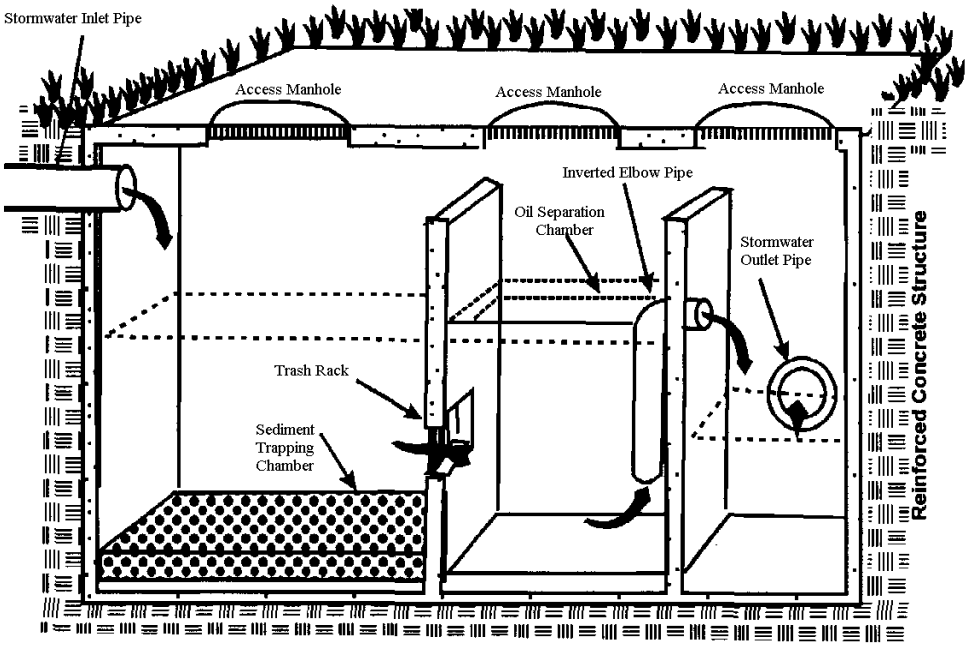


Figure 12: Water Quality Inlet Example *Profile View*

BMP Effectiveness: Water Quality Inlets typically remove 40 percent of suspended sediments and 80 percent free oil. WQIs are not effective at removing nutrients, metals, and dissolved or emulsified oils. WQIs removal efficiencies can be compromised by high sediment loads that can interfere with the separation process and high flow that can resuspend sediment residuals and release them into the stormwater. WQIs should be cleaned out regularly, at least once a season, depending on pollutant loading, to maintain the removal rates. WQIs are limited in storage and therefore do not provide adequate stormwater quantity control.

BMP Suitability: Water Quality Inlets are widely used and can be adapted to all regions of the country. They are recommended for drainage areas of one acre or less. WQIs are best suited for sites that generate high hydrocarbon concentrations, such as gas stations, loading areas, and industrial sites. Because WQIs typically capture and treat only the first portion of runoff, they can be used for pre-treating stormwater before discharging to other BMPs.

Drain Inlet Inserts

General Description: One of three basic types of inserts: tray, bag, or basket, is installed in a drain outlet to treat stormwater runoff as it passes through the insert. The tray and bag inserts have devices that allow high flow to bypass the insert to avoid backwater at the grate.

BMP Effectiveness: Drain inlet inserts of all types perform poorly in removing pollutants because the runoff is in contact with the insert filter for a very short time, as well as inadequate storage area for the materials that are being removed. Collected solids may be resuspended into the discharge when flow increases. Inserts generally remove ten percent of suspended solids and five percent of metals, bacteria, nutrients, and pesticides. Bag and basket drain inlet inserts can be effective in removing large pollutants, such as trash, if they are well maintained.

BMP Suitability: Bag and basket drain inlet inserts are best used as a BMP in limited areas where trash removal is desired.

Catch Basins

General Description: Catch basins are chambers, usually at the curb line, which allow surface water runoff to enter the stormwater conveyance system. Most basins have a low area below the invert of the outlet pipe that retains sediment that would otherwise flow into receiving waters or clog the storm sewer. Specific catch basin products have multiple chambers that aid in free oil removal in addition to sediment removal.

BMP Effectiveness: Catch basins can retain over 30 percent of suspended solids and nearly 20 percent of biochemical oxygen demand in addition to decaying debris and floatables. Catch basin products can remove a greater percentage of suspended solids and nearly all free oil from runoff.

BMP Suitability: Catch basins are best suited for drainage areas with high sediment loading, such as sand, gravel, and leaves, as well as floatables.

Best Management Practices Evaluation

BMPs provide many advantages in addition to improving the quality of waters. BMPs are relatively cost effective for the benefit they provide. For example, it costs less to construct a grassed swale than a curb and gutter system. Man-made BMPs, such as water quality inlets and catch basins, can require costly maintenance more often than vegetative alternatives. The majority of BMPs presented in this appendix recharge ground water and provide adequate stormwater quantity control in addition to improving water quality. BMPs can provide aesthetics and recreational areas. For example, dry detention basins can serve as playing fields and wet retention ponds with walking paths can serve as nature areas. Incorporating recreational areas into BMPs promotes public support of stormwater practices.

Table 5 details pollutant removal rates for specific BMPs. EPA and NIPC studies were weighted more heavily than other data sources. Table 6 lists new development and redevelopment responsibilities.

BMP Designs in Table 5

1. **Filter Strip**: 20 feet wide turf strip.
2. **Filter Strip**: 100 feet wide forested strip with level spreader.
3. **Vegetated Swale**: High slope swales with no check dams.
4. **Vegetated Swale**: Low gradient swales with check dams.
5. **Infiltration Basin**: Facility exfiltrates first-flush; 0.5 inch runoff per impervious acre.
6. **Infiltration Basin**: Facility exfiltrates 1.0 inch runoff volume per impervious acre.
7. **Infiltration Basin**: Facility exfiltrates all runoff, up to the two year design storm.
8. **Infiltration Trench**: Facility exfiltrates first-flush; 0.5 inch runoff per impervious acre.
9. **Infiltration Trench**: Facility exfiltrates 1.0 inch runoff volume per impervious acre.
10. **Infiltration Trench**: Facility exfiltrates all runoff, up to the two year design storm.
11. **Detention Basin**: First-flush runoff volume detained for 6 to 12 hours.
12. **Detention Basin**: Runoff volume produced by 1.0 inch, detained for 24 hours.
13. **Detention Basin**: Runoff volume produced by 1.0 inch, detained for 24 hours and shallow marsh in bottom stage.
14. **Wet Retention Pond**: Permanent pool equal to 0.5 inch storage per impervious acre.
15. **Wet Retention Pond**: Permanent pool equal to 2.5 (Vr); where (Vr) =mean storm runoff.
16. **Wet Retention Pond**: Permanent pool equal to 4.0 (Vr); approximately 2 weeks retention.
17. **Sand Filter Strip**: Many styles to include Delaware, Austin, Washington, D.C., and zeolite designs.
18. **Water Quality Inlet**: 400 cubic feet wet storage per impervious acre.
19. **Water Quality Inlet**: The "Snout" (Oil-Water-Debris Separator).
20. **Porous Pavement**: Facility exfiltrates first-flush; 0.5 inch runoff per impervious acre.
21. **Porous Pavement**: Facility exfiltrates 1.0 inch runoff volume per impervious acre.
22. **Porous Pavement**: Facility exfiltrates all runoff, up to the two year design storm.
23. **Catch Basin**: The "Stormfilter".
24. **Catch Basin**: The "Stormceptor".

BMP	Total Suspended Solids	Total Phosphorus	Total Nitrogen	Biochemical Oxygen Demand (BOD)	Metals	Bacteria	Oil	Nutrients	Pesticides	Overall Removal Capability
Filter Strip	◕	●	●	◑	◑	○	⊗	◔	◔	Moderate
1	◔	○	○	○	◔	⊗	⊗	⊗	⊗	Low
2	●	◑	◑	◕	●	⊗	⊗	⊗	⊗	Moderate
Vegetated Swale	◕	◔	◔	◑	◑	○	◑	◔	◔	Moderate
3	○	○	○	○	○	⊗	⊗	⊗	⊗	Low
4	◔	◔	◔	◔	○	⊗	⊗	⊗	⊗	Low
Infiltration Basin	◕	◕	◕	◕	◕	◕	⊗	⊗	⊗	High
5	◕	◑	◑	◕	◑	◕	⊗	⊗	⊗	Moderate
6	●	◑	◑	◕	●	◕	⊗	⊗	⊗	High
7	●	◕	◕	●	●	●	⊗	⊗	⊗	High
Infiltration Trench	◕	◑	◕	◕	◕	●	⊗	⊗	⊗	High
8	◕	◑	◑	◕	◕	◕	⊗	⊗	⊗	Moderate
9	●	◑	◑	◕	●	◕	⊗	⊗	⊗	High
10	●	◕	◕	●	●	●	⊗	⊗	⊗	High
Detention Basin	◕	◕	◑	⊗	◑	◔	⊗	◔	◔	Moderate
11	◕	◔	◔	◔	◑	⊗	⊗	⊗	⊗	Moderate
12	●	◑	◔	◑	◕	⊗	⊗	⊗	⊗	Moderate
13	●	◕	◑	◑	◕	⊗	⊗	⊗	⊗	High
Wet Retention Pond	◕	◑	◑	◔	◕	○	⊗	⊗	⊗	Moderate
14	◕	◑	◔	◔	◔	⊗	⊗	⊗	⊗	Moderate
15	◕	◑	◔	◔	◕	⊗	⊗	⊗	⊗	Moderate
16	●	◕	◑	◕	◕	⊗	⊗	⊗	⊗	High
Dry Detention Pond	◑	◔	◔	◔	◑	○	⊗	⊗	⊗	Moderate
Constructed Wetland	◕	◔	◔	◑	◕	◕	●	⊗	⊗	Moderate
Media Filter	●	○	◔	⊗	◕	◑	◔	◔	⊗	Moderate
Sand Filter Strip 17	◕	◑	○	◕	◕	◑	◔	⊗	⊗	Moderate
Water Quality Inlet 18	◔	○	○	○	○	⊗	⊗	⊗	⊗	Low
19	◑	⊗	⊗	⊗	⊗	⊗	◕	⊗	⊗	Moderate
Porous Pavement	●	◑	●	◕	●	●	⊗	⊗	⊗	High
20	◑	◕	◑	◕	◑	◕	⊗	⊗	⊗	Moderate
21	●	◕	◕	◕	●	●	⊗	⊗	⊗	High
22	●	◕	◕	●	●	●	⊗	⊗	⊗	High
Drain Inlet Insert	○	⊗	⊗	⊗	○	○	⊗	○	○	Low
Catch Basin	○	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	Low
23	●	◔	⊗	⊗	⊗	⊗	⊗	⊗	⊗	High
24	●	⊗	⊗	⊗	⊗	⊗	●	⊗	⊗	High

Key:	
○	0 to 20 % Removal
◔	20 to 40 % Removal
◑	40 to 60 % Removal
◕	60 to 80 % Removal
●	80 to 100 % Removal
⊗	Insufficient Knowledge

Table 5: Pollutant Removal Rates of Urban BMP Designs

Table 6: Tier Two Responsibilities

TIER TWO RESPONSIBILITIES Action	Responsible Parties State	County	Municipalities	Individuals
New Development and Redevelopment				
Determine impaired waterbodies adjacent to a project and implement construction site BMPs.		X	X	X
Encourage/require sustainable, low maintenance water quality improvement operations wherever practicable.	X	X	X	X
Enhance low quality forests and wetlands with regular management (controlled burns and removal of invasive species) and plant native vegetation to improve water quality.		X	X	
Identify and incorporate as many Best Management Practices as possible into projects both during and post-construction to protect water quality.	X	X	X	X
Identify critical water quality zones and determine appropriate activities.		X	X	
Promote the use of bio-filtering methods and reclamation and reuse methods in wastewater treatment.		X	X	
Promote the use of biological filtering systems and integrate them into stormwater management system design.	X	X	X	
Provide local decision makers visible evidence of the feasibility and aesthetics of Best Management Practices.	X	X	X	
Reduce the amount of overall impervious surfaces and the associated loss of infiltration capacity in project planning, site design, and construction.		X	X	
Require greater consideration of water quality in project planning and site design.	X	X	X	X
Stabilize and restore severly eroded streambanks and shorelines utilizing environmentally-sensitive bioengineering techniques.	X	X	X	X
Use natural, in-stream structures and techniques to reduce erosive velocities and enhance aquatic habitats.	X	X	X	X

TIER THREE: ENFORCEMENT

Tier Three is the ultimate level of government involvement through enforcement of Tiers One and Two.

Enforcement Justification

Water quality, whether surface or sub-surface, affects all living things. The protection of the nation's water from agricultural and urban runoff and point sources, such as industrial facilities and wastewater treatment plants, is necessary and appropriate. Tiers One and Two of Appendix J describe a system where the local government and the public educate one another, routinely perform certain housekeeping operations, and permit new construction, all to benefit and enhance water quality through an increasing level of governmental involvement. As DuPage County and the entire nation strives to better water quality for the public good, it is apparent that enforcement support is required to maintain a minimum standard. Without enforcement, all the words written on paper are nothing more than a vision statement. As much as the public may like to hope that all people will act responsibly with regards to water quality, without enforcement, water quality goals may never be obtainable.

Ultimately it is the responsibility of the local elected officials to dictate what issues should be enforced. There are several issues that are not handled through enforcement, in which people are expected to act on the best interests of the public; one example is recycling household waste. There is a particular difference, however, in comparing water quality enforcement to this example. For instance, the issue of water quality does have national and state statute, programs, and funding to assist in its enhancement. Two programs in particular, which dovetail closely, are the National Pollutant Discharge Elimination System (NPDES) Phase II and the Total Maximum Daily Load (TMDL) programs, which will require significant levels of involvement by the government to ensure compliance. Even though at the time of this writing, certain particulars of these national and state programs have not been revealed, it is expected that enforcement will play a central role in water quality protection / enhancement.

DuPage County Water Quality Enforcement

To properly maintain an efficient, even-handed approach to water quality and assist communities with regional water quality problems, the DuPage County Board directed the DuPage County Department of Development and Environmental Concerns to develop a water quality program countywide. However, DuPage County realizes that implementing water quality programs, structures, and improvements may create financial hardship for municipalities and others. If financial hardship is proven, DuPage County and other funding sources are willing to assist by any means possible. The DuPage County Stormwater Management Plan has three objectives and twelve policy statements all pertaining to water quality protection. The DuPage County Stormwater and Flood Plain Ordinance (Ordinance) additionally has the flexibility to include all structural and non-structural water quality components introduced in Tiers One and Two. The differences between Tier One and Tier Two regarding enforcement are discussed below.

Enforcement of Tier One: Implementation of Self-Determined Best Management Practices

Even though Tier One is based on a volunteer approach of taking personal responsibility for water quality, government agencies are not capable of choosing whether to act in the best interest of the public regarding water quality improvement. The public expects certain minimum measures, such as: street sweeping, illicit discharge connection detection, maintenance of stormwater facilities, and existing structure enhancement. Increased public awareness increases the likelihood that government units will adopt targeted ordinances or statutes to penalize certain private conduct that most adversely affects water quality. Alternatively, enforcement of regulations at federal or state level may be passed down to local jurisdiction via delegation agreements.

Tier One responsibilities are government based. Each public entity, whether County or municipal, is responsible to complete within its own borders: illicit discharge connection detection and elimination; housekeeping tasks; stormwater facility maintenance; and structure enhancement modification. The logical place to include Tier One – Government Responsibility in the Ordinance is in Article 8 – Administration. For these Tier One items, the County must require that all communities function in waiver status, no non- or partial-waivers are permitted. The enforcement of Tier One will be similar to the County auditing process of full- and partial-waiver communities for other stormwater and flood plain permits. The only difference is the water quality information will be placed in the Ordinance Article 8 (Administration); a municipality must not only perform, but also must submit annual reports to the County regarding the status and schedule of all housekeeping tasks and illicit discharge detections. In the event that a municipality should fail to report the required information (see Tier One) to the County, fail to perform on housekeeping tasks, or threaten any potential Countywide state water quality permit through its inaction, the County will be required to employ enforcement measures against that said municipality. See the Ordinance Article 14 for further information regarding fines and enforcement for Tier One.

Enforcement of Tier Two: Regulatory Best Management Practices

In the case of new development, once the Ordinance is updated to include the water quality recommendations as set forth in Appendix J, the enforcement actions of the Ordinance will apply to water quality concerns as well. All Stormwater and Flood Plain permitting authorities, whether County or municipal, must address the water quality situation for each permit and enforce the water quality regulations as required. All full-waiver communities are subject to a water quality review during the County's auditing process. For additional information regarding water quality enforcement regulations, see Article 14-Enforcement and Penalties in the Ordinance for further details.

Table 7: Tier Three Responsibilities

TIER THREE RESPONSIBILITIES Action	Responsible Parties State	County	Municipalities	Individuals	State's Attorney
Enforcement					
Adopt improved ordinances and policies that will improve water quality and control hydrologic impacts.		X	X	X	
Audit communities for compliance with water quality Best Management Practices.		X			
Cite the responsible party for specific violations.	X	X	X		
Inspect Best Management Practices to ensure that they were properly built, maintained, and are compliant with given standards.	X	X	X		
Issue cease and desist orders to the responsible party for repeated or intentional illegal discharges and falsified reports.		X	X		
Monitor BMPs and notify non-compliant responsible parties as to correction plans.	X	X	X		
Provide compliance information for any Best Management Practices that were proposed but never built, are not receiving mandatory maintenance, or are threatening the County's NPDES Permit.	X	X	X		
Prosecute responsible parties for criminal conduct and/or non-compliance.					X
Recommend key water quality principles be implemented into zoning, building, stormwater and floodplain, and transportation ordinances.		X	X	X	
Refer the responsible party who have engaged in criminal conduct to the State's Attorney for possible criminal prosecution.	X	X	X		
Require additional measures to Tier One and Tier Two to improve water quality and comply with local requirements.		X	X		

WATER QUALITY MONITORING

Improvements in water quality will be evident through both biological and chemical monitoring. Monitoring assists in evaluating progress by comparing the current condition to past conditions, determines effectiveness for future recommendations, provides justification for enforcement, affords validation for fine-tuning practices, and demonstrates practical capital expenditures. It is recommended that the County be specific in determining the goals, the authority, the funding, the budget, and the timetable of the monitoring program to ensure success. Please refer to the 'CAPITAL REQUIREMENTS' section for more information regarding capital expenditures.

Tracking Water Quality Improvement Progress

The County will need to conduct monitoring to assess the overall effectiveness of Appendix J's approach to water quality management, which may be done through: volunteer, professional, cost-sharing with other agencies (i.e., IEPA, USGS, or IDNR), or any combination. The County or the Illinois Environmental Protection Agency (IEPA) may also require regular monitoring of Best Management Practices (BMPs) to evaluate their effectiveness. Additionally, the County may conduct monitoring for specific projects. Criteria for project monitoring can be found in the *Water Quality Project Monitoring* section.

The IEPA, in conjunction with local organizations, has maintained a surface water quality monitoring program since 1970 that focuses on water and sediment chemistry as well as physical and biological data. Some of these programs are: the Ambient Water Quality Monitoring Network, the Intensive River Basin Survey, the Facility-Related Stream Survey, the Ambient Lake Monitoring Program, the Clean Lakes Program Intensive, the Citizen Volunteer Lake Monitoring Program, and the National Non-point Source Monitoring Program. These programs collect, analyze, and interpret data to evaluate attainment of designated uses, to determine long-term trends in physical, chemical, and biological conditions, to identify water quality problems, and to investigate the extent and causes of water quality problems. The Environmental Protection Agency (EPA) offers guidance through numerous manuals for organizing a water quality monitoring program. Briefly, some considerations of any monitoring program should be to:

- Determine suitable locations for monitoring stations,
- Understand the characteristics of the water body to be monitored, considering its inflow-outflow points or lack thereof,
- Incorporate the physical attributes of the surrounding land, such as use, imperviousness, soils, topography, and precipitation events,
- Determine the scale that is appropriate for assessing the indicator to be measured,
- Determine sampling size, frequency, interval, and technique, as well as controls to eliminate errors, variability, etc.,
- Determine sampling indicators relevant to the pollutants, the control measures, and potential pollutant sources,
- Establish funding
- Collect and analyze needed samples and determine costs,

- Develop quality assurance plan,
- Determine concise objectives, and
- House data in a regional database with public access for everyone to view and give inputs.

Whereas most of these particulars are dictated by physical characteristics and funding, deciding sampling issues can be the most difficult. Difficulties in choosing and collecting monitoring samples are addressed in the Monitoring Sources section. A monitoring program should be prepared to consider feasible alternatives in the case that progress has not occurred. A quality assurance program should be included in a monitoring program in order for data to be acceptable by other agencies. Quality assurance programs should include: proper documentation of all procedures, field duplicates, lab replicates, spike samples, calibration standards, external field duplicates, split samples, outside lab analysis of duplicate samples, knowns, and unknowns. Because there are many factors that comprise a monitoring program, the range of expenses can vary greatly and are best determined by the needs and constraints of the monitoring program. Monitoring costs depend on the number of sites and parameters, the time period, the frequency, and the use of professional services. Please refer to Monitoring Sources for more information regarding parameters and use of volunteers and professionals in monitoring programs.

Regular Monitoring

Regular monitoring, whether biological or chemical, is the best way to determine the effectiveness of BMPs. The IEPA may provide the schedule, the parameters to be monitored, and the guidelines for regular monitoring of water for quality issues. The County may require monitoring in the event that the IEPA does not or the County may require more stringent monitoring if progress is lacking. Monitoring may be based on the Total Maximum Daily Load (TMDL) program as a minimum, if applicable, and the results will be compared to the existing conditions. Regular results will be submitted to the enforcing authorities and inspections and sampling may be performed if there are questionable reports. If the results reveal exceedences, the responsible parties will be notified and plans for corrections will commence

In addition to regular monitoring the County may perform regular evaluations of past and present BMPs to establish a local performance database of BMP effectiveness. This database may be used for future considerations of BMPs as well as updates to Appendix E – Technical Guidance.

Water Quality Project Monitoring

Specific projects could be individually monitored to determine their effectiveness and compliance as a Best Management Practice. The need for water quality project monitoring will be determined through site-specific conditions. The potential circumstances that will determine if a project warrants monitoring are:

- The project is in a critical zone,
- The project's funding sponsor(s) require monitoring,

- The BMP is investigational or unestablished, or
- There are special circumstances provided by the permitting authority.

These projects should allocate funds for the expenses of monitoring. Projects that achieve the maximum efficiencies of removal rates for pollutants will be strongly recommended for use in similar projects within the County.

Monitoring Sources

Professionals as well as volunteers can be a source of samples for monitoring. The needs of the monitoring program will determine the use of professionals, volunteers, or the combination of both. The ability of volunteers to collect data is limited and most programs will need to employ professional services to some degree. A monitoring program that employs professional services as necessary and utilizes volunteers for sample collection and basic field tests is most cost efficient. Professional collection and analyses can be expensive yet necessary to ascertain some parameters. Collection of some samples is complicated and some instruments require operation by trained individuals. Particular samples, such as plants and fish, must be assessed by knowledgeable persons. Some data requires complex analyses with expensive scientific tools; however, some samples, namely temperature, can only be collected in the field. Specific information regarding analyses methods is available in Table 8: Pollutant Monitoring Methods.

Table 8: Pollutant Monitoring Methods

	Can Be Analyzed In:	
Pollutant	**Field**	**Lab**
Dissolved Oxygen (DO)	X	X
Biochemical Oxygen Demand (BOD)		X
Temperature	X	
pH	X	X
Turbity	X	X
Phosphorus (Total Orthophosphate)	X	X
Nitrates	X	X
Total Solids (includes Metals)		X
Conductivity	X	X
Total Alkalinity	X	X
Fecal Bacteria		X

Notes for Table 8:
- Partial listing of parameters, not inclusive of the TMDL program.
- Samples collected in the field for laboratory analysis must be properly preserved and analyzed by a specific parameter-related time.
- All parameters listed as a pollutant in the table can be collected in the field by volunteers.

Another challenge to monitoring is deciphering the "indicator" parameters. Indicators exemplify the accumulation of long-term impairments and often have many causes. Temperature is an example of a common indicator. Other sources, such as tissue samples, provide data that

illustrate trends. In contrast, chemical constituents represent an exact condition in time and may not be representative of actual overall conditions. It is important to consider external situations that may bias data, such as large precipitation events, extended dry-spells, seasonal variabilities, and spawning events. An acceptable monitoring program will consider these specifics as well as incorporating an appropriate combination of chemical and biological indicators to determine both current and long-term trends of the water body.

Professional Collection

Private laboratories and wastewater treatment plants may serve to professionally collect and chemically analyze water samples. Private laboratories may also analyze samples collected by volunteers. Private entities may collect designated aquatic species and analyze their tissues to determine the long-term trends of specific pollutants in a water body.

Volunteer

Some federal and state agencies, such as the Illinois Environmental Protection Agency, have existing water quality monitoring programs that utilizes volunteers. The County may institute a volunteer program, or join or expand existing programs, to allow members of the community to perform basic field measurements. Temperature, for example, is a relativity stable indicator and is measured easily by volunteers with reliable equipment. Volunteers may also collect water samples for further analyses by professional laboratories. Volunteers that live nearby or on a particular water body can provide significant information on new, returning, thriving, or a reduction in species that inhabit that water body and its surrounding areas. Volunteer monitoring programs accomplish Tier One goals by inviting public participation, providing education opportunities, and demonstrating to individuals that their actions contribute to the state of water quality.

CAPITAL REQUIREMENTS

Water quality improvement projects require significant capital investments. Projects involving creation of wetlands, streambank stabilization, low water quality infrastructure removal, habitat enhancement, public water quality education or awareness, monitoring, and water quality maintenance all require dedicated funding.

DuPage County Water Quality Funding Responsibility

In order for any water quality policy to properly function, DuPage County will have to determine the amount and disbursement of funds between the following program needs:

Public Education / Public Awareness – Public service announcements; public awareness campaigns; training of engineers, public officials, developers, contractors, and the public-at-large; for the purposes of water quality enhancement, must be financially supported on the local level.

Good Housekeeping Measures / Best Management Practices Maintenance – Street sweeping; catch basin cleaning; swale mowing; leaf litter / brush pick-up; replacing filters, gravel, or vegetation in mechanical Best Management Practices (BMPs); and stormwater basin / wetland maintenance should be a regular part of the County's and the municipalities' schedule. With National Pollutant Discharge Elimination System (NPDES) requirements, the frequency of these activities may increase along with the associated record keeping. A good housekeeping program will likely not occur before Illinois Environmental Protection Agency (IEPA) sets housekeeping standards for the NPDES Phase II permit.

Illicit Discharge Detection – Very few localities attempt to detect illicit discharges into the storm sewer systems at this time. Requirements from the NPDES program will dictate the amount of detection required in each reporting period. At a minimum, the County and its municipalities will have to clearly identify all the storm sewer systems in their jurisdiction and follow a precise plan to check these storm sewer segments. It is expected that some communities will have to hire personnel to complete this task. Similar to the good housekeeping program above, an illicit discharge detection program will likely not occur before IEPA sets illicit discharge detection standards for the NPDES Phase II permit.

Monitoring – Collecting samples at several sites throughout the County on a regular basis, installing continuous samplers in critical areas, testing samples in DuPage County local labs as well as private laboratories, providing analysis to the data on a annual/semi-annual basis, and record keeping are all aspects of a monitoring program that would have to be funded. Any monitoring program will be the product of a stakeholder committee comprised of NPDES industrial dischargers as well as NPDES Phase I and Phase II stormwater dischargers.

Water Quality Improvement Projects – Streambank stabilization or any water quality enhancement project such as: removal of old, low water quality drainage infrastructure, creation of wetland / filtering systems, shading of streams to lower water temperatures, and creation of

meanders in streams where channelization has occurred, requires capital expenditures. Through the existing Stream Maintenance Program, the County has been able to divert some funding to put towards projects of these types. The Water Quality Improvement Program was brought to the Stormwater Committee for preliminary approval in early 2000 and will go through the approval processes again based on a closer realignment with Appendix J in 2002. The funding capabilities of this program at this time are extremely limited, but the need to complete water quality improvement projects in DuPage County is on the rise.

Development of Programs

Each of the programs listed above do not have associated costs at this time because a cost range will depend upon the general makeup of each program. In the next few years, the County will develop these programs, with assistance from stakeholders, and at that time they will include cost ranges and action plans.

Potential Supplemental Funding Sources

There are a variety of different grant sources that can be contacted for further information, including instructions for applications and deadlines. A complete list of all grants and sources will not be made available in this appendix. The following is a summary of different grant sources and their associated websites.

Federal Funding Sources

The federal government is an excellent place to investigate funding resources for water quality projects. Once you identify your specific requirements, the Catalog of Federal Domestic Assistance (CFDA) is the single best place to look for federal funding sources; the catalog should be available at a local library or can be viewed on-line:

Catalog of Federal Domestic Assistance: *http://www.cfda.gov*	Federal Grant Information in General: *http://www.whitehouse.gov/omb/grants*

Web sites of federal agencies may give more information about individual government programs as well as provide information on other opportunities for assistance:

Dept. of Agriculture (USDA) *http://www.usda.gov* *http://milleniumgreen.usda.gov*	Dept. of Interior (USDI) *http://www.doi.gov*	Dept. of Transportation *http://www.dot.gov*
Federal Emergency Mgt. Agency *http://www.fema.gov*	Fish & Wildlife Service *http://grants.fws.gov/*	Env. Protection Agency *http://www.epa.gov/ogd*

State Funding Sources

The State of Illinois administers numerous programs for community-based conservation. Some of the money for these programs originates at the federal level and is "pass-through" funding, but much comes directly from the State.

Useful State websites:

Catalog of State Assistance to Local Governments:
http://www.legis.state.il.us/commission/igcc/catalog1999.pdf

Illinois Environmental Protection Agency:
http://www.epa.state.il.us/assistance.html

Education grants:
http://www.dnr.state.il.us/lands/education/classrm/grant

Illinois Dept of Natural Resources:
http://www.dnr.state.il.us/finast.htm

Private Sources

Private sources of funding for community and urban conservation projects include corporations and individuals that have established foundations for charitable purposes. Many corporate foundations focus their philanthropy in areas near their operations, therefore local retailers, businesses, or the local chamber of commerce might be a source of revenue for your project. Most, but not all, require that the group applying for funding be sponsored by a not-for-profit [501(c)(3)] corporation. Information about private foundations can be identified through organizations that specialize in grant information research. Fees for services or products may be charged by these organizations, so be sure to clarify if charges will be incurred. For "do-it-your-selfers," local grant data collection centers are available throughout Illinois and in convenient Indiana and Missouri locations:

National/Regional Organizations:

Resources for Global Sustainability (RGS)
P.O. Box 3665, Cary, NC 27519.
1-800-724-1857

RGS publishes a yearly catalog called
"Environmental Grantmaking Foundations"
http://www.environmentalgrants.com

The Foundation Center
79 Fifth Street, New York, New York 10003-3076
1-800-334-2564
http://www.fdncenter.org

Sonoran Institute
Useful website in identifying sources:
http://www.sonoran.org/cat/search.asp

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Northern Virginia Regional Commission (NVRC). 1992. *Northern Virginia BMP Handbook.* Annadale, VA.
(http://www.novaregion.org)

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(http://www.novaregion.org/enviser.html)

NVRC. *Nonstructural Urban BMP Handbook—A Guide to Nonpoint Source Pollution Prevention and Control through Nonstructural Measures.* Annandale, VA.
(http://www.novaregion.org/pdf/NSBMP1.pdf)

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WATERBODY NAME	ID	DESIGNATED USE	CAUSE (303d)	CAUSE (Specific Assessment)	SOURCE (Specific Assessment)
Addison Creek	IL_GLA-02	*Aesthetic Quality*	*Debris/Floa*	79- Aldrin; 84-Alteration in stream-sde or littoral vegetative cover; 138-chloride, 154-chromium (total); 177-DDT, 246-Hexachlorobenzene; 301-Nickel, 319-Other flow regime alterations; **462-Phophorus, total**; 500-Changes in stream depth/velocity patterns; 400-Fecal coliform; 181-debis/flotables trash	28-Contaminated sediments; 20-channelization; 72-loss of riparian habitat; 23-CSOs; 85-POTWs; 177-Urban runoff/storm sewers; 132-Upstream impoundments; 142-dam/impoundment; 84-urbanized high density area
		Aquatic Life	Aldrin		
		Aquatic Life	Chromium		
		Aquatic Life	DDT		
		Aquatic Life	Hexachlorc		
		Aquatic Life	Nickel		
		Aquatic Life	**Phosphoru**		
		Primary Contact Rec	Fecal Colif		
Addison Creek	IL_GLA-04	*Aesthetic Quality*	*Bottom De*	1-.alpha.-BHC; 84-Alteration in stream-sde or littoral vegetative cover; 163-copper; 246-Hexachlorobenzene; 301-Nickel, 319-Other flow regime alterations; **322-DO**; 348-PCBs; 371-Sedimentation/Silitation; 403-TTS; 462-Phophorus, total; 471-Bottom Deposits; **479-Aquatic Algae**; 519-Visible Oil	28-Contaminated sediments; 20-channelization; 72-loss of riparian habitat; 125-Streambank modification/destablization; 132-Upstream impoundments; 85-POTWs; 58-O,pacts from hydrostruture flow; 177-Urban runoff/storm sewers; 142-dam/impoundment; 84-urbanized high density area
		Aesthetic Quality	***Phosphoru***		
		Aesthetic Quality	*Visible Oil*		
		Aquatic Life	.alpha.-BH		
		Aquatic Life	copper		
		Aquatic Life	Hexachlorc		
		Aquatic Life	**Phosphoru**		
		Aquatic Life	PCBs		
		Aquatic Life	sedimenta		
Armitage Ditch	IL_GBLG	Aquatic Life	Cause unkn	84-Alteration in stream-side or littoral vegetative cover; 463- Cause unknown; 501-Loss of instream cover	72-loss of riparian habitat
East Branch DuPage River	IL_GBL-02	Aquatic Life	Arsenic	96-Arsenic; 277-methoxychlor; 319-other flow regime alterations; 371-sedimentation/silitation; **462-phosphorus, total**; 348-PCBs	all
		Aquatic Life	Methoxych		
		Aquatic Life	**Phosphoru**		
		Aquatic Life	sedimenta		
		Fish Consumption	PCBs		

East Branch DuPage River	IL_GBL-05	Aquatic Life	Phosphoru	84-alterations in stream-side vegetative cover; 138-chlroide; **322-DO**; 403-TSS; 462-phosphorus, total; 348-PCBs	20-channelization; 122-site clearance (land development); 177-urban runoff/storm sewers; 85-POTWs; 140-source unknown
		Aquatic Life	Total suspe		
		Fish Consumption	PCBs		
East Branch DuPage River	IL_GBL-08	Aquatic Life	Arsenic	84-alteration in stream-side vegetative cover; 96-Arsenic; 198-dieldrin; 246-hexachlorbenzene; 277-methoxychlor; 319-other flow regime alterations; 371-sedimentation/silitation; 403-TSS; **462-phosphorus, total;** 348-PCBs	20-channelization; 122-site clearance (land development); 132-upstream impoundment; 28-contaminated sediment; 58-impacts from hydrostructure flow; 14-dam/impoundment; 177-urban runoff/storm sewers; 50-highway, roads, bridges; 85-POTWs; 140-source unknown
		Aquatic Life	Dieldrin		
		Aquatic Life	Hexachlorc		
		Aquatic Life	Methoxych		
		Aquatic Life	**Phosphoru**		
		Aquatic Life	sedimenta		
		Aquatic Life	Total suspe		
		Fish Consumption	PCBs		
East Branch DuPage River	IL_GBL-10	Aquatic Life	Arsenic	84-alteration in stream-side vegetative cover; 96-Arsenic; 138-chlroide; 198-dieldrin; 246-hexachlorbenzene; 277-methoxychlor; 319-other flow regime alterations; 371-sedimentation/silitation; 403-TSS; **462-phosphorus, total**; 501-loss of instream cover; 348-PCBs; 400-fecal coliform	20-channelization; 28-contaminated sediments; 177-urban runoff/storm sewers; 85-POTWs; 140-source unknown
		Aquatic Life	Dieldrin		
		Aquatic Life	Hexachlorc		
		Aquatic Life	Methoxych		
		Aquatic Life	**Phosphoru**		
		Fish Consumption	PCBs		
		Primary Contact Rec	Fecal Colif		

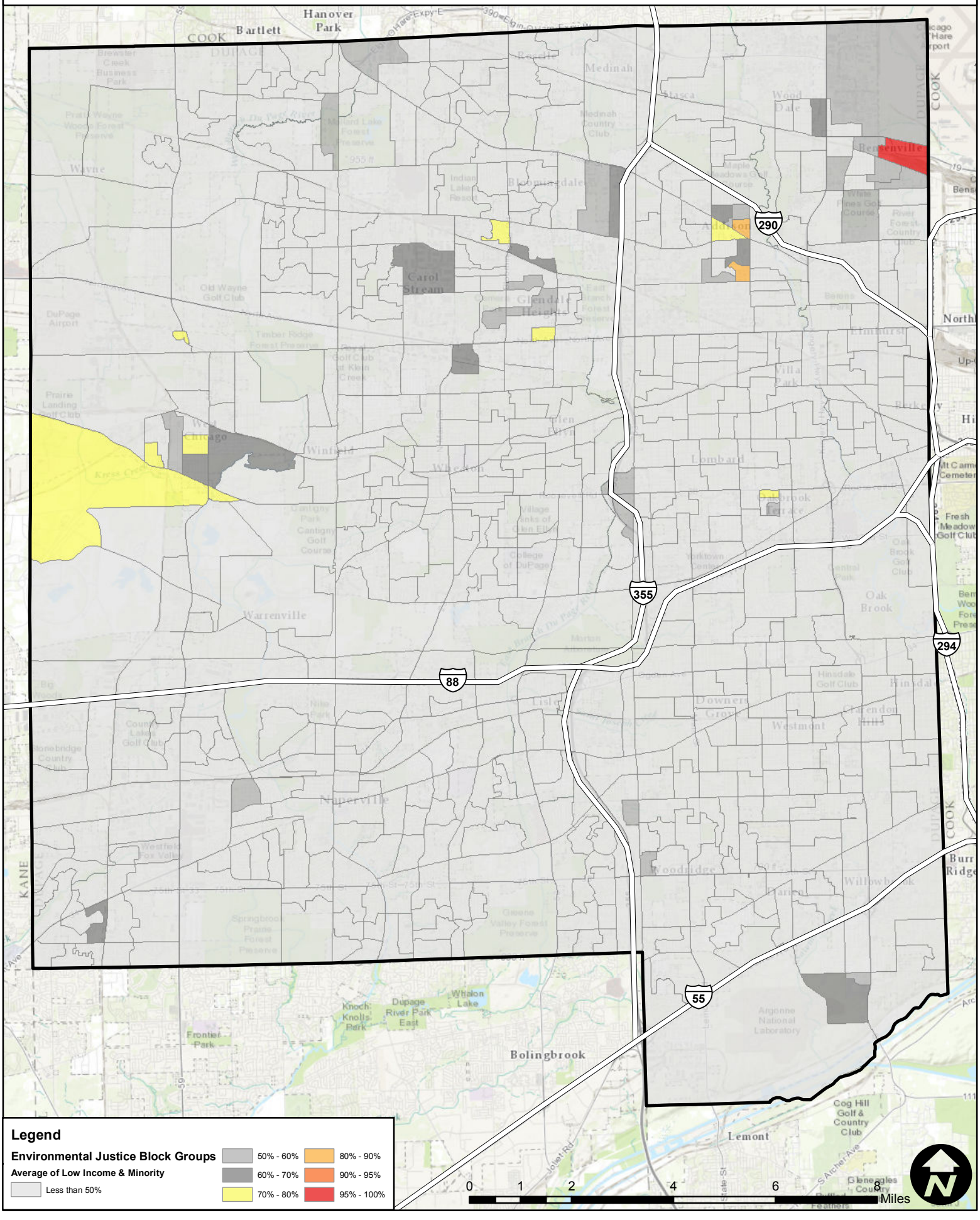
East Branch DuPage River	IL_GBL-11	Aquatic Life	**Dissolved**	84-alteration in stream-side vegetative cover; 319-other flow regime alterations; **322-DO**; 371-sedimentation/silitation; 441-pH; **462-phosphorus, total**; 348-PCBs	20-channelization; 72-loss of riparian habitat; 122-site clearance (land development); 125-streambank modification/ destabilization; 177-urban runoff/storm sewers; 85-POTWs; 140-source unknown
		Aquatic Life	pH		
		Aquatic Life	**Phosphoru**		
		Aquatic Life	sedimenta		
		Fish Consumption	PCBs		
Kress Creek	IL_GBKB-01	Aquatic Life	Dissolved	84-alteration in streamside vegetative cover; **322-DO**; 501-loss of instream cover	20-Channelization; 72-loss of riparian habitat
Lacey Creek	IL_GNLC	Aquatic Life	Bottom De	138-Chloride; 371-Sedimentation/Siltation; 471-bottom deposits; 501- loss of instream cover	177-urban runoff/ storm sewers; 20-channelization
		Aquatic Life	Chloride		
		Aquatic Life	sedimenta		
Lily Cache Creek	IL_GBE-02	Aquatic Life	Cause unkr	463-cause unknown	N/A
Salt Creek	IL_GL-03	Aquatic Life	DDT	84-Alteration in stream-sde or littoral vegetative cover; 177-DDT, 246-Hexachlorobenzene; 244-heptachlor; **322-DO**; 371-Sedimentation/siltation; 348-PCBs; 403-TSS; 319-Other flow regime alterations; 462-**Phophorus, total**; 500-Changes in stream depth/velocity patterns; 274-Mercury	20-channelization; 84- Urbanized high density area; 28-Contaminated sediments; 23-CSOs; 115-SSOs; 122-Site Clearance; 177-Urban runoff/storm sewers; 85-POTWs; 142-Dam or Impoundment; 10-Atmospheric Deposition - Toxics; 140-Sources Unknown
		Aquatic Life	Heptachlor		
		Aquatic Life	**Phosphoru**		
		Aquatic Life	PCBs		
		Aquatic Life	sedimenta		
		Fish Consumption	Mercury		
		Fish Consumption	PCBs		

Salt Creek	IL_GL-09	Aquatic Life	aldrin	79-aldrin; 138-Chloride;277-methyoxychlor; 3**22-DO;** 371-Sedimentation/siltation; 348-PCBs; 403-TSS; 319-Other flow regime alterations; 403-TSS; **462-Phophorus, total**; 400-fecal coliform; 274-Mercury	28-contaminated sediments; 23-CSOs; 85-POTWs; 132-Upstream Impoundments; 142-Dam or Impoundment; 10-Atmospheric deposition (toxins); ; 85-POTWs; 58-Impacts from hydrostruture flow; 177-Urban runoff/storm sewers; 140-sources unknown
Salt Creek	IL_GL-09	Aquatic Life	Methoxych		
Salt Creek	IL_GL-09	Aquatic Life	**Phosphoru**		
Salt Creek	IL_GL-09	Aquatic Life	sedimenta		
Salt Creek	IL_GL-09	Fish Consumption	Mercury		
Salt Creek	IL_GL-09	Fish Consumption	PCBs		
Salt Creek	IL_GL-09	Primary Contact Rec	Fecal Colif		
Salt Creek	IL_GL-10	Aquatic Life	Arsenic	84-Alteration in stream-sde or littoral vegetative cover; 96-arsenic; 138-chloride, 246-hexachlorobenzene; 277- methoxychlor; 301-nickel; 319-Other flow regime alterations; **322-DO**; 441-pH; 274-mercury; 348-PCBs; 400- Fecal coliform	20-channelization; 125-Streambank Modifications; 58-Impacts from hydrostructure flow; 132-upstream impoundments; 28-Contaminated sediments; 177-Urban runoff/storm sewers; 85-POTWs; 142-Dam or Impoundment; 10-Atmospheric Deposition - Toxics; 140-Sources Unknown
Salt Creek	IL_GL-10	Aquatic Life	Hexachlorc		
Salt Creek	IL_GL-10	Aquatic Life	Methoxych		
Salt Creek	IL_GL-10	Aquatic Life	Nickel		
Salt Creek	IL_GL-10	Aquatic Life	Dissolved (		
Salt Creek	IL_GL-10	Aquatic Life	pH		
Salt Creek	IL_GL-10	Fish Consumption	Mercury		
Salt Creek	IL_GL-10	Fish Consumption	PCBs		
Salt Creek	IL_GL-10	Primary Contact Rec	Fecal Colif		
Spring Brook	IL_GLB-01	Aquatic Life	DDT	84-Alteration in stream-sde or littoral vegetative cover; 177-DDT; 213-Endrin; 246-Hexachlorbenzene; 319-Other flow regime alterations; **322-DO**; 371-Sedimentation/Siltation; 403-TSS; **462- Phosphorus, Total; 479-Aquatic Algae**	20-channelization;28-Contaminated sediments; 58-Impacts from Hydrostructure flow; 177-Urban runoff/storm sewers; 85-POTWs; 132-Upstream Impoundments
Spring Brook	IL_GLB-01	Aquatic Life	Endrin		
Spring Brook	IL_GLB-01	Aquatic Life	Hexachlorc		
Spring Brook	IL_GLB-01	Aquatic Life	**Phosphoru**		
Spring Brook	IL_GLB-01	Aquatic Life	sedimenta		
Spring Brook	IL_GLB-07	Aquatic Life	Cause Unk	463-cause unknown	140-source unknown

Spring Brook	IL_GBKA	Aquatic Life	Chloride	84-Alteration in stream-sde or littoral vegetative cover; 138-chloride; **322-DO**; **462-Phosphorus, Total;** 400-fecal coliform	20-channelization;156-agriculture; 177-Urban runoff/storm sewers; 140-source unknown
Spring Brook	IL_GBKA	Aquatic Life	Dissolved O		
Spring Brook	IL_GBKA	Aquatic Life	**Phosphoru**		
Spring Brook	IL_GBKA	Primary Contact Rec	Fecal Colif		
Spring Brook	IL_GBKA-01	Aquatic Life	**Phosphoru**	84-Alteration in stream-sde or littoral vegetative cover; **462- Phosphorus, Total**; 501-loss of instream cover; 400-fecal coliform	20-channelization; 85-POTWs; 140-Sources Unknown
Spring Brook	IL_GBKA-01	primary Contact Rec	Fecal Colif		
St Joseph Creek	IL_GBLB-01	Aquatic Life	Oil and gre	84-Alteration in stream-sde or littoral vegetative cover; 317- oil and grease; 319-other flow regime alterations; 403-TSS; **479-Aquatic Algae**; 501-loss of instream cover	20-channelization; 72-loss of riparian habitat; 122-site clearance (land development); 125-streambank modification/ destabilization; 177-urban runoff/storm sewers; 85-POTWs; 140-source unknown
St Joseph Creek	IL_GBLB-01	Aquatic Life	TSS		
West Branch Du Page River	IL_GBK-02	Aquatic Life	Arsenic	96-arsenic; 277-methoxychlor; 319-other flow regime alterations; 371-sedimentation/silitation; **462-phosphorus**, total; 274-mercury	28-contaminated sediments; 58-impacts from hydrostructural flow; 142-dam or impoundment; 177-urban runoff/storm sewers; 85-POTWs; 10-atmospheric depsoition, toxins
		Aquatic Life	Methoxych		
		Aquatic Life	**Phosphoru**		
		Aquatic Life	sedimenta		
		Fish Consumption	Mercury		

West Branch Du Page River	IL_GBK-05	Aquatic Life	**Dissolved**	84-Alteration in stream-sde or littoral vegetative cover; 319-other flow regime alterations; **322-DO;** 371- sedimentation/siltation; 403-TSS; **462- phosphorus, total**; 400-fecal coliform	20-channelization; 122-site clearance; 85-POTWs; 177-urban runoff/storm sewers; 140-source unknown
		Aquatic Life	**Phosphoru**		
		Aquatic Life	sedimenta		
		Aquatic Life	TSS		
		Primary Contact Rec	Fecal Colif		
West Branch Du Page River	IL_GBK-09	Aquatic Life	**Dissolved**	138-chloride; **322-DO**; 371-Sedimentation/Siltation; 388-Temperature, water; 441-pH; **462; phosphorus, total**; 400-fecal coliform	122-site clearance; 85-POTWs; 177-urban runoff/storm sewers; 140-source unknown
		Aquatic Life	pH		
		Aquatic Life	**Phosphoru**		
		Aquatic Life	sedimenta		
		Aquatic Life	Temperatu		
		Primary Contact Rec	Fecal Colif		
West Branch Du Page River	IL_GBK-14	Aquatic Life	**Dissolved**	84-Alteration in stream-side or littoral vegetative cover; 138-chloride; **322-DO**; 500-changes in stream depth/velocity patterns; 400-fecal coliform	20-channelization; 84-Urbanized high density area; 177-urban runoff/storm sewers
		Primary Contact Rec	Fecal Colif		
Winfield Creek	IL_GBKF-01	Aquatic Life	**Dissolved**	84-Alteration in stream-sde or littoral vegetative cover; **322-DO**	20-channelization; 72-loss of riparian habitat; 142-dam or impoundment; 177-urban runoff/storm sewers
Herrick Lake	IL_WGN	Aesthetic Quality	**Phosphoru**	**462-Phosphorus, Total; 478-Aquatic Plants**	140-source unknown; 156-Agriculture; 177-urban runoff/Storm sewers; 181-runoff from forest/grassland/pasture
Hidden Lake	IL_WGZE	Aesthetic Quality	**Phosphoru**	403-TSS; **462-Phosphorus, Total; 478-Aquatic Plants**	140-Source unknown
		Aesthetic Quality	TSS		
Rice Lake (DuPage)	IL_WGZW	Aesthetic Quality	Cause unkn	463-Cause unknown; **479-Aquatic algae**	140-source unknown; 181-runoff from forest/pasture/grassland
Sterling Pond	IL_WGC	Aesthetic Quality	**Phosphoru**	403-TSS; **462-Phosphorus, Total; 478-Aquatic Plants; 479-Aquatic Algae**	71-littorial/shore modification; 101-permitted silviculture activities; 123-speciality crop production; 134-waterfowl; 177-urban runoff/storm sewers; 181-runoff from forest/ grass/pasture

DuPage County by Census Block Group
Environmental Justice Index



INTRODUCTION

The purpose of the Illicit Discharge Detection and Elimination (IDDE) Technical Guidance chapter is to describe the procedures for performing the screening of outfalls as well as procedures for investigating and eliminating suspected illicit discharges. The chapter is subdivided into the following sections:

- SECTION 1.0: Outfall Screening
- SECTION 2.0: Investigation Procedures
- SECTION 3.0: Procedures for Disconnection of Identified Illicit Discharges

The NPDES Phase II program is limited to regulatory outfalls, that is, outfalls associated with municipal separate storm sewer systems (MS4s). Within DuPage County, these regulatory outfalls include those outfalls that are owned or operated by DuPage County, municipalities, and any other public entities. While private storm sewer systems are not included in the NPDES program, DuPage County's IDDE program has been expanded to include the ability to collect discharge samples at outfalls associated with private storm sewer systems. In order for the program to be effective, it is important to visit the outfalls as frequently as possible since illicit discharges can only be discovered if the outfalls are observed on a regular basis. This observation can be through formal outfall screening (described in this chapter) or various other monitoring methods, not discussed in this chapter, including routine volunteer (resident) observations of one or multiple outfalls or use of unmanned monitoring methods at outfalls. As a point of clarification, screening and monitoring are synonymous within the context of this program and the term screening will be used throughout this chapter instead of the term monitoring.

1.0 OUTFALL SCREENING

The Outfall Screening program is comprised of two basic components:

- ***Outfall Prioritization***
- ***Routine Outfall Screening***

The term "outfall screening" within this document applies to any visit by a field technician to an outfall as part of a planned, on-going field investigation. Ideally, all outfalls will be visited at least once annually. Some IDDE programs are very large, making it very expensive to perform screening once annually. There are several approaches to addressing this issue including, but not limited to:

- Limiting the number of outfalls by visiting only major outfalls (discussed below)
- Reducing the screening frequency to one visit to each outfall during the 5-year permit cycle
- Dedicating the resources necessary to perform annual visits of all outfalls
- Limiting the number of outfalls through prioritization

Some states, including neighboring states like Wisconsin, have limited the Illicit Discharge Detection and Elimination Program to major outfalls, at least for the time being. Major outfalls are defined in the Code of Federal Regulations as follows:

> *Major municipal separate storm sewer outfall (or ``major outfall") means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more). 40CFR122.26*

Limiting the program to major outfalls initially is one way to make the program more manageable, but research performed by Pitt (2001) suggests that screening small outfalls may be "at least as important" as large outfalls. In addition, DuPage County recognizes that illicit discharges can emanate from both private and public sources. It is for these reasons that DuPage County's program will include the ability to screen all outfalls, regardless of size and ownership. The frequency in which outfalls are visited will be determined as the program evolves based upon historical data regarding the rate at which screening is performed and the availability of staff resources. As mentioned above, an attempt will be made initially to visit every outfall at least once annually. If this does not appear to be feasible, the order and frequency of screening specific outfalls may be determined by prioritizing the outfalls using the approach described later within this chapter (see section 1.1 OUTFALL PRIORITIZATION).

Initially, the County will begin screening outfalls on the following waterways (not necessarily in the order presented):

- Salt Creek main stem
- East Branch DuPage River main stem
- West Branch DuPage River main stem

The screening will proceed from upstream to downstream along these main stem reaches. After the initial screening is completed for these main stems, the program will be reviewed and the necessity of prioritization will be evaluated.

1.1 OUTFALL PRIORITIZATION

The ILR40 permit issued for the first permit cycle of the NPDES Phase II program is non-specific regarding how the detection of illicit discharges is to be performed. Outfall Prioritization is not necessary when there are a small number of outfalls to visit or in the event that there are significant staff resources available to perform the work. Because DuPage County's program includes a large number of outfalls, it may be necessary to prioritize the outfalls in order to ensure that the outfalls with the highest probability of contributing illicit discharges are visited first and as frequently as possible.

Outfall Prioritization includes assessing various factors associated with outfalls and determining the likelihood of each outfall, relative to other outfalls, of being a contributor of illicit discharges. This task is an on-going task that will be reviewed and revised as the program evolves through the collection of specific data on individual outfalls.

The prioritization process is based on a number of illicit discharge risk factors. These illicit discharge risk factors are divided into two distinct groups:

- Reach Illicit Discharge Risk Factors
- Subbasin Illicit Discharge Risk Factors

The risk factors can be used to compute scores based on specific data associated with the reaches and subbasins. In order to use these risk factors, it is necessary to define an appropriate element with which to compare scores. While outfalls could be used, it is recommended that the regulatory waterways be subdivided into waterway segments of uniform length that can be assigned the final score regarding their potential for receiving illicit discharge. These will be referred to as "IDDE waterway segments."

The risk factors can be used to compute scores for each IDDE waterway segment. These scores can then be utilized to prioritize the field screening work. Each IDDE waterway segment will have a unique collection of outfalls associated with it such that the priority associated with the IDDE waterway segment becomes the priority associated with the outfalls directly associated with the IDDE waterway segment.

Reach Illicit Discharge Risk Factors

There are two pieces of data that can be used to weigh a particular pre-defined reach's likelihood of being impacted by illicit discharges. These are related directly to the stream system and are:

- Number of outfalls per stream mile
- Dry-weather in-stream water quality data

The number of outfalls per stream mile provides an indication of the level of opportunity that exists within a given reach for illicit inflows to enter the stream system based solely on the density of outfalls. The higher the number of outfalls, the greater the "risk" of potential illicit flows entering the storm sewer system. The number of outfalls can be limited to the regulatory outfalls, but using the actual number of outfalls, both private and regulatory, will be a better indicator.

If dry weather water quality data is available for a waterway, it should be used to identify specific locations where elevated pollutant levels have been observed. Specifically, high concentrations of fecal coliform or E. coli, high ammonia-nitrogen, and phosphorus are good indicators of a potential problem. Suggested in-stream parameters and thresholds are included within this chapter (see Table 1-2 on page 7).

Subbasin Illicit Discharge Risk Factors

DuPage County's detailed watershed and subbasin boundary mapping data will be used as the basis of the Subbasin Illicit Discharge Risk Factor calculation. The evaluation should be performed using the smallest subbasin mapping units available (also referred to as catchments in the DuPage County GIS). This will provide a more refined definition regarding the location of the most probable illicit connection locations. The factors can be used to establish a total score for each subbasin that can be associated with an outfall and ultimately a portion of the stream system so that a comparison with other stream system segments throughout the County can be performed.

In order for the Subbasin Illicit Discharge Risk Factors to be useful, it will be important to know how each subbasin is connected to the receiving waterway. Specifically, every outfall must be associated with a subbasin. While it would be convenient to have each subbasin associated with a single outfall, this would result in unrealistically small subbasins, therefore a single subbasin will likely be associated with a number of outfalls. The risk factor computed for a given subbasin will be assumed to be applicable to all outfalls associated with it. In general, the number of outfalls and the non-homogeneity of the illicit discharge risk factors increases with the size of the subbasins. Therefore, the larger the subbasins become, the less indicative the scores are regarding any single outfall's potential for contributing illicit discharges. This is why it is important to keep the subbasins relatively small, but not to an unmanageable degree.

Table 1-1 on the following page provides a summary of Subbasin Illicit Discharge Risk Factors that might be considered when developing scores for the subbasins. It may not be necessary to use all of these factors. The factors used will depend on which factors are most relevant within DuPage County as well as the availability of the data necessary to compute the individual factor totals.

TABLE 1-1
SUBBASIN ILLICIT DISCHARGE RISK FACTORS

Subbasin Illicit Discharge Risk Factor	Required Data	Data Sources
Land Use	• Density of specific types of land uses	• DuPage County Engineering Department
Density of Existing Septic Systems	• Location of individual septic systems • Dates when constructed or last replaced (if available)	• DuPage County Health Department septic system inspection records • Similar records from municipalities with septic systems
Combined Sewer	• Locations where combined sewers used to be located • Locations of current combined sewers	• DuPage County Public Works Department • Municipal public works directors and municipal engineers
Septic to Sanitary Sewer Conversion	• Location of properties that had septic systems and were converted to sanitary sewer connections • Date when converted (if available)	• DuPage County Health Department septic system inspection records • Municipal public works directors and municipal engineers
Condition of Storm Sewer	• Location of storm sewer system • Date when constructed (or replaced)	• DuPage County Division of Transportation • DuPage County Engineering Department • Municipal public works directors and municipal engineers
Condition of Sanitary Sewer	• Location of sanitary sewer system • Date when constructed (or replaced)	• DuPage County Public Works Department • Municipal public works directors and municipal engineers
Density of Industrial NPDES Permit Holders	• Location of all industrial properties • SIC code (if available) • Activity/Product(s) manufactured • Date when constructed (if available) • NPDES industrial permit holder locations • Number of industrial NPDES permit holders per square mile of tributary area	• DuPage County Engineering Department • DuPage County Building Department • EPA • Individual industrial property owner Refer to Appendix A of the Center for Watershed Protection's "Illicit Discharge Detection and Elimination Technical Appendices"
Age of Development	• Location of properties of approximately the same age (cluster properties into approximately homogenous age groups) • Approximate age of each cluster of properties	• DuPage County Engineering Department • DuPage County Building Department • Municipal Building Departments • Windshield survey
Historical Discharge Complaints	• Historical septic system complaint records • Historical pollutant discharge complaints related to storm sewers	• DuPage County Public Works Department • Municipal public works directors and municipal engineers

1.1.1 Prioritization Process

The Illicit Discharge Risk Factor analysis does require a great deal of data and it is best conducted using the County's GIS. The analysis includes the following ten steps:

Step 1: Define IDDE waterway segments
Step 2: Delineate Subbasins
Step 3: Determine which of the Reach Illicit Discharge Risk Factors and Subbasin Illicit Discharge Risk Factors are going to be used for prioritization
Step 4: Gather data required to compute the Reach Illicit Discharge Risk Factors and Basin Illicit Discharge Risk Factors
Step 5: Compute Reach Illicit Discharge Risk Factors
Step 6: Compute Subbasin Illicit Discharge Risk Factors
Step 7: Compute Subbasin Illicit Discharge Risk Scores
Step 8: Create Prioritization Scoring Map and Table
Step 9: Perform Critical Review
Step 10: Review Prioritization

Step 1 - Define IDDE waterway segments

The fundamental unit used for prioritization is the IDDE waterway segment. These segments are created by subdividing the regulatory waterways into segments of uniform length that can be assigned the final score regarding their potential for receiving illicit discharge. Any length can be used, but using a length of 1 mile is recommended for simplicity. If the length needs to be reduced in order to account for variability reflected in the subbasins and along the waterway, then it should be shortened.

This task can be performed using the County's stream centerline data. Each IDDE waterway segment must be given a unique name and should be initialized at its confluence (0+00) with a higher order stream. These IDDE waterway segments will be used to communicate the resulting prioritization information, therefore it is important that they be defined clearly (i.e., beginning and ending points of specific segments clearly identified and unique names assigned for each segment). At a minimum, IDDE waterway segments must be defined along the Primary DuPage County IDDE Waterways as defined in the Municipal Separate Storm Sewer System Mapping Chapter.

Step 2 - Delineate Subbasins

DuPage County has detailed basin delineation information available that was developed as part of the County's watershed planning, flood plain mapping, and drainage investigation project work. This information can be used as the basis for performing this step. Plot all known outfall locations and relate each outfall to the IDDE waterway segment (defined in Step 1) into which the outfall directly discharges. Then, subbasins must be defined and related to specific outfalls or groups of outfalls. It will be important to understand how each subbasin connects to major waterways. This means that it will be important to have as much information as possible regarding the stormwater management system within a subbasin, especially for subbasins that are not adjacent to Primary DuPage County IDDE Waterways. Subbasins will likely fall under one of the following four types:

1) Subbasins adjacent to Primary DuPage County IDDE Waterways draining through outfalls discharging directly to Primary DuPage County IDDE Waterways
2) Subbasins without outfalls (distributed / non-point runoff draining to major waterway) draining to Primary DuPage County IDDE Waterways

3) Interior subbasins (not adjacent to Primary DuPage County IDDE Waterways) draining to outfalls that discharge directly to Primary DuPage County IDDE Waterways
4) Internally drained subbasins that do drain to a Primary DuPage County IDDE Waterway

The first and third types will be the most common while the second type does not involve outfalls, therefore runoff from these areas would not be regulated under the IDDE program and the fourth type, i.e., completely isolated depressional areas, will likely be a very rare occurrence.

While preferred, the basins do not have to be delineated such that a basin has a single outfall with which it is associated.

Step 3 - Determine which of the Reach Illicit Discharge Risk Factors and Subbasin Illicit Discharge Risk Factors are going to be used for prioritization

Each of the illicit discharge risk factors requires varying amounts of data with differing levels of relative complexity associated with acquisition. While one could use all of the factors listed in Table 1-1 using them all is not necessary. In fact, using too many may prevent the development of a prioritization plan within a reasonable timeframe. The key is to select those factors that are relevant in DuPage County and will help reveal those areas that have the highest likelihood of having illicit discharges. Another consideration is the relative ease of acquiring the data. If the data is not readily available or will take too much time to organize into a format that can be used, then that factor may not be a good choice.

Both of the Reach Illicit Discharge Risk Factors mentioned earlier, outfall density and in-stream water quality data, should be used, if available. The outfall density is a good indicator of risk while existing in-stream water quality data provides an indication of areas with high in-stream pollutant levels (relative to established thresholds). One potential drawback to the in-stream water quality data is that it is not available for every reach within the County, therefore those reaches that have been included in an in-stream monitoring program would have an advantage, or disadvantage depending on your perspective, over those reaches that aren't being monitored.

The following Subbasin Illicit Discharge Risk Factors are recommended:

- Land Use
- Density of Existing Septic Systems
- Age of Development
- Historical Discharge Complaints

Others factors listed in Table 1-1 can be added depending on data availability and the need to further differentiate the subbasins.

Step 4 - Gather data required to compute the Reach Illicit Discharge Risk Factors and Subasin Illicit Discharge Risk Factors

Potential data sources are provided in Table 1-1.

Step 5 - Compute Reach Illicit Discharge Risk Factors

The potential Reach Illicit Discharge Risk Factors are:

- Number of outfalls per stream mile
- Dry-weather in-stream water quality data

These factors are directly associated with the stream reach. It is not necessary to use both of them, although it is recommended. The number of outfalls per stream mile is one of the easiest factors to compute and provides some indication regarding risk of illicit discharges being introduced to the stream system. It is for these reasons that the number or outfalls per stream mile should be considered a mandatory factor to be considered during prioritization.

The number of outfalls per stream mile can be computed for each IDDE waterway segment by counting the number of known outfalls along each IDDE waterway segment. The number of total outfalls, both private and regulatory, are preferred. It is likely that ownership information will not be completed prior to performing this evaluation, therefore it is likely that the number will be based on all known outfalls (note: there may be more outfalls identified during field screening, therefore this number might change in the future). Typically, a value of greater than 20 outfalls per stream mile is considered high enough to indicate an elevated risk. If the number of outfalls equals or exceeds 20 per stream mile, then the IDDE Waterway Segment associated with this density becomes a 1st Priority segment (see Table 1-4 on page 13).

In-stream sampling data may also be used, if available. The DuPage River Salt Creek Work Group (DRSCW) has collected sampling data at a number of locations throughout the County which can be used to identify stream reaches with either intermittent or perpetually elevated pollutant levels. The data being collected includes pH, temperature, conductivity, and dissolved oxygen. Table 1-2 below provides threshold in-stream values that can be used for a variety of parameters. If these dry-weather in-stream water quality benchmarks are exceeded, the cause could be due to illicit discharges entering the stream system. Parameters other than the ones currently collected as part of the DRSCW's work are included in the table for use in the event that the in-stream monitoring program is expanded.

TABLE 1-2
IN-STREAM PARAMETER THRESHOLDS

PARAMETER	THRESHOLD VALUE	REFERENCE (SEE END OF CHAPTER)
E. Coli (*Escherichia coli*)	1000 MPN / 100 mL	4
Total Phosphorus	0.40 mg/l	4
Ammonia-nitrogen	0.30 mg/l	4
Conductivity	1500 µs/cm	4, 5
pH	$6 \leq pH \leq 9$	6
Total Nitrogen (TN)	3.5 mg/l	4
Dissolved Oxygen	2 mg/l or % sat.	7

If dry-weather in-stream sampling data exceeds any of these thresholds, then the IDDE waterway segment containing the sample location becomes a candidate for becoming a high priority reach. That is, if the threshold value is exceeded, then the IDDE Waterway Segment associated with the in-stream monitoring location becomes a 1st Priority segment. If additional in-stream parameter concentrations have been collected, the list above should be expanded and corresponding threshold values assigned. In addition to specific sampling data, or in lieu of it, the IEPA's 303(d) list data may be used to identify reaches with impairments. This data is somewhat limited in its usefulness in identifying specific locations along a reach due to the length of the segments used in the assessment. If 303(d) list data is used, one could simply make these identified "impaired" reaches a high priority, regardless of the potential source identified. A more detailed evaluation of the potential source data could be performed, but is probably not worth the effort. Caution should be used when using the 303(d) list information and specific in-stream water quality

data not only because the locations of the available data is biased to larger waterways (primarily the main stems), but also because illicit discharges are not necessarily associated with an in-stream impairment.

Step 6 - Compute Subbasin Illicit Discharge Risk Factors

After all of the data necessary to compute the selected Subbasin Illicit Discharge Risk Factors is collected, the scoring for the individual factors and the total score for each subbasin unit can be computed. The approach is to assign a likelihood of low, medium (if applicable), or high for each of the selected Subbasin illicit Discharge Risk Factors (selected in Step 3), which numerically will be assigned using 1, 2 (if applicable), or 3 respectively. This is accomplished by collecting the necessary data associated with each of the Subbasin Illicit Discharge Risk Factors selected and using the resulting %, density, age, etc. to assign a Factor Value. The result will be a Factor Value of 1, 2, or 3 for each of the selected Basin Illicit Discharge Risk Factors that can be used in Step 7 to compute total scores for each subbasin. It is important that it is clear where each subbasin discharges (connects) into the receiving waterway since this will determine the assignment of subbasins to specific IDDE waterway segments.

Table 1-3 on the following page summarizes the suggested scoring criteria for each risk factor. As mentioned previously, it is not necessary to use all of the risk factors for the assessment.

TABLE 1-3
SUBBASIN ILLICIT DISCHARGE RISK FACTORS

SUBBASIN ILLICIT DISCHARGE RISK FACTOR	FACTOR VALUE[2]		
	Low = 1	**Medium = 2**	**High = 3**
Land Use[1]	"Open" land uses > 50%	"Business / Residential" > 50%	"Manufacturing / Commercial" > 50% OR Industrial land use parcels per sq mi > 10 parcels
Density of Existing Septic Systems	Number of septic systems per sq mi < 100		Number of septic systems per sq mi ≥ 100
Combined Sewers	Combined sewer separation has not occurred at anytime or anywhere within the subbasin (unit of interest) AND There is no combined sewer currently in the subbasin (unit of interest)		Combined sewer separation has occurred sometime and somewhere in the subbasin (unit of interest) OR There is combined sewer within the subbasin (unit of interest)
Septic to Sanitary Sewer Conversion	Septic to sewer conversion has not occurred at anytime or anywhere within the subbasin (unit of interest)		Septic to sewer conversion has occurred sometime and somewhere in the subbasin (unit of interest)
Condition of Storm Sewer	No infrastructure within the subbasin (unit of interest) is > 50 years old		There is infrastructure within the subbasin (unit of interest) > 50 years old
Condition of Sanitary Sewer	No infrastructure within the subbasin (unit of interest) is > 50 years old		There is infrastructure within the subbasin (unit of interest) > 50 years old
Density of Industrial NPDES Permit Holders	Sites per sq mi < 3	3 ≤ sites per sq mi ≤ 10	Sites per sq mi > 10
Age of Development	Age of buildings (years) < 25	25 ≤ Age of buildings (years) ≤ 50	Age of buildings (years) > 50
Historical Discharge Complaints	Number of complaints < 5	5 ≤ Number of complaints ≤ 10	Number of complaints > 10

NOTES:
1. Each of the three land use groups are discussed on the following pages
2. The ranges associated with each Factor Value are interpreted based on guidance provided in the Center for Watershed Protection's "Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments"

Land Use

DuPage County has developed parcel-based land use for the entire County. These 17 parcel-based land uses can be combined into three broad land use categories for the purposes of assigning illicit discharge risk potential.

Open

- Vacant
- Agricultural
- Golf Course Open Space
- Forest Preserve Open Space
- Other Open Space
- Detention Pond Open Space

Business / Residential

- Office Research
- Business Park
- Institutional
- Unsewered Single Family Residential
- Sewered Single Family Residential
- Multiple Family Residential

Manufacturing / Commercial

- Industrial
- Commercial
- Sewered Roadway
- Unsewered Roadway
- Other transportation-related properties

The approach is to compute the total amount (area) of each of the three groups of land uses (i.e., Open, Business / Residential, Industrial / Commercial) and determine which group predominates within a subbasin. A simple percentage for each of the three groups for each subbasin is calculated and the land use group that forms the majority is used as one of the criteria to assign the score. In addition, the number of Industrial parcels will be tallied within each subbasin and a density in terms of industrial parcels per square mile can be computed. This will minimize the chance of missing an area with a significant amount of industrial property that does not receive a high score simply because of the relative magnitude of other land uses within the subbasin. A cautionary note: many times, large industries reside on multiple parcels, therefore the number of industrial parcels per square mile may over-estimate the perceived quantity of separate industries. The alternative is to determine the actual individual industries based upon tax parcel information or other land use mapping that may be based upon actual owner information, but this will be more time-consuming than the simple parcel-based approach which can easily be performed using the County's GIS.

Density of Existing Septic Systems
In order to use this factor, the location of all septic systems throughout the County is required. The number of septic systems per square mile is computed for each subbasin and a score can be assigned based on the computed density. This factor could be modified to include an age component (e.g., only count septic systems that are greater than 30 years of age), but this data may be difficult to acquire.

Combined Sewers
Areas that were formerly served by combined sewers, but were separated have a high potential for improper connections. In addition, areas that are currently served entirely or partially by combined sewers are likely candidates for cross connections. If a subbasin includes any areas that either did contain or currently contain combined sewers, then there is a high risk of illicit discharges from the subbasin under consideration.

Septic To Sanitary Sewer Conversion
This is similar to the ***Combined Sewer*** factor in the sense that areas that were formerly served by septic systems, and were converted to separate sanitary sewers, have a high potential for improper connections. If a subbasin includes any areas that were formerly served by septic systems, then there is a high risk of illicit discharges from the subbasin under consideration.

Condition of Storm Sewer
The condition of the storm sewer within a subbasin may also provide some indication as to whether there is a high probability of illicit discharges entering the storm sewer. Older systems are more prone to leaks due to deterioration and improper connections over time. A simple assessment of whether there is or is not any storm sewer over 50 years of age is recommended. Fifty years is recommended since this represents the design life of most sewer systems. A more sophisticated approach can be used based on the percentage of the sewer system that is over 50 years of age, but this is more difficult and is likely not worth the effort, unless this data is readily available.

Condition of Sanitary Sewer
The condition of the sanitary sewer within a subbasin may also provide some indication as to whether there is an increased chance of illicit discharges entering the storm sewer system due to exfiltration from the sanitary sewer system. Older sanitary systems are more prone to leaks due to deterioration over time. Most sanitary systems are constructed deeper than storm sewer systems, but this is not always the case, especially in older areas. Therefore, a leaky sanitary sewer located at a higher elevation in the vicinity of a nearby storm sewer may be a source of illicit discharges. Private laterals are more likely candidates than older sanitary sewers as illicit discharge sources, but they are assumed to be included in the "Age of Development" risk factor described below, although private laterals could also be used as a separate subbasin illicit discharge risk factor if accurate records of replacement history are available (note: if "Age of Development" is used for prioritization, do not use lateral age since this might overestimate the risk associated with older development). A simple assessment of whether there is or is not any sanitary sewer (or laterals) over 50 years of age can be performed. Fifty years is recommended since this represents the design life of most sewer systems. A more sophisticated approach can be used based on the percentage of the sewer system that is over 50 years of age, but this is more difficult and is likely not worth the effort, unless this data is readily available.

Density of Industrial NPDES Permit Holders
The density of industrial storm water permit holders is also a good indicator of potential sources of illicit discharges. These permit holders have already been identified as having a high likelihood of discharging pollutants that are potentially harmful to the receiving waterway. That is why they have a separate NPDES

permit for discharges. The location of industrial storm water permit holders is available from the IEPA. This is a subset of the industrial properties within the County since not all industrial activities require an NPDES permit. Standard Industrial Classifications (SIC) or North American Industry Classification System (NAICS) codes may also be used to help identify parcels or groups of parcels that have a high potential for contributing illicit discharges to MS4s and other storm sewer systems. Use of SIC or NAICS codes is not recommended due to the effort required to collect and categorize the data, although they may be used if further refinement is required after the initial prioritization is complete.

Age of Development

Older development has a high probability of contributing illicit discharges due to infrastructure deterioration and ultimate failure as well as a longer period of time for residents to construct illicit connections.

Historical Discharge Complaints

Historical complaints regarding illicit discharges made to the DuPage County Stormwater Management Division, DuPage County Health Department, DuPage County Public Works, and any other complaint sources (including municipal records) should be compiled and reviewed for relevance. Some of these complaints may have been logged as drainage complaints. Complaints that are over 5 years old should not be used in the evaluation.

Step 7 - Compute Subbasin Illicit Discharge Risk Scores

The Subbasin Illicit Discharge Risk Factors computed in the previous step for each subbasin will be used to compute an overall score for each subbasin. The approach is as follows:

$$\textbf{Individual subbasin score} = \frac{\sum \textbf{(Subbasin Illicit Discharge Risk Factors)}}{\textbf{(\# of Basin Factor Values)}}$$

Where,

Individual subbasin score: the normalized score for each subbasin with a value between 1 and 3.

Subbasin Illicit Discharge Risk Factors: values computed in Step 6 for each of the selected factors

# of Basin Factor Values: the total number of Basin Illicit Discharge Risk Factors selected in Step 3. This does not include the Reach Illicit Discharge Risk Factors.

After a score is computed for each of the subbasins, the score must be associated with an IDDE waterway segment (defined in step 1). Each IDDE waterway segment will have at least one subbasin discharging directly into it. The association between a subbasin and an IDDE waterway is dictated by the location of the outfall discharge points along the stream system. While one could develop weighting criteria (based on subbasin area) for assigning scores to IDDE waterway segments, a simpler approach is recommended that will result in a conservative estimate of those segments in the vicinity of areas with a high potential for being sources of illicit discharges. The recommended approach is as follows:

- compile a list of all of the subbasins associated with each IDDE waterway segment, then
- compare the individual subbasin scores associated with a given IDDE waterway segment and determine the highest score, then
- assign the highest subbasin score to the IDDE waterway segment.

Step 8 – Create Prioritization Scoring Map and Table

Once the Reach Illicit Discharge Risk Factor and Subbasin Illicit Discharge Risk Factor analysis has been performed, each of the IDDE waterway segments can be ranked and priorities assigned. Table 1-4 provides the recommended priority assignments.

TABLE 1-4
IDDE WATERWAY SEGMENT PRIORITIZATION

	REACH ILLICIT DISCHARGE RISK FACTOR	**IDDE WATERWAY SEGMENT SCORE**		
	> 20 outfalls per mile OR In-stream thresholds exceeded	**3** HIGH RISK	**2** MEDIUM RISK	**1** LOW RISK
1st Priority	X			
2nd Priority		X		
3rd Priority			X	
4th Priority				X

Based on the results of the assignments defined in Table 1-4, each IDDE waterway segment will have a priority associated with it. These assignments should be shown on a map so that priority trends can be reviewed.

Step 9 – Perform Critical Review

Using the map prepared in the previous step, groups of segments of equal priority can be lumped together to create clustered reaches with a similar priority. It is important to use common sense so that overall trends are observed so that "spotty" reach prioritizations are not defined. Situations such as a single isolated low priority segment surrounded by high priority segments should be ignored and the collection defined as a high priority reach.

If the prioritization is unclear, then other factors may need to be assessed (revisit steps 3 and 4) or the IDDE waterway segment lengths may have to be decreased (revisit step 1).

Step 10 – Review Prioritization

The prioritization will be reviewed and updated, if necessary, on an annual basis. The review and update process will include:

(1) Updating the number of outfalls within the IDDE waterway segments to include additional outfalls reported by communities, other public agencies and those discovered during outfall screening visits by County staff.

(2) Consideration of use of other factors or decreasing IDDE waterway segment lengths in an effort to further refine the prioritization.

1.1.2 Alternative Approach

The prioritization process may be simplified by eliminating the Subbasin Illicit Discharge Risk Factor analysis and simply basing the prioritization on the number of outfalls per stream mile (outfall density). Specifically, basing the prioritization on outfall density will provide an approach for prioritizing the outfall screening based on a single indicator of risk. This will limit the prioritization to using data that is an integral part of all IDDE programs, outfall locations, therefore no additional data collection is required. This approach is appropriate as an interim prioritization, but should not replace the detailed procedure described in section 1.1.1.

1.2 ROUTINE OUTFALL SCREENING

1.2.1 Permitted Discharges

The General NPDES Permit No. ILR40 authorizes the following non-storm water discharges provided they have been determined not to be substantial contributors of pollutants to a particular small MS4 applying for coverage under the permit:

- Water line and fire hydrant flushing
- Landscape irrigation water
- Rising ground waters
- Ground water infiltration
- Pumped ground water
- Discharges from potable water sources
- Foundation drains
- Air conditioning condensate
- Irrigation water (except for wastewater irrigation)
- Springs
- Water from crawl space pumps
- Footing drains
- Storm sewer cleaning water
- Water from individual residential car washing
- Routine external building washdown which does not use detergents
- Flows from riparian habitats and wetlands
- Dechlorinated pH neutral swimming pool discharges
- Residual street wash water
- Discharges of flows from fire fighting activities
- Dechlorinated water reservoir discharges, and
- Pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed)
- Discharge of storm water associated with construction site activities for municipal construction projects of one acre or more (when in compliance with ILR10)

1.2.2 Indicator Parameters

There are a variety of indicator parameters that are in use throughout the United States for aiding in Illicit Discharge Detection and Elimination (IDDE) programs. These include on-site visual characterization, on-site colorimetric tests, on-site instrument tests, and off-site/laboratory tests. Visual and Chemical parameters for the DuPage IDDE Screening are discussed below. Additional potential follow-up screening tests are also identified.

1.2.2.1 Visual Characterization Parameters

IDDE programs include a narrative description of the visual observances when inspecting an outfall. Typical on-site visual characterization elements recommended for the DuPage IDDE program include the following:

- Odor
- Color
- Turbidity
- Floatable Matter
- Deposits/Stains
- Vegetation
- Damage to Outfall Structure

TABLE 1-5
VISUAL CHARACTERIZATION INTERPRETATION (1)

PARAMETER	INTERPRETATION
Odor	*sewage:* smell associated with stale sanitary wastewater, especially in pools near outfall. *sulfur ("rotten eggs"):* industries that discharge sulfide compounds or organics (meat packers, canneries, dairies, etc.). *oil and gas:* petroleum refineries or many facilities associated with vehicle maintenance or petroleum product storage *rancid-sour:* food preparation facilities (restaurants, hotels, etc.).
Color	*cloudy:* sanitary wastewater, concrete or stone operations, fertilizer facilities, automotive dealers. *opaque:* food processors, lumber mills, metal operations, pigment plants.
Turbidity	*cloudy:* sanitary wastewater, concrete or stone operations, fertilizer facilities, automotive dealers. *opaque:* food processors, lumber mills, metal operations, pigments plants.
Floatable Matter	*oil sheen:* petroleum refineries or storage facilities and vehicle service facilities. (2) *sewage:* sanitary wastewater.
Deposits and Stains	*sediment:* construction site erosion. *oily:* petroleum refineries or storage facilities and vehicle service facilities.
Vegetation	*excessive growth:* food product facilities *inhibited growth:* high stormwater flows, beverage facilities, printing plants, metal product facilities, drug manufacturing, petroleum facilities, vehicle facilities and automobile dealers.
Damage to Outfall Structures	*concrete cracking, concrete spalling, industrial flows, metal corrosion:* industrial flows

(1) Adapted from "Table 3: Physical Observation Parameters and Likely Associated Flow Sources (Pitt, 2001)" of "Techniques for Identifying and Correcting Illicit and Inappropriate Discharges Task #2 Technical Memorandum".

(2) Some naturally occurring phenomenon can be mistaken for the presence of oil. A quick way to distinguish between oil-related materials and natural residue is to disturb the area in question. If it breaks up into 'platelets' it is a natural material. If it returns to cover the area of disturbance without breaking up, it is probably an oil related product.

1.2.2.2 Chemical Screening Parameters

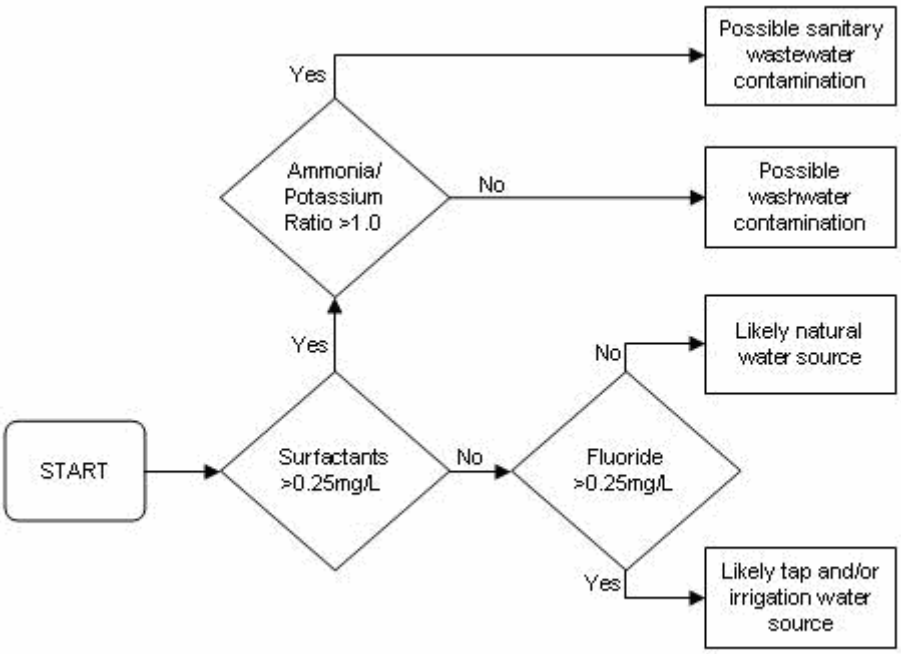
Discharge samples will be collected at outfalls where flow is occurring during periods of dry weather in order to determine whether potential illicit discharges are present. A variety of indicator parameters are available for general screening, with up to 15 or more typically in use throughout the United States. These include, but are not limited to: ammonia, boron, chlorine, color, conductivity, E.coli, detergents, fluorescence, fluoride, hardness, pH, potassium, surface tension, surfactants, and turbidity. However, a small number of indicator parameters are typically employed in general screening to identify the presence of potential illicit discharges.

The following parameters will be used for routine outfall screening in DuPage County:

- Surfactants (a detergent measurement)
- Ammonia
- Potassium
- Fluoride
- Conductivity
- pH

Individually, these tests are not able to identify all illicit discharge sources, but together they are able to identify most sanitary wastewater, washwater, and potable water discharges. In combination with other visual screening parameters, these parameters can also be used to identify potential industrial discharge problems. Figure 1 identifies the likely sources of flow for active outfalls dominated by residential land use.

FIGURE 1
IDDE SCREENING PARAMETERS AND THRESHOLDS



For outfalls with mixed land use, the inclusion of pH and Conductivity (as a measure of Total Dissolved Solids) can help identify potential industrial sources. Because of the variability and typical mixed nature of industrial discharges, if industrial sources are suspected, it is typically best to go directly to the potential source and, based on the type of industry, select appropriate screening parameters for testing. However, illicit industrial source potential can be guided by reviewing the results of the Visual characterization with conductivity and pH results following the guidance included in Tables 1-6 and 1-7.

Both field and lab testing have their own procedures for the handling of samples and testing based on the source of the test materials, with pros and cons associated with each. One advantage of field tests is the ability to obtain immediate results that may expedite identification of outfalls with a high potential for the presence of illicit discharges, providing a real-time decision model. One disadvantage is that some field test kits can contain hazardous waste components for certain parameters that require special handling and disposal considerations.

Colorimetric tests can be performed using color comparators or sophisticated equipment such as a spectrophotometer. In general, colorimetric tests using color comparators are inherently subjective as the comparison of the test ampoule color with the color comparator is interpreted by an individual. Common color comparators include color wheels, slides, test strips, and vials. In addition, the comparator and individual test ampoules can degrade in effectiveness over time and typically have clearly identified expiration dates. Colorimetric testing performed with equipment such as a spectrophotometer eliminates the subjectivity of the testing, although manufacturers of portable colorimetric testing equipment have identified variances in results depending on the parameter in question, regardless of whether comparator or electronic testing equipment is used.

Lab tests are conducted in a more controlled environment and with a higher level of accuracy, but the effort and cost associated with transporting and conducting lab tests may not be warranted. In light of this, DuPage County will perform the colorimetric testing first and if the results warrant further testing, samples will be taken to a lab for further investigation.

Therefore, while the recommended test thresholds and identification flow chart provided within this section are strong indications of the presence of illicit discharges, not all discharges with elevated pollutant levels require immediate follow-up investigation. The term “follow-up investigation” is meant to indicate a return visit to an outfall based on one or more screening indicator parameters. Follow-up investigations are typically grouped into categories of response.

High Priority Follow-up Investigation: A high priority follow-up investigation is a more immediate response associated with one or more screening indicator parameters (visual and/or chemical) that strongly suggest the presence of an illicit discharge. A return visit to these outfalls should be made as soon as possible to conduct a confirmation screening and then proceed with an investigation of the system in an attempt to identify or isolate the potential illicit discharge source(s).

Medium Priority Follow-up Investigation: A medium priority follow-up investigation is a programmed/scheduled return visit to an outfall associated with one or more screening indicator parameters (visual and/or chemical) that may suggest the presence of an illicit discharge. A return visit to these outfalls should be made in a programmatic/scheduled response to conduct a second screening (confirmation screening) and then proceed with an investigation, if warranted, of the system in an attempt to identify or isolate the potential illicit discharge source(s). While not requiring “immediate” response, these investigations should be conducted in a timely manner to further develop the program. Within this

category, there may be additional prioritization based on available resources, ability to identify outlier samples based on sampling history, etc.

Low Priority Follow-up Investigation: A low priority follow-up investigation is a programmed/scheduled return visit to an outfall associated with one or more screening indicator parameters (visual and/or chemical) that are present but have a much lesser potential for the presence of an illicit discharge. A return visit to these outfalls should be made in a programmatic/scheduled response to conduct a second screening, typically after all municipal outfalls are screened once, or if resources are available to conduct more frequent re-screening.

A summary of common indicator parameters has been provided in Table 1-6 with a designation regarding their relative concentration in discharges from specific non-stormwater flow sources.

TABLE 1-6
ILLICIT DISCHARGE FIELD SURVEY PARAMETERS

	NON-STORMWATER FLOW SOURCES							
	NATURAL WATER	**POTABLE WATER**	**SANITARY SEWAGE**	**SEPTAGE WATER**	**INDUS. WATER**	**WASH WATER**	**RINSE WATER**	**IRRIG. WATER**
PARAMETER								
Fluorides	-	+	+	+	+/-	+	+	+
Surfactants	-	-	+	-	-	+	+	-
Florescence	-	-	+	+	-	+	+	-
Potassium	-	-	+	+	-	-	-	-
Ammonia	-	-	+	+	-	-	-	-
Odor	-	-	+	+	+	+/-	-	-
Color	-	-	-	-	+	-	-	-
Clarity	-	-	+	+	+	+	+/-	-
Floatables	-	-	+	-	+	+/-	+/-	-
Deposits and stains	-	-	+	-	+	+/-	+/-	-
Vegetation change	-	-	+	+	+	+/-	-	+
Structural damage	-	-	-	-	+	-	-	-
Conductivity	-	-	+	+	+	+/-	+	+
pH	-	-	-	-	+	-	-	-
Note: -	implies relatively low concentration							
+	implies relatively high concentration							
+/-	implies variable conditions							

Adapted from FIELD SURVEY PARAMETERS AND ASSOCIATED NON-STORMWATER FLOW SOURCES (PITT, 2001)

Table 1-7 provides a detailed summary of characteristics for specific industrial categories. These characteristics can be helpful in identifying the type of industrial dischargers that might be responsible for a potential illicit discharge.

TABLE 1-7
CHARACTERISTICS OF INDUSTRIAL DISCHARGES

Industrial Categories Major Classfications SIC Group Numbers	Odor	Color	Turbidity	Floatables	Debris and Stains	Structural Damage	Vegetation	pH	Total dissolved solids
Primary Industries									
20 Food and Kindred Products									
201 Meat Products	Spoiled Meats, Rotten Eggs and Flesh	Brown to Reddish-Brown	High	Animal Fats, Byproducts, Pieces of Processed Meats	Brown to Black	High	Flourish	Normal	High
202 Dairy Products	Spoiled Mile, Rancid Butter	Grey to White	High	Animal Fats, Spoiled Milk Products	Grey to Light Brown	High	Flourish	Acidic	High
203 Canned and Preserved Fruits and Vegetables	Decaying Products Compost Pile	Various	High	Vegetable Waxes, Seeds, Skins, Cores, Leaves	Brown	Low	Normal	Wide Range	High
204 Grain Mill Products	Slightly Sweet & Musty, Grainy	Brown to Reddish Brown	High	Grain Hulls and Skins, Straw & Plant Fragments	Light Brown	Low	Normal	Normal	High
205 Bakery Products	Sweet and or Spoiled	Brown to Black	High	Cooking Oils, Lard, Flour, Sugar	Grey to Light Brown	Low	Normal	Normal	High
206 Sugar and Confectionary Products	NA	NA	Low	Low Potential	White Crystals	Low	Normal	Normal	High
207 Fats and Oils	Spoiled Meats, lard or Grease	Brown to Black	High	Animal Fats, Lard	Grey to Light Brown	Low	Normal	Normal	High
208 Beverages	Flat Soda, Beer or Wine, Alcohol, Yeast	Various	Mod.	Grains 6 Hops, Broken Glass, Discarded Canning Items	Light Brown	High	Inhibited	Wide Range	High
21 Tobacco Manufactures	Dried Tobacco, Cigars, Cigarettes	Brown to Black	Low	Tobacco Stems & Leaves, Papers and Fillers	Brown	Low	Normal	Normal	Low
22 Textile Mill Products	Wet Burlap, Bleach, Soap, Detergents	Various	High	Fibers, Oils, Grease	Grey to Black	Low	Inhibited	Basic	High
23 Apparel; and Other Finished Products	NA	Various	Low	Some Fabric Particles	NA	Low	Normal	Normal	Low
Material Manufacture									
24 Lumber & Wood Products	NA	NA	Low	Some Sawdust	Light Brown	Low	Normal	Normal	Low
25 Furniture & Fixtures	Various	Various	Low	Some Sawdust, Solvents	Light Brown	Low	Normal	Normal	Low
26 Paper & Allied Products	Bleach, Various Chemicals	Various	Mod.	Sawdust, Pulp Paper, Waxes, Oils	Light Brown	Low	Normal	Wide Range	Low
27 Printing, Publishing, and Allied Industries	Ink, Solvents	Brown to Black	Mod.	Paper Dust, Solvents	Grey to Light Brown	Low	Inhibited	Normal	High
31 Leather & Leather Products	Leather, bleach, Rotten Eggs or Flesh	Various	High	Animal Flesh & Hair, Oils, Grease	Grey to Black, Salt Crystals	High	Highly Inhibited	Wide Range	High

TABLE 1-7 (CONTINUED)
CHARACTERISTICS OF INDUSTRIAL DISCHARGES

Industrial Categories Major Classifications SIC Group Numbers	Odor	Color	Turbidity	Floatables	Debris and Stains	Structural Damage	Vegetation	pH	Total dissolved solids
33 Primary Metal Industries	Various	Brown to Black	Mod.	Ore, Coke, Limestone, Millscale, Oils	Grey to Black	High	Inhibited	Acidic	High
34 Fabricated Metal Products	Detergents, Rotten Eggs	Brown to Black	High	Dirt, Grease, Oils, Sand, Clay Dust	Grey to Black	Low	Inhibited	Wide Range	High
32 Stone, Clay, Glass, and Concrete Products	Wet Clay, Mud, Detergents	Brown to Reddish-Brown	Mod.	Glass Particles Dust from Clay or Stone	Grey to Light Brown	Low	Normal	Basic	Low
Chemical Manufacture									
28 Chemical & Allied Products									
2812 Alkalies and Chlorine	Strong Halogen or Chlorine, Pungent, Burning	Alkalies – NA Chlorine – Yellow to Green	Low	NA	Alkalies – White Carbonate Scale Chlorine - NA	High	Highly Inhibited	Basic	High
2816 Inorganic Pigments	NA	Various	High	Low Potential	Various	Low	Highly Inhibited	Wide Range	High
282 Plastic Materials and Synthetics	Pungent, Fishy	Various	High	Plastic Fragments, Pieces of Synthetic Products	Various	Low	Inhibited	Wide Range	High
283 Drugs	NA	Various	High	Gelatin Byproducts for Capsulating Drugs	Various	Low	Highly Inhibited	Normal	High
284 Soap, Detergents & cleaning Preparations	Sweet or Flowery	Various	High	Oils, Grease	Grey to Black	Low	Inhibited	Basic	High
285 Paints, Varnishes, Lacquers, Enamels and Allied Products (SB – Solvent Base)	Lates – Ammonia SB – Dependent Upon Solvent (Paint Thinner, Mineral Spirits)	Various	High	Latex – NA SB – All Solvents	Grey to Black	Low	Inhibited	Latex – Basic SB - Normal	High
286 Indust. Organic Chemicals									
2861 Gum and Wood Chemicals	Pine Spirits	Brown to Black	High	Rosins and Pine Tars	Grey to Black	Low	Inhibited	Acidic	High
2865 Cyclic Crudes, & Cyclic Intermediates Dyes, & Organic Pigments	Sweet Organic Smell	NA	Low	Translucent Sheet	NA	Low	Highly Inhibited	Normal	Low

TABLE 1-7 (CONTINUED)
CHARACTERISTICS OF INDUSTRIAL DISCHARGES

Industrial Categories Major Classifications SIC Group Numbers	Odor	Color	Turbidity	Floatables	Debris and Stains	Structural Damage	Vegetation	pH	Total dissolved solids
287 Agricultural Chemicals									
2873 Nitrogenous Fertilizers	NA	NA	Low	NA	White Crystalline Powder	High	Inhibited	Acidic	High
2874 Phosphatic Fertilizers	Pungent Sweet	Milky White High	NA	White Amorphous Powder	High	Inhibited	Acidic	High	
2875 Fertilizers, Mixing Only	Various	Brown to Black	High	Pelletized Fertilizers	Brown Amorphous Powder	Low	Normal	Normal	High
29 Petroleux Refining and Related Industries									
291 Petroleum Refining	Rotten Eggs, Kerosene, Gasoline	Brown to Black	High	Any Crude or Processed Fuel	Black Salt Crystals	Low	Inhibited	Wide Range	High
30 Rubber & Miscellaneous Plastic Products	Rotten Eggs, Chlorine, Peroxide	Brown to Black	Mod.	Shredded Rubber Pieces of Fabric or Metal	Grey to Black	Low	Inhibited	Wide Range	High
Transportation & Construction									
15 Building Construction	Various	Brown to Black	High	Oils, Grease, Fuels	Grey to Black	Low	Normal	Normal	High
16 Heavy Construction	Various	Brown to Black	High	Oils, Grease, Fuels, Diluted Asphalt or Cement	Grey to Black	Low	Normal	Normal	High
Retail									
52 Building Materials, Hardware, Garden Supply, and Mobil Home Dealers	NA	Brown to Black	Low	Some Seeds, Plant Parts, Dirt, Sawdust, or Oil	Light Brown	Low	Normal	Normal	Low
53 Gen. Merchandise Stores	NA	NA	NA	NA	NA	Low	Normal	Normal	Low
54 Food Stores	Spoiled Produce, Rancid, Sour	Various	Low	Fragments of Food, Decaying Produce	Light Brown	Low	Flourish	Normal	Low
55 Automotive Dealers & Gasoline Service Stations	Oil or Gasoline	Brown to Black	Mod.	Oil or Gasoline	Brown	Low	Inhibited	Normal	Low
56 Apparel & Accessory Stores	NA	NA	Low	NA	NA	Low	Normal	Normal	Low
57 Home Furniture, Furnishings, & Equip. Stores	NA	NA	Low	NA	NA	Low	Normal	Normal	Low

TABLE 1-7 (CONTINUED)
CHARACTERISTICS OF INDUSTRIAL DISCHARGES

Industrial Categories Major Classifications SIC Group Numbers	Odor	Color	Turbidity	Floatables	Debris and Stains	Structural Damage	Vegetation	pH	Total dissolved solids
58 Eating & Drinking Places	Spoiled Foods Oil & Grease	Brown to Black	Low	Spoiled or Leftover Foods	Brown	Low	Normal	Normal	Low
Coal Steam Electric Power	NA	Brown to Black	High	Coal Dust	Black Amorphous Powder	Low	Normal	Slightly Acidic	Low
Nuclear Steam Electric Power	NA	Light Brown Low		Oils, Lubricants	Light Brown	Low	Normal	Normal	Low

ADAPTED FROM CHEMICAL AND PHYSICAL PROPERTIES FOR INDUSTRIAL NON-STORMWATER DISCHARGES (PITT, 2001)

1.2.3 ADDITIONAL SCREENING PARAMETERS

1.2.3.1 Industrial Discharges

In some cases of specific suspected discharge types or as part of follow-up screening activities, additional parameters can aid in characterizing the discharge. Specifically, if the previous screening parameters and other characterizations (see Tables 1-6 and 1-7) indicate a high potential for industrial non-stormwater discharges, an expanded list of available parameters exists and should be consulted when pursuing targeted industrial follow-up screening efforts as listed in Table 1-8. Testing for many of these parameters is best conducted in a controlled laboratory setting; however, several tests can be conducted in the field with portable test kits or instrumentation.

TABLE 1-8
SIGNIFICANT CHEMICALS IN INDUSTRIAL WASTEWATERS

Chemical:	Industry:
Acetic acid	Acetate rayon, pickle and beetroot manufacture.
Alkalies	Cotton and straw Kiering, cotton manufacture, mercerizing, wool scouring, and laundries.
Ammonia	Gas, coke, and chemical manufacture.
Arsenic	Sheep-dipping, and felt mongering.
Chlorine	Laundries, paper mills, and textile bleaching.
Chromium	Plating, Chrome tanning, and aluminum anodizing.
Cadmium	Plating.
Citric acid	Soft drinks and citrus fruit processing.
Copper	Plating, pickling, and rayon , manufacture.
Cyanides	Plating, metal cleaning, case-hardening, and gas manufacture.
Fats, oils	Wool scouring, laundries, textiles, and oil refineries.
Fluorides	Gas, coke, and chemical manufacture, fertilizer plants, transistor manufacture, metal refining, ceramic plants, and glass etching.
Formalin	Manufacture of synthetic resins and penicillin.
Hydrocarbons	Petrochemical and rubber factories.
Hydrogen peroxide	Textile bleaching, and rocket motor testing.
Lead	Battery manufacture, lead mining, paint manufacture, and gasoline manufacture.
Mercaptans	Oil refining, and pulp mills
Mineral acids	Chemical manufacture, mines, Fe and Cu pickling, brewing, textiles, photo-engraving, and batter manufacture.
Nickel	Plating.
Nitro compounds	Explosives and chemical works.
Organic acids	Distilleries and fermentation plants.
Phenols	Gas and coke manufacture, synthetic resin manufacture, textiles, tanneries, tar, chemical, and dye manufacture and sheep-dipping.
Silver	Plating, and photography.
Starch	Food, textile, and wallpaper manufacture.
Sugars	Dairies, foods, sugar refining, and preserves.
Sulfides	Textiles, tanneries, gas manufacture, and rayon manufacture.
Sulfites	Wood process, viscose manufacture, and bleaching.
Tannic acid	Tanning, and sawmills.
Tartaric acid	Dyeing, wine, leather, and chemical manufacture.
Zinc	Galvanizing, plating, viscose manufacture, and rubber process

Source: Van der Leeden, et al 1990.

1.2.3.2 Impaired Waters

In areas with developed TMDLs, parameters that aid in understanding or identifying constituents that can impact stream pollutant loads may be added to identify potential impairment sources and improve discharges to waterways.

1.2.3.3 Human Markers

Additionally, new techniques are being developed that aid in sanitary or industrial characterization such as using DNA tests for Bacteroides to distinguish between animal and human wastewater sources.

1.2.4 Field Screening Procedure

a. Outfall Screening Staff – Normal outfall field screening should be conducted by a two person team with appropriate equipment to accomplish the screening in a safe and efficient manner.

b. Safety – Depending on screening methodology, safety equipment will vary. A project-specific safety plan is recommended including identification of hazards and location of medical facilities. For normal outfall reconnaissance and screening, safety equipment generally includes, but is not limited to the following:
    - a standard first aid kit (bandages, gauze, tape, etc)
    - cell phone(s) (and/or radios)
    - rubber gloves
    - waders
    - steel toed boots
    - safety glasses
    - safety vests
    - hard hats
    - floatation devices (if working from a canoe or wading streams)
    - waste disposal bottle/container

c. Screening Equipment – Depending on the final screening methodology, screening equipment will vary. Typical screening equipment includes, but is not limited to the following:
    - System mapping
    - Data collection forms
    - Writing instruments
    - Measuring tape
    - Digital camera
    - Sample collection jar/device
    - Sample collection pole and bucket (in anticipation of hard to reach sample sites)
    - Test kits (for portable/on-site field screening)
    - Sampling instruments (for on-site screening)
    - Sample jars (for samples identified for laboratory testing – if necessary)
    - Cooler and ice (to transport samples for lab testing – if necessary)
    - GPS Device (Leica GPS1200)
    - Optional equipment includes an electronic data collector or field laptop computer

d. Screening Weather Conditions - IDDE field screening should be conducted during dry weather periods, typically at least 72 hours after any rainfall (0.1 inches or greater). Screening can be done as soon as 48 hours after measurable rainfall if necessary but may lead to a greater number of flowing outfalls because of higher ground water levels and detention pond flows.

e. Field Screening Outfall Prioritization - Field screening points will, where possible, be prioritized based on outfall density, total drainage area, population density of the site, age of the structure or buildings in the area, history of the area, and land use types, etc. (See Section 1.1).

f. Field Screening Location – Field screening points shall be located where practicable at the outfall. If the outfall is inaccessible or submerged, the farthest downstream manhole, or other accessible location downstream in the system is typical. If necessary and immediate screening of inaccessible outfalls is impractical, the outfall conditions that resulted in screening not being possible should be noted and it should be identified for screening at a later date with appropriate resources.

g. Data Collection Forms - Data should be collected using a standardized IDDE inspection form. A sample Illicit Discharge Inspection Form is included at the end of this Chapter and should be used for all inspections to record physical and chemical testing results (if necessary). Alternately, digital data forms can be developed and used for expedited data recording.

   On-site parameters are collected on field forms that are specific for each outfall that requires screening and are typically developed ahead of field activities with appropriate background information to verify that the correct site location is being inspected. Often at the inception of a program, or in the case where a new outfall is discovered, a blank field form is available and filled out with relevant information at the site. In some programs, paper field forms are supplemented or replaced with hand held data collection devices or computer tablets in some cases, including GPS equipment to allow expedited data collection and downloading.

      i. General Outfall Information – general information (Background Data, Outfall Description) already known should be indicated on a data collection form prior to going into the field. This will assist with location and verification of the outfall. While in the field, existing documented information should be verified and corrected if necessary and new information indicated (see sample form). A photograph of the outfall should be taken to aid in future visits to confirm location, document current physical characteristics and through time, document change in characteristics.

      ii. Physical Characteristics – physical characteristics for flowing and non-flowing outfalls should be document by completing the appropriate section of the data collection form (see sample form and Indicator Parameters Section for additional guidance).

      iii. Chemical Characteristics – If sufficient flow is observed and samples can be safely collected, a field chemical analysis of the discharge should be performed and documented on the data collection form (see sample form and Indicator Parameters Section for additional guidance).

h. Sample Collection - The field chemical analysis will consist of the following:

i. Take grab samples at a flowing outfall that has sufficient flow that a sample can reasonably taken for field screening.

ii. Samples should be collected in a clean sample container.

iii. If sample containers are reused in the field, the container should be rinsed out three times with the water from the outfall being sampled.

iv. Care should be taken not to scrape the bottom of the outfall and capture sediment and other benthic materials.

v. Stream flows/pond water and water pooled at the outfall should NOT be taken as the outfall grab sample; however, these sources CAN be sampled to aid in overall characterization of water quality in the area. Specifically, pooled water can and should be taken to supplement the normal outfall sampling in the case where the pooled water looks like it may contain pollutants from past (intermittent) discharges or dumping (discoloration, floatables, etc). Pooled water (or other stream/pond) grab samples should be tested on-site and, if test results return positive for potential pollutant indicators, it is suggested that an additional grab sample (of up to one liter) be taken for potential follow-up lab testing after review of potential sources and tests to be conducted. Collected sample jars should be put on ice in a cooler to preserve them as best as possible as many tests have retention times and specific preservatives and handling requirements.

vi. Amount of grab samples/quantity of collected water necessary will vary depending on the field screening method (test kit, on-site instrument test, lab sample).

vii. Detailed procedures for collecting each sample and conducting each test should be reviewed following the manufactures guidance.

viii. Testing should be conducted for each screening parameter following manufacturer's guidance.

ix. Results should be immediately transferred to the data collection form following the test.

x. Unused grab sample water can generally be poured out on site. Used sample vials/ampoules, etc should be handled and disposed of per manufacturers directions.

xi. Test kits and instruments should be cleaned and closed carefully after completion of tests.

xii. Once the field screening is complete and all resources are repacked and secure the team should proceed to the next outfall.

xiii. If test results return highly positive for potential pollutant indicators or visual observations appear to contain conclusive indication of an active illicit discharge, identify the outfall for follow-up screening (see Section 2.0).

2.0 INVESTIGATION PROCEDURES

2.1 Deciding When to Conduct Further Investigations

a. Deciding when to further investigate discharges - The County will investigate portions of the municipal separate storm sewer system that, based on field screening sampling results or other information indicate a reasonable potential for containing illicit discharges or other sources of non-storm water discharges. The following instances as outlined will generally be considered as conditions that warrant follow-up investigations along with the recommended action:

i. Normal field screening parameters meet the following characteristics:

TABLE 2-1
SCREENING PARAMETER THRESHOLDS

Screening Parameter	Threshold	Action
Surfactants (Detergents)	Sample > 0.25 mg/l	Evaluate Ammonia and Potassium Levels and Ratio for potential source(s)
Potassium	Sample > 3.1 mg/l	Exceeds average spring water and tap water levels (Reference - Pitt). Review local sample result "Library" if available. Review other test results including Ammonia/Potassium Ratio then conduct normal confirmation follow-up actions (See Section 2.2)
Ammonia	Sample > 0.1 mg/l	Exceeds average spring water and tap water levels (Reference - Pitt). Review local sample result "Library" if available. Review other test results including Ammonia/Potassium Ratio then conduct normal confirmation follow-up actions (See Section 2.2).
Ammonia/Potassium Ratio	Sample Ratio > 1 (possible wastewater contamination) Sample Ratio <1 (possible washwater contamination)	Note potential source(s) and conduct normal confirmation follow-up actions (See Section 2.2)
Fluoride	Sample > 0.25 mg/l	Exceeds typical groundwater levels. Likely contains sources of potable water or sewage. (Heavily diluted sewage is often within threshold levels.) Conduct normal confirmation follow-up actions (See Section 2.2)
pH	Sample < 5 or Sample > 9	Likely contains an industrial process water source. Review potential industrial sources. (See Table 1-7)
Conductivity	Sample > 150 uS/cm	Exceeds average spring water and tap water levels (Reference - Pitt). Review local sample result "Library" if available. Review other test results including Ammonia/Potassium Ratio then conduct normal confirmation follow-up actions (See Section 2.2).

a. Notes:
   i. Levels/ratios as noted do not necessarily "guarantee" the presence of an illicit discharge.
   ii. In some cases, not all chemical parameters may be tested for during the initial screening (such as potassium) for various reasons including: complexity of the field test; use of hazardous chemicals; cost; and other considerations.
   iii. It may be beneficial to develop a "Library" of local chemical test results of potable water and ground water samples or document reported potable water average levels from standard water quality reports.
   iv. Chemical test that exceed (or are below) the levels presented above, in Figure 1 and on the Illicit Discharge Inspection Form do not necessarily indicate the presence (or lack) of an illicit discharge. Permitted industrial storm water discharges or other permitted non-storm water discharges may be present or may be masked by excessive clear water flows. Additionally, these tests can be somewhat subjective if visual colorimetric test kits are used and there can also be varying levels of accuracy depending on the test kits selected.
   v. Documentation of results can also be used to compare one outfall level to another, develop history on an outfall (i.e. establish baseline levels) and serve as potential indicators of illicit discharges.

ii. Normal field screening parameters (Physical and Chemical) meet the following characteristics:
   1. In comparison to Table 1-6 indicates either Sanitary Sewage, Septage Water, Industrial Water, Wash Water, or Rinse Water Probabilities
   2. Recommended follow-up actions include:
      a. If Table 1-6 indicates a high probability for Industrial sources, Table 1-7 Should be reviewed for additional potential source characterization
      b. Table 1-8, where appropriate will aid in follow-up screening parameter identification
      c. Review known land use for drainage basin system locations containing land use/businesses with high potential to be discharge source
      d. Select test parameters best suited to identify likely discharge sources
      e. Conduct follow-up investigations by conducing follow-up screening within the drainage system downstream of potential sources screening following the same procedures for normal field screening and, assuming screening confirms continued suspicion of discharges, conduct selected testing

iii. Reported spills or dumping
   1. Document as many details of reported occurrence as possible including but not limited to the following:

a. Time and Date
b. Location
c. Name of suspect person or business (if known)
d. Nature of material (if known)
e. Is the incident about to occur (in the instance of dumping)
f. Is the incident on-going
g. Has this been known to occur in the past
h. Name and number of person reporting incident (if willing to offer)
i. Other information

2. County should develop a form to document this information and form should be kept near the phone of the person taking calls from the spills hotline or other likely person.
3. See Spills and Dumping in Section X.X and the County Spill Response Plan in Appendix Z for additional information. **TO BE COMPLETED BY DUPAGE COUNTY STAFF AT A LATER DATE.**
4. Priority -
    a. Appropriate emergency follow-up action should be taken if the incident is about to occur, on-going, or recently occurred to protect the health of residents, the environment, and County infrastructure.
    b. Non-emergency situations should be evaluated for additional follow-up actions depending on the nature of the problem.

b. Identifying outfalls for future screening
    1. Future follow-up screening is recommended if Physical, Chemical, or other indications show signs of potential or past illicit discharges but do not meet the criteria for conducting follow-up investigations. Criteria for placing an outfall on a future screening or "watch" schedule that is more frequent than the normal routine outfall screening include but are not limited to the following:
        a. Inactive outfalls with staining, corrosion/pitting, discolored pools, excessive (or void of) vegetation, or other signs of potential past or intermittent discharges.
        b. Active outfalls with surfactants < 0.25 mg/l, but > 0.0 mg/l
        c. Active outfalls that were identified for follow-up screening but when follow-up confirmation testing is conducted, parameters are below previous identified thresholds or the outfall is no longer active.
        d. Active outfalls where follow-up investigations are not successful in locating source(s).
        e. Outfalls with reported or historical past indications of potential illicit discharges including dumping but are not active.
        f. Note: Outfalls with suspected intermittent and potential illicit discharges should be followed-up using specific approaches to trap samples. These include caulk dams, suspended absorption devices, automatic samplers, or other techniques.

2.2 Procedures for Following Up on Known or Suspected Illicit Discharges

a. For active outfalls identified in the field screening (or through other means such as complaint driven notification) as having a reasonable potential for containing illicit discharges or other sources of unallowable non-stormwater discharges, the County will attempt to locate the source of the potential discharge. The following procedure will generally be followed:

    i. Confirmation Screening – The suspect outfall will be revisited within a reasonable timeframe following the initial field screening and, assuming the outfall remains active, re-sampled for testing at a laboratory to confirm the presence of the identified parameters. This sampling will include provisions for any additional testing not initially performed in the field.

        a. If the outfall is inactive or produces screening levels that appear too low to reasonably conduct follow-up investigation, the follow-up can be terminated and the outfall can be placed on the future follow-up “watch” schedule.

    ii. Additional Screening Tests - If additional sampling parameters were identified based on suspect industrial sources, they should be taken following a successful confirmation sampling. If they include on-site test kit or instrument tests and do not produce positive results, they can be dropped from the remaining follow-up sampling effort but may be re-tested if a potential source is isolated because some chemicals can be present in low levels if there is sufficient dilution but more likely to be present in higher concentrations at a discharge source.

    iii. Upstream Screening - The sampling crew will follow the storm drainage system upstream to the next accessible upstream manhole or storm sewer junction to confirm the presence of flow and sampling. A three person team may be necessary depending on the location and depth of manholes and other sampling locations and conditions, including heavy traffic and the potential to follow confined space protocols for deep samples. If fewer parameters can be evaluated to reduce cost and effort (such as surfactants or industrial parameter that is tested on-site with test kits or instrument test) other parameters may be dropped from the sampling regiment if desired. The full sample set should be periodically tested to verify no significant change in detection.

        a. This procedure will be continued using storm sewer system mapping until the suspect illicit discharge chemical source location is isolated to one or more storm sewer segments if possible.

    iv. Windshield Survey - Once the location is isolated (if possible), the crew will search for obvious visual signs of illicit connections and discharges by conducting a “windshield survey”. The survey includes photographing the surrounding area including buildings, observing business types, and other items of interest. Other items of interest can include, but are not limited to outdoor storage areas, staining, or other potential signs of illicit discharges or dumping. Inlets and catch basins, if present may be inspected for the presence of

discolored water, staining, or other indications of non-storm water discharges and may include direct chemical testing of catch basin sumps. No internal entry of any business is included in this effort. The results of the survey will be shared with County staff at a meeting for discussion of potential sources and recommended next steps.

v. Building Records Review - Following the "windshield survey", building records may be researched to identify potential cross connections and discussions may be held with building owners.

vi. Advanced Investigation Techniques - If no immediate source is apparent after visual site inspection of sewers and buildings, the County will consider other methods to identify the flow such as sewer system televising, dye water testing (IEPA should be notified in advance of the time and location of any dye water testing), smoke testing, etc., based on the general location of the chemical and other specific details such as proximity to industrial activity and sanitary sewers.

a. Televising – For drainage systems where field screening isolated the pollutant(s) to a single storm sewer segment and previous investigative efforts or discussions with municipal staff did not result in any other specific actions or recommendations, the most common next step may be to televise the isolated storm sewer line for potential illicit connections or inflow/infiltration points. The televising is reviewed for flow sources, staining, debris buildup and other potential pollutant source indicators. This effort can generally be accomplished without notification or permission of surrounding landowners. Who conducts and reviews the televising will depend on available resources and expertise.

b. Smoke Testing – For drainage systems where field screening isolated the pollutant(s) to a single storm sewer segment, and where discussions with municipal staff or results from storm sewer line televising suggest a potential illicit connection, a probable next step is to conduct smoke testing of the isolated storm sewer line. Smoke testing can identify larger direct and some indirect connections to the storm sewer system. This effort is accomplished after notification of surrounding landowners by providing notices to each homeowner/business of the upcoming test in the area, as well as notifying appropriate municipal staff and fire/police staff a minimum of two to three days prior to testing. Informing downstream communities is typically not needed because smoke migration is relatively local.

c. Dye Testing - For drainage systems where field screening isolated the pollutant(s) to a single storm sewer segment but other methods of investigation fail to completely identify the source of the suspect connection, dyed water testing can assist in locating the source. This effort is accomplished after

notification of surrounding landowners and, depending on what line is to be tested, often requires permission to enter private property. A private or municipal potable water source is typically needed for this testing. Appropriate notification of regulatory officials and any downstream connected municipalities should also be conducted. Multiple field staff are needed to drop the dye and watch potential receiving sewers/areas.

d. Leak Detection Survey (Assumes Fluoride Parameter Used) - For each drainage system where field screening for pollutant(s) of interest resulted in isolating the pollutant(s) to a single storm sewer segment and the pollutant(s) of interest included fluoride and no obvious source is manifest, leaking water lines may be a source of the potable water. Potable water sources can lead to unnecessary outfall screening, dilute pollution sources, and can infiltrate into sanitary and storm systems resulting in unnecessary costs by the municipality to treat the potable water in the distribution system and treat excess infiltration and inflow in the sanitary sewer system. A leak detection survey on the water mains is recommended in the area of the suspected flow. This can typically be conducted with a single staff person with appropriate equipment and experience. If a leak is identified, the location of the leak will be identified and forwarded to appropriate staff for repair. If there is a repair made, a follow-up visit to check for the presence of flow and, if applicable, additional leak detection survey efforts on the area to confirm that there were no other apparent leaks present. .

vii. Assessing Permitted Industrial Discharges - The County will assess whether or not an identified source facility is appropriately permitted to discharge into the storm sewer system. This can be done by contacting IEPA with the name and address of the business in question for information on their permit or using other methods.

3.0 PROCEDURES FOR DISCONNECTION OF IDENTIFIED ILLICIT DISCHARGES

a. Illicit Discharges Within Unincorporated DuPage County - When an illicit connection/discharge is located, the County will begin procedures to work with the subject property/owner to eliminate the connection as expediently as possible.

b. Notification to Neighboring (downstream) Municipalities - In the case of an illicit discharge that originates within the County and that discharges directly to a neighboring municipality's MS4, the County will notify the affected municipality as soon as practicable of the identified source, typically within 24 hours of confirming the illicit discharge source.

c. Illicit Discharges Originating from Incorporated Areas Within DuPage County - In the case of an illicit discharge that originates from an area other than Unincorporated DuPage County, the County will notify the 'originating" municipality as soon as practicable, ideally within 24 hours.

d. Minimization of Discharge - Prior to the actual disconnection, the County will require the owner/operator of the illicit connection/discharge to take all reasonable measures to minimize the discharge of pollutants to the municipal separate storm sewer system.

e. Elimination of Illicit Connections/Discharges - Each illicit connection/discharge discovery will be handled on a case-by-case basis. The County has not prepared an exact remedy or timeframe for illicit discharge correction because of the wide variability of potential discharge situations. More complicated or costly remedies may take a longer period of time to correct. If it appears that more than 72 hours will be required to remedy the situation, the IEPA will be contacted and provided with additional details regarding the problem, including but not limited to interim measures to eliminate or reduce pollutant exposure, and an estimated timeline for complete elimination.

f. Illicit Discharge and Spills Contact Information – DuPage County Stormwater Management Division (999) 999-9999 (IDDE Hotline number). **TO BE ADDED BY DUPAGE COUNTY STAFF AT A LATER DATE.**

ILLICIT DISCHARGE INSPECTION FORM

ILLICIT DISCHARGE INSPECTION FORM

Pipe / Outfall Location (include ID if available):_____

Pipe Description (material, shape, dimensions):_____
-OR-
Open Drainage Description (material, shape, dimensions):_____

Inspector's Names _____

Date/Time of Inspection: _____

Date & amount of last rainfall: _____in.

Is pipe/outfall active? _____

Ambient Temperature: _____°F

Water Temperature: _____°F

Insert Photo Here

OUTFALL SCREENING RESULTS
FIRST SAMPLE

OBSERVATIONS

Color:_____

Odor:_____

Turbidity:_____

Floatable Matter:_____

Deposits/Stains:_____

Vegetation:_____

Damage to Outfall Structure:_____

SAMPLE RESULTS (Expected Range/Level)

pH:_____(5.0>sample<9.0)

Detergent:_____mg/L (sample<0.25)

Fluoride:_____mg/L (sample<0.25)

Ammonia:_____mg/L (sample<0.1)

Potassium:_____mg/L (sample<3.1)

Conductivity:_____uS/cm (sample<150)

Ammonia/Potassium Ratio:_____

FLOW/DISCHARGE ESTIMATE

Velocity: slow (<2 ft/s) Moderate (2-5 ft/s) Fast (> 5 ft/s) Water Level in Pipe/Channel:_____inches.

Additional Comments/Observations: _____

_____

_____

OUTFALL SCREENING RESULTS
SECOND SAMPLE (if necessary) Date/Time: _____

OBSERVATIONS

Color:_____

Odor:_____

Turbidity:_____

Floatable Matter:_____

Ammonia/Potassium Ratio:_____

SAMPLE RESULTS (Expected Range/Level)

pH:_____(5.0>sample<9.0)

Detergent:_____mg/L (sample<0.25)

Fluoride:_____mg/L (sample<0.25)

Ammonia:_____mg/L (sample<0.1)

Potassium:_____mg/L (sample<3.1)

Conductivity:_____uS/cm (sample<150)

FLOW/DISCHARGE ESTIMATE

Velocity: slow (<2 ft/s) Moderate (2-5 ft/s) Fast (> 5 ft/s) Water Level in Pipe/Channel:_____inches.

Additional Comments/Observations: _____

_____

REFERENCES

1. Code of Federal Regulations Title 40 Part 122 (40CFR122). EPA Administered Programs: The national Pollutant Discharge Elimination System.
2. Deb Caraco, Center for Watershed Protection, Techniques for Identifying and Correcting Illicit and Inappropriate Discharges Task #2 Technical Memorandum, March 30, 2002 (revised October 10, 2002)
3. Center for Watershed Protection, Techniques for Identifying and Correcting Illicit and Inappropriate Discharges Task #1 Technical Memorandum, November 7, 2002
4. Center for Watershed Protection, Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments, October 2004
5. Rhode Island Department of Environmental Management Office of Water Resources, Instructions / Guidance for the Illicit Discharge Detection and Elimination Outfall Identification and Dry Weather Flow Survey Inspection Forms, materials not dated.
6. Earth Tech, 2007 Illicit Discharge Detection & Elimination (IDDE) Monitoring Program prepared for: Village of Hales Corners, WI, August 2007.
7. Peavy/Rowe/Tchobanoglous, Environmental Engineering, 1985, pg 83

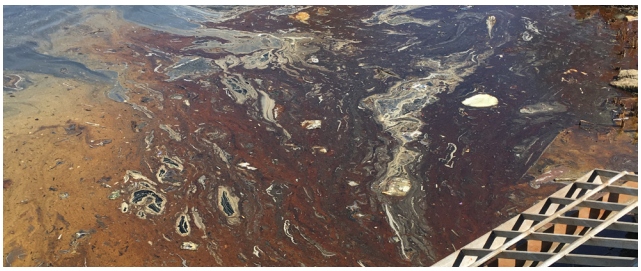
DUPAGE COUNTY

STORMWATER MANAGEMENT

SPILL RESPONSE & REPORTING

When do I need to report a spill?

Any contact with or potential for release into a waterbody. If in doubt, report it! Connection to a waterbody can be through a storm sewer, ditch, or overland.



What size spills need to be reported?

Any size if there is an imminent threat to waterbody.

Who do I report a spill to?

Illinois EPA Spill 24-Hour Hotline:
(800) 782-7860 or (217) 782-7860

DuPage County Stormwater Management
24-Hour Hotline:
(630) 407-6800

What if the spill has already been reported by the first responder?

The responsible party must also self-report to the Illinois EPA.

Need help containing, tracing and locating source?

Call DuPage County Stormwater Management for containment and absorbent supplies, as well as equipment for tracing and verifying cleanup.

FOR MORE INFORMATION
dupageco.org/swm

DUPAGE COUNTY

STORMWATER MANAGEMENT

Emergency Release Notification Fact Sheet

DuPage County Stormwater Management (SWM) is relaying this information from the Illinois Emergency Management Agency regarding response to spills.

A. Immediate telephone notification shall be given by the owner or operator of a facility when a release equal to or exceeding the reportable quantity of an extremely hazardous substance(1) or a CERCLA hazardous substance(2) occurs at the facility. In such incidents, notifications are to be made to the following:

1) Illinois Emergency Management Agency (IEMA)/State Emergency Response Commission (SERC) at 1-800-782-7860 (within state) or (217) 782-7860 (when calling from out-of- state);
2) Local Emergency Planning Committee (LEPC) that is likely to be affected by the release. The LEPC telephone number(s) may be obtained from the IEMA Website at http://www.illinois.gov/iema/Preparedness/SERC/Pages/default.aspx.
3) National Response Center (NRC) at 1-800-424-8802 (if the substance is a CERCLA hazardous substance).

Please Note: Transportation-related incidents only require 9-1-1 notification.

B. Immediate telephone notification is also required if an incident or accident involving a hazardous material(3) occurs which results in:

1) a member of the general public is killed;
2) a member of the general public receives injuries requiring hospitalization;
3) an authorized official of an emergency agency recommends an evacuation of an area by the general public;
4) a motor vehicle has overturned on a public highway;
5) Fire, breakage, release or suspected contamination occurs involving an etiologic agent;
6) Any release of petroleum (or oil) that produces a sheen on nearby surface water(4) and/or threatens navigable waters;
7) Any spill or overfill of petroleum that results in a release to the environment that exceeds 25 gallons (25-gallon reporting threshold for USTs only)(4). ASTs are not subject to the 25-gallon spill reporting threshold in 41 IAC 176.340 but are subject to 29 IAC 430.

In such incidents, notification shall be made as noted in Paragraph A, above, except no notification is required to the NRC, except items 6 and 7 (oil that impacts water and overfills emanating from underground storage tanks).

At a minimum, notification shall include:

1) the chemical name or identity of any substance involved in the release;
2) an indication of whether the substance is an extremely hazardous substance;
3) an estimate of the quantity in pounds of any such substance that was released into the environment;
4) the time and duration of the release;
5) the specific location of the release;
6) the medium or media (air, land, water) into which the release occurred;
7) any known or anticipated acute or chronic health risks associated with the emergency and, where appropriate, advice regarding medical attention necessary for exposed individuals;
8) proper precautions to take as a result of the release, including evacuations;
9) the name and telephone number of the person or persons to be contacted for further information.

C. WRITTEN FOLLOW-UP NOTICE IS REQUIRED WITH RESPECT TO INCIDENTS AS DESCRIBED IN PARAGRAPH A, ABOVE. As soon as practicable after such release (within 30 days), the owner or operator shall provide a written follow-up emergency notice (or notices, as more information becomes available) to the SERC and the LEPC, updating the information provided in the immediate notification and including additional information with respect to:

1) Actions taken to respond to and contain the release;
2) Any known or anticipated acute or chronic health risks associated with the release;
3) Where appropriate, advice regarding medical attention necessary for exposed individuals.

1 See 40 CFR 355 for a listing of extremely hazardous substances (EHS)

2 See 40 CFR 302.4 for a listing of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) hazardous substances

3 See 49 CFR 172.101 for a list of hazardous materials

4 See 41 IAC 176.340 Reporting and Cleanup of Spills and Overfills (USTs).

(These rules are compiled in 29 IAC 430 and 29 IAC 620)

Last updated 3/2018

Developing Your Stormwater Pollution Prevention Plan

A Guide for Construction Sites

EPA-833-R-06-004
May 2007

Developing Your Stormwater Pollution Prevention Plan

A Guide for Construction Sites

Who?

Construction site operators (generally, the person who has operational control over construction plans and/or the person who has day-to-day supervision and control of activities occurring at the construction site)

Where?

Construction sites required to comply with stormwater discharge requirements

What?

A guide to help you develop a good Stormwater Pollution Prevention Plan (SWPPP)

Why?

Stormwater runoff from construction sites can cause significant harm to our rivers, lakes, and coastal waters

A SWPPP is required (by your construction general permit) and will help you prevent stormwater pollution

A SWPPP is more than just a sediment and erosion control plan.
It describes all the construction site operator's activities to prevent stormwater contamination, control sedimentation and erosion, and comply with the requirements of the Clean Water Act

Purpose of this Guidance Document

This document provides guidance to construction site operators that need to prepare a SWPPP in order to receive NPDES permit coverage for their stormwater discharges. The Clean Water Act provisions, EPA regulations and EPA's Construction General Permit described in this document contain legally binding requirements. This document does not substitute for those provisions, regulations or permit, nor is it a regulation or permit itself. It also does not substitute for requirements under State law or construction general permits issued by States. It does not impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA and State decisionmakers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. Any decisions regarding a particular construction site will be made based on the applicable statutes, regulations and/or permit terms. Therefore, interested parties are free to raise questions and objections about the appropriateness of the application of this guidance to a particular situation, and EPA—or the applicable NPDES permitting authority—will consider whether or not the recommendations or interpretations in the guidance are appropriate in that situation based on the law and regulations.

This guidance document occasionally uses language describing mandatory requirements for construction site operators and those covered by a general permit for stormwater discharges from such sites. This language is generally intended to reflect requirements applicable where EPA is the NPDES permitting authority. Although requirements in jurisdictions where EPA is not the permitting authority may resemble these requirements, the reader should not assume that this guidance accurately describes those requirements. Rather, the reader should consult the applicable regulations and any applicable NPDES permit.

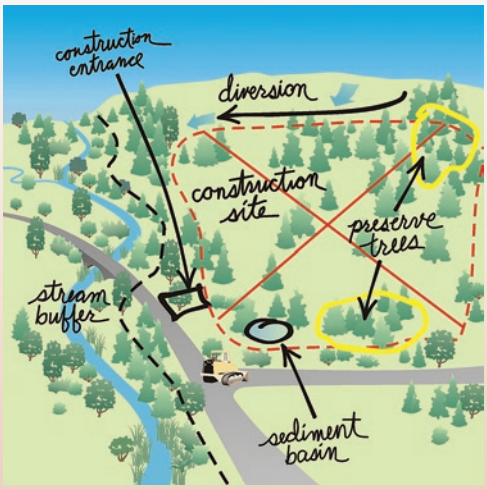
Contents

What is a Stormwater Pollution Prevention Plan (SWPPP)?

A SWPPP may be called many things. Your state may use terms like:

- **Construction Best Practices Plan**
- **Sediment and Stormwater Plan**
- **Erosion, Sediment, and Pollution Prevention Plan**
- **Construction Site Best Management Practices Plan**
- **Erosion Control Plan and Best Management Practices**
- **Best Management Practices Plan**
- **Erosion and Sediment Control Plan**

Regardless of the title used in your state, these documents—and the stormwater permits that require them—tend to have many common elements. This guide is intended to help you develop a better SWPPP for your construction site.



Example sketch identifying various points to address in the SWPPP.

How to Use This Guide

- This guide was developed as a helpful reference guide for construction site operators across the country. We have tried to accommodate the wide range of knowledge and experience about stormwater pollution prevention that currently exists among operators—from novice to expert.
  - If you are relatively new to managing stormwater at a construction site, you will probably want to read this entire guide.
  - If you are very experienced and familiar with the requirements in your state, this guide may help you brush up on certain requirements or provide you with ideas to improve your SWPPP. You might want to review the table of contents and skip around. Be sure to take a look at the SWPPP template (Appendix A) to see if you can make improvements in the way you develop and maintain your SWPPP.

- This guide is written in a general format and can be used at most construction sites in any state, territory, or in Indian country. The document assumes that you will obtain discharge authorization under an appropriate National Pollutant Discharge Elimination System (NPDES) construction general permit and use both the permit and this guidance to assist in developing your SWPPP. In this guide, we make some references to the U.S. Environmental Protection Agency's Construction General Permit for illustrative purposes. **You should always consult your applicable NPDES permit for the exact requirements that apply to you**.

- Remember that you are developing your SWPPP for both your use and for review by the regulatory agencies responsible for overseeing your stormwater controls. As such, one of your goals in developing your SWPPP should be to present the information in a way that clearly demonstrates that it meets all the requirements of your NPDES permit.

- You can obtain an electronic copy of this guide (PDF format), the SWPPP template, and inspection form (in Microsoft Word) at **www.epa.gov/npdes/swpppguide**

Chapter 1: **Introduction**

▶ This chapter provides an orientation to this guide and its contents and describes why stormwater controls at construction sites are necessary.

A. Why Should You Use this Guide?

If you are responsible for erosion and sediment control and stormwater management at a permitted construction site, then this guide may be useful to you. This guide is designed to walk you through the steps for developing and implementing an effective stormwater pollution prevention plan (SWPPP). The basic outline of the guide is presented below:

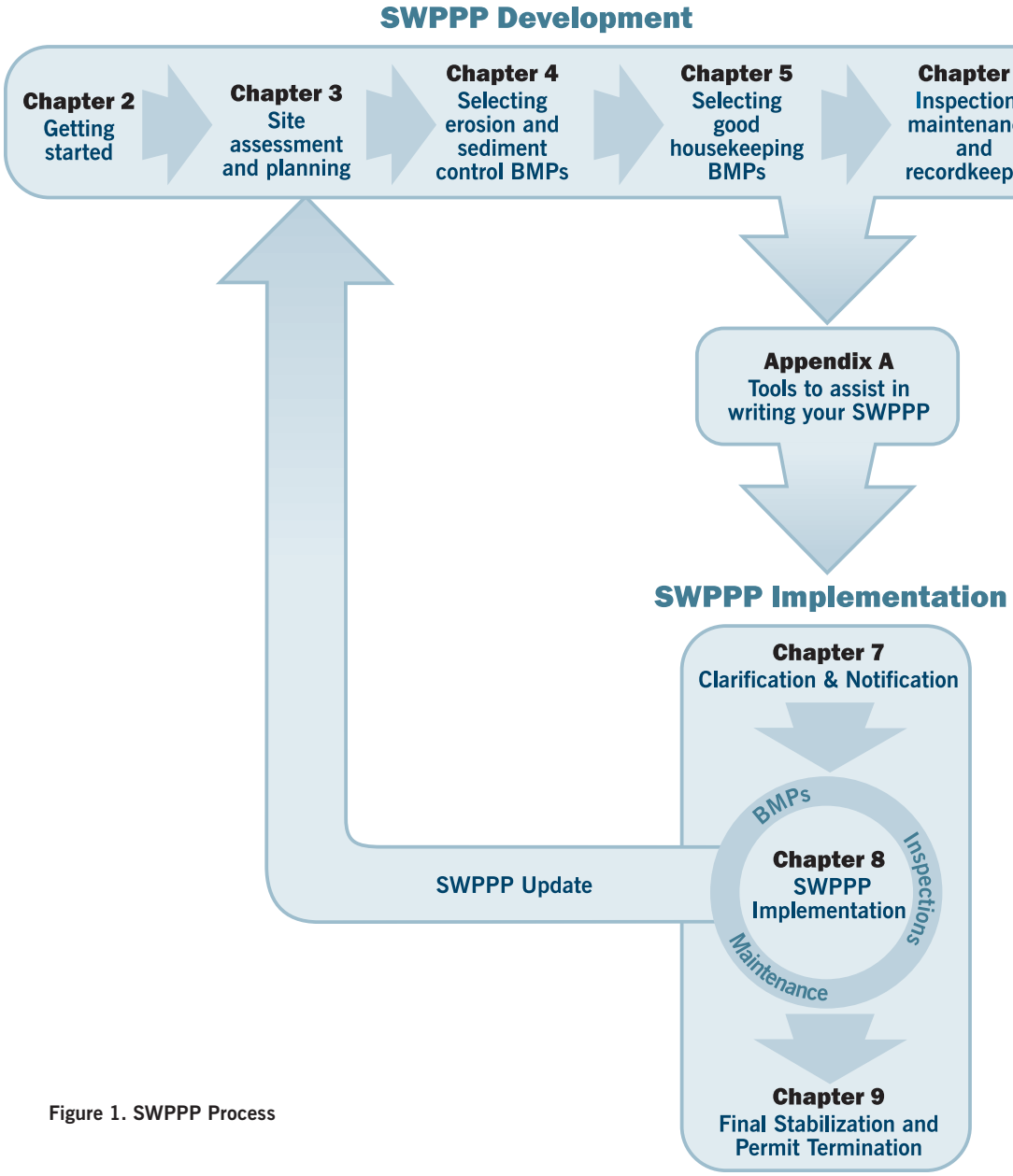


Figure 1. SWPPP Process

Take a Closer Look…

What is a SWPPP?

A SWPPP is a site-specific, written document that:

- Identifies potential sources of stormwater pollution at the construction site
- Describes practices to reduce pollutants in stormwater discharges from the construction site. Reduction of pollutants is often achieved by controlling the volume of stormwater runoff (e.g., taking steps to allow stormwater to infiltrate into the soil).
- Identifies procedures the operator will implement to comply with the terms and conditions of a construction general permit

What does this mean to me?

Failure to implement your SWPPP could result in significant fines from EPA or a state environmental agency. Therefore, it is important that you develop your SWPPP to address the specific conditions at your site, fully implement it, and keep it up-to-date to reflect changes at your site.

B. What Is Stormwater Runoff and What Are Its Impacts?

Stormwater runoff is rain or snowmelt that flows over land and does not percolate into the soil. Stormwater runoff occurs naturally, in small amounts, from almost any type of land surface, especially during larger storm events. Impervious surfaces, such as buildings, homes, roads, sidewalks, and parking lots, can significantly alter the natural hydrology of the land by increasing the volume, velocity, and temperature of runoff and by decreasing its infiltration capacity. Increasing the volume and velocity of stormwater runoff can cause severe stream bank erosion, flooding, and degrade the biological habitat of these streams. Reducing infiltration can lower ground water levels and affect drinking water supplies.

SWPPP Tip!

A SWPPP can have different names

A SWPPP may also be called a *"construction best practices plan," "sediment and stormwater plan," "erosion, sedimentation, and pollution prevention plan,"* or similar term. The SWPPP (or similarly named plan) is generally required to comply with EPA's or the state's stormwater construction general permit.

In addition, as stormwater runoff moves across surfaces, it picks up trash, debris, and pollutants such as sediment, oil and grease, pesticides and other toxics. Changes in ambient water temperature, sediment, and pollutants from stormwater runoff can be detrimental to aquatic life, wildlife, habitat, and human health. Soil exposed by construction activities is especially vulnerable to erosion. Runoff from an unstabilized construction site can result in the loss of approximately 35–45 tons of sediment per acre each year (ASCE and WFF, 1992). Even during a short period of time, construction sites can contribute more sediment to streams than would be deposited naturally over several decades. Excess sediment can cloud the water reducing the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways.

The primary stormwater pollutant at a construction site is sediment. To control erosion at a construction site, it is important to understand the different types of erosion that can occur. Erosion begins when raindrops break down the soil structure and dislodge soil particles. Runoff carrying the soil particles becomes sheet erosion which eventually forms smaller rills and larger gullies. The best way to stop erosion is to keep the soil in place through vegetation, erosion control blankets, or other methods that prevent the soil from becoming dislodged during rain events.

The erosion process is typically influenced by climate, topography, soils, and vegetative cover. Understanding how these factors influence erosion will help you select and design appropriate controls to minimize erosion from your construction site.

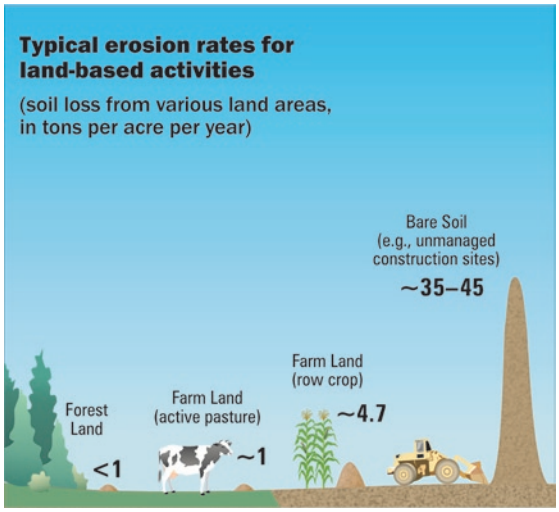


Figure 2. Typical erosion rates from land-based activities. (Dunne, T. and L. Leopold, 1978; NRCS, 2000; NRCS, 2006; ASCE and WEF, 1992)

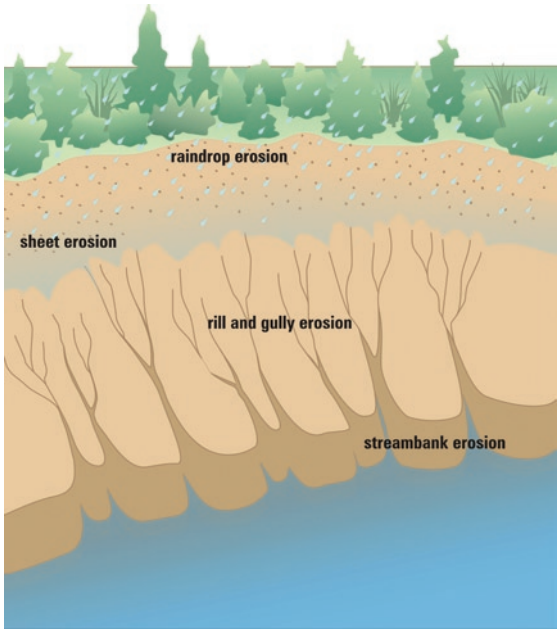


Figure 3. Types of erosion.

Raindrop erosion
Dislodging of soil particles by raindrops

Sheet erosion
The uniform removal of soil without the development of visible water channels

Rill erosion
Soil removal through the formation of concentrated runoff that creates many small channels

Gully erosion
The result of highly concentrated runoff that cuts down into the soil along the line of flow

Streambank erosion
Flowing water that erodes unstable streambanks

Climate. The frequency, intensity, and duration of rainfall are the principal factors influencing erosion from a construction site. Know the weather patterns in your area and, if possible, plan your soil disturbance activities for periods of historically lower rainfall.

Topography. The longer and steeper a slope, the greater the potential there is for erosion from that slope. Use practices such as diversions or fiber rolls to break up long slopes. Consider minimizing soil disturbance activities on steeper slopes.

Soils. Soil type can also impact erosion. Soil texture, structure, organic matter content, compaction, and permeability can all influence erosion rates.

Vegetative cover. Vegetative cover provides a number of critical benefits in preventing erosion—it absorbs the energy of raindrops, slows velocity of runoff, increases infiltration, and helps bind the soil. Soil erosion can be greatly reduced by maximizing vegetative cover at a construction site.

C. How Can Construction Site Operators Prevent Stormwater Pollution?

An effective SWPPP is the key! If sediment and erosion controls and good housekeeping practices are not followed, construction activity can result in the discharge of significant amounts of sediment and other pollutants. The term *Best Management Practices* or BMPs is often used to describe the controls and activities used to prevent stormwater pollution.

SWPPP Tip!

Erosion versus Sedimentation

Erosion is the process by which the land surface is worn away by the action of water or wind. Sedimentation is the movement and settling out of suspension of soil particles. It is usually easier and less expensive to prevent erosion than it is to control sediment from leaving a construction site.

BMPs can be divided into two categories—structural and non-structural BMPs. Structural BMPs include silt fences, sedimentation ponds, erosion control blankets, and temporary or permanent seeding, while non-structural BMPs include picking up trash and debris, sweeping up nearby sidewalks and streets, maintaining equipment, and training site staff on erosion and sediment control practices. In this document, the term "BMPs" is used broadly and includes both structural and non-structural controls and practices.

A SWPPP is more than just a sediment and erosion control plan. Most SWPPPs are written documents that describe the pollution prevention practices and activities that will be implemented on the site. It includes descriptions of the site and of each major phase of the planned activity, the roles and responsibilities of contractors and subcontractors, and the inspection schedules and logs. It is also a place to document changes and modifications to the construction plans and associated stormwater pollution prevention activities.

Chapter 2: **Getting Started**

▶ **This chapter describes some of the basic things you'll want to determine (Do you need permit coverage? What permit applies to you?), as well as some of the materials and information you may need to develop your SWPPP. Collecting this information before you start will help you develop your SWPPP more efficiently. Keep in mind that you may also need to gather this information and develop your SWPPP before you complete your Notice of Intent (NOI) and file for permit coverage (note that filing an NOI is not discussed until Chapter 7).**

A. What Are the Federal Requirements for Stormwater Runoff from Construction Sites?

The Clean Water Act and associated federal regulations (Title 40 of the *Code of Federal Regulations* [CFR] 123.25(a)(9), 122.26(a), 122.26(b)(14)(x) and 122.26(b)(15)) require nearly all construction site operators engaged in clearing, grading, and excavating activities that **disturb one acre or more, including smaller sites in a larger common plan of development or sale**, to obtain coverage under a National Pollutant Discharge Elimination System (NPDES) permit for their stormwater discharges. Under the NPDES program, the U.S. Environmental Protection Agency (EPA) can authorize states to implement the federal requirements and issue stormwater permits. Today, most states are authorized to implement the NPDES program and issue their own permits for stormwater discharges associated with construction activities.

SWPPP Tip!

Don't forget about "common plans of development or sale"

A *common plan of development or sale* includes larger-scale plans for land development to be carried out by one or more entities. Examples include housing developments and subdivisions, industrial parks, and commercial developments.

EPA has described this term in the fact sheet accompanying its Construction General Permit as including: any announcement or piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, permit application, zoning request, computer design, etc.), or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating construction activities may occur on a specific plot. Each permitting authority may review documentation to determine if common plan requirements apply.

Each state (or EPA, in the case of states that are not authorized) issues one or more NPDES construction general permits. These permits, generally, can be thought of as umbrella permits that cover all stormwater discharges associated with construction activity in a given state for a designated time period, usually 5 years. Operators of individual constructions sites then apply for coverage under this permit. *Before applying for permit coverage, you should read and understand all the provisions of the appropriate construction general permit and develop a SWPPP.* **Because authorized states develop their own NPDES requirements, you should carefully read your state's construction general permit and follow the specific instructions it contains.**

Take a Closer Look…

EPA Permits vs. State-Issued Permits

At the time of publication, EPA was the NPDES permitting authority in Massachusetts, New Hampshire, New Mexico, Idaho, Alaska, the District of Columbia, Puerto Rico, the U.S. territories (except the Virgin Islands), most Indian country lands, and for federal facilities in four states. For an up-to-date list of NPDES permitting authorities, visit **www.epa.gov/npdes/stormwater/construction** or **www.cicacenter.org/swrl.html**

What does this mean to me?

Because EPA and state-issued permits can be different, you should make sure you read and apply for the correct permit. Use the links on either of the web sites listed to the left to determine which agency issues NPDES permits where your construction activity will occur.

Most construction general permits contain similar elements:

- Applicability—describes the geographic area covered and who is eligible to apply
- Authorization—describes the types of stormwater (and non-stormwater) discharges that are covered
- SWPPP requirements—outlines the elements that should to be addressed to prevent the contamination of stormwater runoff leaving the construction site
- Application—includes instructions for obtaining permit coverage, usually by filing an application or Notice of Intent (NOI) form
- Implementation—BMP installation, inspection, and maintenance requirements
- Other requirements—may include additional requirements such as spill prevention
- Standard conditions—list of conditions that are applicable to most NPDES permits
- Termination—lists conditions for terminating permit coverage after construction is complete

What Construction Activities Require NPDES Permit Coverage?

In this document, "*construction*" refers to actions that result in a disturbance of the land, including clearing, grading, excavating, and other similar activities. It also includes "*construction-related activities,*" areas that support the construction project such as stockpiles, borrow areas, concrete truck washouts, fueling areas, material storage areas and equipment storage areas.

Construction activities that do not disturb land, such as interior remodeling, generally do not require NPDES permit coverage.

Are There Situations Where a Permit Is Not Needed?

Generally, permit coverage is not required for activities that are considered routine maintenance, such as landscaping, road maintenance, and maintaining stormwater BMPs. Some states and EPA offer the option of a waiver for small sites (disturbing less than 5 acres) in areas and times of the year with low predicted rainfall. To be eligible for the waiver, you would have to meet the requirements specified in the regulations.

Local Requirements

Operators of construction sites should keep in mind that local governments (cities, towns, counties) often have their own requirements for construction sites (e.g., local permits for grading, sediment and erosion, utilities). **Compliance with local requirements does not mean compliance with federal NPDES requirements or vice versa, unless the authorized state agency or EPA has specifically designated the local program a *qualifying local program*.**

Qualifying Local Programs

In some states, the NPDES permitting agency has identified certain local construction stormwater control programs that have requirements that are equivalent or more protective than the state's requirements. If one of these local stormwater programs has been designated by the permitting agency as a *qualifying local program*, the construction site operator may simply read and follow the local requirements. The permitting agency (state or EPA) might choose to waive the requirement to file a Notice of Intent (NOI) or similar application form for small construction sites operating within the jurisdiction of a qualifying local program. If waived, these sites would be covered under the appropriate construction general permit automatically. Check your construction general permit carefully.

The NPDES permitting authority must identify any qualifying local programs in the construction general permit. Violations of the local requirements are also considered violations of the NPDES requirements and may be enforced accordingly.

SWPPP Tip!

Read Your General Permit!

You should thoroughly read and understand the requirements in your general permit. This includes requirements on eligibility (whether your site qualifies for the general permit), application (how to notify EPA or the state that you'd like to be covered by the general permit), SWPPPs, and termination (stabilizing your site and notifying EPA or the state that your project is complete). By applying for coverage under the general permit, you are telling EPA or your state that you will comply with the permit's requirements, so read your permit carefully!

B. Who Is Required to Get NPDES Permit Coverage?

Construction site *operators* are responsible for obtaining NPDES permit coverage for their stormwater discharges. Each state has its own definition of the term *operator*. Operators may include owners (e.g., developers), general contractors, independent subcontractors, government officials, companies, or corporations. This section reflects EPA's understanding of most NPDES permit requirements for stormwater discharges throughout the country. You should, of course, consult your construction general permit for the requirements that apply to you. In some cases, states have defined the operator as a single entity, usually the land owner or easement holder. In other states, several entities may meet the definition of operator. For instance, the owner may control the project's plans and specifications, and the general contractor may control the site's day-to-day operations. In such cases, both may be defined as operators. If a site has multiple operators, they may cooperate on the development and implementation of a single SWPPP. Operators generally obtain coverage under an NPDES permit, often by filing a form called a Notice of Intent (NOI).

Figure 4. Use signage to help educate construction staff.

EPA's Construction General Permit (which applies only where EPA is the permitting authority—see Chapter 2 Section A) defines operator as any party that:

- Has control over the construction plans and specifications

  and/or

- Has day-to-day operational control of the site, including activities necessary to implement the SWPPP

Regardless of whether or not the operator is a corporation or governmental entity, someone must direct the SWPPP's preparation and implementation and apply for NPDES permit coverage for the stormwater discharges. In most cases, this will be a high-level official, such as a corporate officer, manager or elected official, or a principal executive officer. For specific instructions, refer to the appropriate NPDES stormwater permit.

Multiple Operators

In many instances, there may be more than one party at a site performing tasks related to *operational control* and more than one operator may need to submit an NOI. Depending on the site and the relationship between the parties (e.g., owner, developer, general contractor), there can either be a single party acting as site operator and consequently responsible for obtaining permit coverage, or there can be two or more operators all needing permit coverage. Exactly who is considered an operator is largely controlled by how the *owner* of the project chooses to structure the contracts with the *contractors* hired to design and/or build the project. The following are three general operator scenarios (variations on any of these three are possible, especially as the number of owners and contractors increases):

- *Owner as sole permittee*. The property owner designs the structures for the site, develops and implements the SWPPP, and serves as general contractor (or has an on-site representative with full authority to direct day-to-day operations). The owner may be the only party that needs permit coverage under these circumstances. Everyone else on the site may be considered subcontractors and might not need permit coverage.

- *Contractor as sole permittee*. The property owner hires one company (i.e., a contractor) to design the project and oversee all aspects of the construction project, including preparation and implementation of the SWPPP and compliance with the permit (e.g., a *turnkey* project). Here, the contractor would likely be the only party needing a permit. It is under this scenario that an individual having a personal residence built for his own use (e.g., not those to be sold for profit or used as rental property) would not be considered an operator. However, individual property owners would meet the definition of *operator* and may require permit coverage if they perform general contracting duties for construction of their personal residences.
- *Owner and contractor as co-permittees*. The owner retains control over any changes to site plans, SWPPPs, or stormwater conveyance or control designs; but the contractor is responsible for overseeing actual earth disturbing activities and daily implementation of SWPPP and other permit conditions. In this case, which is the most common scenario, both parties may need to apply for permit coverage.

However, you are probably not an operator and subsequently would not need permit coverage if one of the following is true:

- You are a subcontractor hired by, and under the supervision of, the owner or a general contractor (i.e., if the contractor directs your activities on-site, you probably are not an operator)
- The operator of the site has indicated in the SWPPP that someone other than you (or your subcontractor) is reponsible for your activities as they relate to stormwater quality (i.e., another operator has assumed responsibility for the impacts of your construction activities). This is typically the case for many, if not most, utility service line installations.

In addition, *owner* typically refers to the party that owns the structure being built. Ownership of the land where construction is occurring does not necessarily imply the property owner is an operator (e.g., a landowner whose property is being disturbed by construction of a gas pipeline). Likewise, if the erection of a structure has been contracted for, but possession of the title or lease to the land or structure does not to occur until after construction, the would-be owner may not be considered an operator (e.g., having a house built by a residential homebuilder).

Transferring Ownership

In many residential developments, an overall developer applies for the stormwater permit coverage, conducts grading activities, and installs the basic infrastructure (e.g., utilities, roads). Individual lots are then sold to builders who then construct the houses. Unless the developer is still responsible for stormwater on these individual lots (which is typically not the case), it is likely that the builder will need to apply for NPDES permit coverage for stormwater discharges during home construction.

Subcontractors

It is typically a good idea to include specific contract language requiring subcontractors to implement appropriate stormwater controls. Subcontractors should be trained on appropriate BMPs and requirements in the SWPPP and should not disturb or remove BMPs. Some contractors will include specific penalties in subcontractor agreements to ensure subcontractors do not damage or remove BMPs.

Take a Closer Look…

Erosion Control vs. Sediment Control

When developing a SWPPP, it is important to understand the difference between erosion control and sediment control. Erosion control measures (e.g., mulch, blankets, mats, vegetative cover) protect the soil surface and prevent soil particles from being dislodged and carried away by wind or water. Sediment control measures remove soil particles after they have been dislodged (typically through settling or filtration). It is usually easier and less expensive to prevent erosion than it is to control sedimentation.

What does this mean to me?

You should try to use erosion control BMPs as the primary means of preventing stormwater contamination, and sediment control techniques to capture any soil that does get eroded. Because no one technique is 100 percent effective, a good SWPPP will use both kinds of BMPs in combination for the best results.

C. What Elements Are Required in a SWPPP?

The SWPPP lays out the steps and techniques you will use to reduce pollutants in stormwater runoff leaving your construction site. Therefore, proper development and implementation of your SWPPP is crucial. First and foremost, your SWPPP must be developed and implemented consistent with the requirements of the applicable NPDES stormwater construction permit. The following discussion describes requirements that are contained in most of these permits.

Your SWPPP is used to identify all potential pollution sources that could come into contact with stormwater leaving your site. It describes the BMPs you will use to reduce pollutants in your construction site's stormwater discharges, and it includes written records of your site inspections and the follow-up maintenance that is performed.

Your SWPPP should contain the following elements:

- Cover/title page
- Project and SWPPP contact information
- Site and activity description, including a site map
- Identification of potential pollutant sources
- Description of controls to reduce pollutants
- Maintenance/inspection procedures
- Records of inspections and follow-up maintenance of BMPs
- SWPPP amendments
- SWPPP certification

Chapters 3–6 of this guide describe how to develop a SWPPP—from site evaluation and data collection to selecting appropriate BMPs and assigning maintenance and inspection responsibilities.

D. SWPPP Roles and Responsibilities

The operator has the lead for developing and implementing the SWPPP and commiting resources to implement the BMPs. Stormwater pollution control is typically the job of more than a single person; the SWPPP development process provides a good opportunity to define roles and responsibilities of everyone involved. Roles and responsibilities are to be documented clearly in the SWPPP and subcontractor agreements as necessary. Your SWPPP should describe:

- Who is on the stormwater pollution prevention team?
- Who will install structural stormwater controls?
- Who will supervise and implement good housekeeping programs, such as site cleanup and disposal of trash and debris, hazardous material management and disposal, vehicle and equipment maintenance, and so on?
- Who will conduct routine inspections of the site to ensure all BMPs are being implemented and maintained?
- Who will maintain the BMPs?
- Who is responsible for documenting changes to the SWPPP?
- Who is responsible for communicating changes in the SWPPP to people working on the site?

When you apply for your stormwater permit, the application may ask for a SWPPP contact. This could be the construction site operator, but in many cases it's a staff person (e.g., project superintendent, field manager, construction manager, stormwater compliance officer) at the construction site who is responsible for conducting inspections, ensuring BMPs are installed and maintained, and updating the SWPPP when necessary.

SWPPP Tip!

Erosion Control Certification

Several programs promote the training and certification of individuals in erosion and sediment control. Some states have developed certification programs and require construction sites to have a certified individual on-site at all times. The Soil and Water Conservation Society and the International Erosion Control Association sponsor a national certification program, the Certified Professional in Erosion and Sediment Control (**www.cpesc.org**)

E. Common SWPPP Objectives

The SWPPP outlines the steps you will take to comply with the terms and conditions of your construction general permit. Keeping the following objectives in mind as you develop your SWPPP will help guide you in addressing your permit requirements and in protecting water quality.

- *Stabilize the site as soon as possible.* Get your site to final grade and either permanently or temporarily stabilize all bare soil areas as soon as possible. Take into consideration germination times for the grasses or other vegetation selected, and provide additional stabilization (mulches, matrices, blankets, soil binders) on erosion-prone areas such as slopes and drainage ways. Also consider seasonal limitations to plant establishment and growth, such as drought or cold temperatures, and make an effort to ensure that areas that are not showing adequate vegetation establishment are reseeded or mulched immediately. Areas needed for future roads, construction, or other purposes should be temporarily stabilized (see your permit for requirements related to areas of the site not currently under active construction). Establishing a vegetated cover on as much of the site as possible will help to minimize erosion and sediment problems. Perimeter controls should remain in place until final stabilization has been achieved.
- *Protect slopes and channels.* Convey concentrated stormwater runoff around the top of slopes and stabilize slopes as soon as possible. This can be accomplished using pipe slope drains or earthen berms that will convey runoff around the exposed slope. Avoid disturbing natural channels and the vegetation along natural channels, if possible.
- *Reduce impervious surfaces and promote infiltration.* Reducing impervious surfaces will ultimately reduce the amount of runoff leaving your site. Also, divert runoff from rooftops and other impervious surfaces to vegetated areas when possible to promote infiltration.
- *Control the perimeter of your site.* Divert stormwater coming on to your site by conveying it safely around, through, or under your site. Avoid allowing run-on to contact disturbed areas of the construction site. For the runoff from the disturbed areas of the site, install BMPs such as silt fences to capture sediment before it leaves your site. Remember—"Divert the clean water, trap the dirty water."
- *Protect receiving waters adjacent to your site.* Erosion and sediment controls are used around the entire site, but operators should consider additional controls on areas that are adjacent to receiving waters or other environmentally sensitive areas. **Remember, the primary purpose of erosion and sediment controls is to protect surface waters.**
- *Follow pollution prevention measures.* Provide proper containers for waste and garbage at your site. Store hazardous materials and chemicals so that they are not exposed to stormwater.
- *Minimize the area and duration of exposed soils.* Clearing only land that will be under construction in the near future, a practice known as construction phasing, can reduce off-site sediment loads by 36 percent for a typical subdivision (Claytor 2000). Additionally, minimizing the duration of soil exposure by stabilizing soils quickly can reduce erosion dramatically.

Take a Closer Look…

Incentives to preserve open space

It should be the goal of every construction project to, where possible, preserve open space and minimize impervious surfaces through practices such as clustering houses. Open space preservation can provide significant water quality and economic benefits to property owners.

What does this mean to me?

From a marketing perspective, studies have shown that lots abutting forested or other open space are initially valued higher than lots with no adjacent open space, and over time their value appreciates more than lots in conventional subdivisions (Arendt 1996). For example, lots in an open space subdivision in Amherst, Massachusetts, experienced a 13 percent greater appreciation in value over a comparable conventional development after 20 years even though the lots in the conventional development were twice as large (Arendt 1996).

Chapter 3: **SWPPP Development—Site Assessment and Planning**

▶ **The first step in developing a SWPPP is assessing the site and identifying measures to protect natural features.**

This chapter describes a number of steps that will help provide a good foundation for your SWPPP, including:

- Assessing current conditions at the site
- Establishing pollution prevention and water quality protection goals for your project
- Developing a framework to help you meet those goals

A. Assess Your Site and Proposed Project

The first step in developing your SWPPP is to evaluate your proposed construction site. Your SWPPP should describe the undeveloped site and identify features of the land that can be incorporated into the final plan and natural resources that should be protected. Understanding the hydrologic and other natural features of your site will help you develop a better SWPPP and, ultimately, to more effectively prevent stormwater pollution.

SWPPP Tip!

A SWPPP is a detailed plan that:

- Identifies potential sources of stormwater pollution
- Describes the practices that will be used to prevent stormwater pollution. These should include: erosion and sediment control practices, good housekeeping practices, conservation techniques, and infiltration practices (where appropriate), and
- Identifies procedures the operator will implement to comply with all requirements in the construction general permit

Visit the Site

The people responsible for site design and drafting the SWPPP should conduct a thorough walk-through of the entire construction site to assess site-specific conditions such as soil types, drainage patterns, existing vegetation, and topography. Avoid copying SWPPPs from other projects to save time or money. Each construction project and SWPPP is unique, and visiting the site is the only way to create a SWPPP that addresses the unique conditions at that site.

Assess Existing Construction Site Conditions

Assess the existing conditions at the construction site, including topography, drainage, and soil type. This assessment, sometimes called *fingerprinting* (see text box on page 11) is the foundation for building your SWPPP and for developing your final site plan. In this assessment, use or create a topographic drawing that:

- Indicates how stormwater currently drains from the site, and identify the location of discharge points or areas
- Identifies slopes and slope lengths. The topographic features of the site are a major factor affecting erosion from the site
- Identifies soil type(s) and any highly erodible soils and the soil's infiltration capacity
- Identifies any past soil contamination at the site
- Identifies natural features, including trees, streams, wetlands, slopes and other features to be protected

Take a Closer Look…

Fingerprinting Your Site

When you evaluate your construction site, you should clearly identify vegetation, trees, and sensitive areas, such as stream buffers, wetlands, highly erodible soils, and steep slopes at your site. You should protect these areas from disturbance. Inventorying a site's natural features is a technique called fingerprinting. Fingerprinting identifies natural features that you can protect from clearing and heavy equipment by signage or physical barriers.

What does this mean to me?

Fingerprinting your site will help ensure that you don't damage natural features such as waterways or wetlands. Conducting construction activity in a waterway or wetland without the proper permits can result in significant penalties.

In most cases, the site designer can compile all this information on a digitized drawing that can then be adapted to show the planned construction activity, the phases of construction, and the final site plan.

Topographic maps are readily available on the Internet (e.g., **www.terraserver.com** or **www.mapquest.com**) or by contacting the U.S. Geological Survey store (**http://store.usgs.gov**). If you need help determining your soil type, contact your local Natural Resource Conservation Service (NRCS) office or extension service office. To find the NRCS office nearest to your site, visit the U.S. Department of Agriculture's Service Center Locator website (**http://offices.sc.egov.usda.gov/locator/app**). Soil information is also available online from NRCS (**http://soils.usda.gov**).

Identify Receiving Waters, Storm Drains, and Other Stormwater Conveyance Systems

Your SWPPP should clearly identify the receiving waters and stormwater systems through which stormwater from your site could flow. Many states require planning for a specific storm event or storm events. These storm events are referred to by their recurrence interval and duration such as 1-year, 6-hour storm or a 100-year, 24-hour storm. These events then translate into a specific rainfall amount depending on average conditions in your area.

If your site's stormwater flows into a municipal storm drain system, you should determine the ultimate destination of that system's discharge. This may be obvious and easy to document. However, in some systems, you may have to consult with the local agency responsible for the storm drain system to determine the waterbody to which you are discharging.

If your site's stormwater runs off to areas not connected to the storm drain system, you should consider your land's topography and then identify the waterbodies that it could reach. Many sites will discharge some stormwater to a storm drain system and some to other areas not connected to the system. If your site's stormwater could potentially reach two or more waterbodies, note that in your SWPPP. Remember, stormwater can travel long distances over roads, parking lots, down slopes, across fields, and through storm sewers and drainage ditches.

Describe Your Construction Project

Your SWPPP should contain a brief description of the construction activity, including:

- Project type or function (for example, low-density residential, shopping mall, highway)
- Project location, including latitude and longitude
- Estimated project start and end dates
- Sequence and timing of activities that will disturb soils at the site
- Size of the project
- Estimated total area expected to be disturbed by excavation, grading, or other construction activities, including dedicated off-site borrow and fill areas
- Percentage of impervious area before and after construction

Construction Site Pollutants										
		Other Pollutants								
Areas of Consideration	Primary Pollutant: Sediment	Nutrients	Heavy metals	pH (acids & bases)	Pesticides & herbicides	Oil & grease	Bacteria & viruses	Trash, debris, solids	Other toxic chemicals
Clearing, grading, excavating, and unstabilized areas	✓							✓	
Paving operations	✓							✓	
Concrete washout and waste			✓	✓				✓	
Structure construction/ painting/cleaning		✓		✓				✓	✓
Demolition and debris disposal	✓							✓	
Dewatering operations	✓	✓							
Drilling and blasting operations	✓			✓				✓	
Material delivery and storage	✓	✓	✓	✓	✓	✓		✓	✓
Material use during building process		✓	✓	✓	✓	✓		✓	✓
Solid waste (trash and debris)								✓	✓
Hazardous waste			✓	✓	✓	✓			✓
Contaminated spills		✓	✓	✓	✓	✓			✓
Sanitary/septic waste		✓		✓			✓		✓
Vehicle/equipment fueling and maintenance						✓			✓
Vehicle/equipment use and storage						✓			✓
Landscaping operations	✓	✓						✓	

- Runoff coefficient[1] before and after construction
- Soil types
- Construction site location and any nearby waters or wetlands
- Describe and identify the location of other potential sources of stormwater contamination, such as asphalt and concrete plants, stucco operations, paint and concrete washout, and such

Identify Pollutants and Pollution Sources

Identify the pollutants and sources that are likely to be found on the site. The principle pollutant of concern, of course, is sediment. There are, however, other pollutants that may be found, usually in substantially smaller amounts, in stormwater runoff from construction sites. These can include nutrients, heavy metals, organic compounds, pesticides, oil and grease, bacteria and viruses, trash and debris, and other chemicals. After identifying the pollutants and sources, be as specific as possible in your SWPPP about the BMPs you will use to address them. The table at the left lists the sources of pollutants at construction sites, including sediment, the primary pollutant and other pollutants that may be present at construction sites.

Figure 5. Make sure storm drain inlets are protected.

[1] The runoff coefficient is the partial amount of the total rainfall which will become runoff. Runoff coefficients generally range from 0.95 (highly impervious) to 0.05 (vegetated surface that generates little runoff). For more information on calculating the runoff coefficient for your site, see Appendix C.

Non-Stormwater Discharges

Most permits will require you to identify any non-stormwater discharges in your SWPPP. Certain non-stormwater discharges may be allowed under the terms and conditions of your permit, however, you should make every effort to eliminate these discharges where possible. You should identify these sources in your SWPPP and identify pollution prevention measures to ensure that pollutants are not introduced to these discharges and carried to nearby waterbodies.

EPA's CGP identifies these allowable non-stormwater discharges: discharges from fire-fighting activities, fire hydrant flushings, waters used to wash vehicles, buildings, and pavements where detergents are not used, water used to control dust, potable water (including uncontaminated water line flushings), uncontaminated air conditioning condensate, uncontaminated ground water or spring water, among others. The permit goes on to say that non-stormwater discharges should be eliminated or reduced to the extent feasible and that the SWPPP should identify and ensure the implementation of appropriate pollution prevention measures for these discharges. More discussion of pollution prevention measures for some of these non-stormwater sources can be found in Chapter 5.

Permanent Stormwater Controls (Post-Construction)

The topic of designing, installing, and maintaining permanent or post-construction stormwater controls, although a requirement, is beyond the scope of this SWPPP guide. A SWPPP compiled in support of coverage under EPA's Construction General Permit, however, needs to include a description of all permanent stormwater controls that will be constructed along with the buildings, roads, parking lots, and other structures. You should incorporate sediment and erosion controls into your SWPPP for areas where permanent stormwater controls, such as wet ponds, swales, and bioretention cells are to be constructed.

Effectively managing stormwater over the long-term—long after the actual construction process is over—is a significant challenge. Many communities (and a few states) have or are developing comprehensive requirements to better manage permanent (or post-construction) stormwater runoff. To be most effective, you should consider integrating your design process for your permanent stormwater controls into your overall design for your site. Planning for your permanent stormwater controls could affect your decisions about site design, location of buildings and other structures, grading, and preserving natural features. By preserving natural drainage patterns, trees, native vegetation, riparian buffers, and wetlands, you might need to construct fewer or smaller structural storm-water controls to cope with runoff from your site. Permanent stormwater controls should be designed with two important goals in mind: (1) reduction of the volume and velocity of runoff, and (2) reduction of the pollutants in the stormwater that does leave your site.

Techniques, such as *Low Impact Development*, Better Site Design, or *Conservation Development*, which emphasize addressing stormwater where it falls, infiltrating it, preserving natural drainage patterns, and

Take a Closer Look…

Specimen Trees and Natural Vegetation

Before a site plan is prepared, identify and clearly mark existing trees and vegetation you want to preserve. Some communities have tree preservation ordinances, and local extension service offices and foresters will often provide free advice on tree and plant preservation. Remember to notify all employees and subcontractors about trees and areas you intend to preserve and mark them clearly.

What does this mean to me?

Large trees and other native vegetation can represent significant value in the long term to property owners and the community at large. Many studies document that the presence of trees on residential and commercial sites provide many benefits including improved aesthetics, habitat for birds and other wildlife, and energy savings (shade) that ultimately enhance the economic value of the site. Trees also provide shade and act as windbreaks, which can reduce energy costs over the long term. By protecting existing trees, you can reduce landscaping costs and improve the appearance of a newly developed property. According to the National Arbor Day Foundation, trees around a home can increase its value by 15 percent or more.

preserving natural vegetation offer the best opportunity to protect nearby rivers, lakes, wetlands, and coastal waters. **Incorporating these ideas and concepts into the design for your project before it is built also offers the opportunity to reduce capital infrastructure and long-term maintenance costs**.

At the neighborhood or even at the watershed scale, *Smart Growth* techniques can help us design neighborhoods that minimize impacts on water quality, reduce air pollution, and improve the general quality of life for residents. **In the *Resources* list in Appendix D, you will find a list of suggestions on this topic, including how to incorporate Smart Growth and Low Impact Development techniques into the design of your site.**

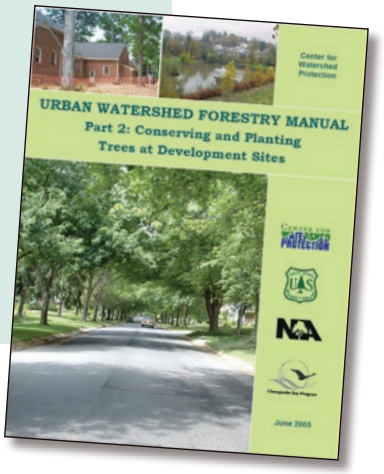
B. Identify Approaches to Protect Natural Resources

Preservation of natural areas, waterbodies, and open space has numerous economic, aesthetic, community, and environmental benefits. Preservation efforts also often increase the value of lots and homes and help to reduce overall expenditures on infrastructure. Specifically, these kinds of conservation efforts can help to significantly reduce the volume and velocity of stormwater runoff and the pollutants that may be carried with it.

SWPPP Tip!

Tree Preservation Resources

For more on tree preservation, contact your local extension service office or forester. Also, American Forests has useful information and tools at their website, **www.americanforests.org/resources/urbanforests**. The Center for Watershed Protection in cooperation with the U.S. Forest Service has developed a series of manuals on urban forestry. Part two, titled Conserving and Planting Trees at Development Sites will be of particular interest. You can find these manuals at **www.cwp.org**



Protect Nearby Waters

Your SWPPP should describe how you will protect and preserve any streams, wetlands, ponds or other waterbodies that are on your property or immediately adjoining it. Riparian areas around headwater streams are especially important to the overall health of the entire river system. Many states and communities have buffer or shoreline protection requirements to preserve sensitive areas around waterbodies.

Many states apply special designations to high-value or high-quality waters. Check with your state water pollution control agency to determine if your project could discharge to *outstanding* or special protection waters (such as wetlands, or salmon and trout streams). You might be subject to additional requirements to protect these waterbodies.

Wetland areas, including bogs, marshes, swamps, and prairie potholes may be found in areas adjacent to rivers, lakes, and coastal waters but may also be found in isolated places far from other surface waters. Many types of wetlands are protected under the Clean Water Act and construction activities in and around these areas may require an additional permit from the Army Corps of Engineers. Construction site operators should make every effort to preserve wetlands and must follow applicable local, state, and federal requirements before disturbing them or the areas around them.

To ensure the protection of natural areas during the construction period, you should use a combination of techniques, including temporary fencing, signage, and educating staff and subcontractors.

Assess Whether Your Project Impacts an Impaired Waterbody

Under the Clean Water Act, states are required to determine if rivers, lakes, and other waters are meeting water quality standards. When a waterbody does not meet water quality standards because of one or more sources of pollution, the state lists the water as impaired. When a water is determined to be impaired, the state or EPA develops a plan for correcting the situation. This plan is called a Total Maximum Daily Load (TMDL). If stormwater from your project could reach an impaired water with or without an approved TMDL (either directly or indirectly through a municipal storm drain system), your permit

may include additional requirements to ensure that your stormwater discharges do not contribute to that impairment and your stormwater controls are consistent with plans to restore that waterbody. Your SWPPP should describe the specific actions you will take to comply with these permit requirements for impaired waters.

You should determine, before you file for permit coverage, if the receiving waters for your project are impaired and if so, whether a TMDL has been developed for this waterbody. Visit EPA's Enviromapper website (**www.epa.gov/waters/enviromapper**) or contact your state environmental agency for more information.

Assess Whether You Have Endangered Plant or Animal Species in Your Area

The federal Endangered Species Act protects endangered and threatened species and their critical habitat areas. (States and tribes may have their own endangered species laws.) In developing the assessment of your site, you should determine whether listed endangered species are on or near your property. Critical habitat areas are often designated to support the continued existence of listed species. You should also determine whether critical habitat areas have been designated in the vicinity of your project. Contact your local offices of the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), or your state or tribal heritage centers. These organizations often maintain lists of federal and state listed endangered and threatened species on their Internet sites. For more information and to locate lists for your state, visit **www.epa.gov/npdes/endangeredspecies**

Additionally, your state's NPDES stormwater permit may specifically require that you address whether the activities and the stormwater discharged by your construction site have the potential to adversely affect threatened or endangered species or the critical habitat areas. You might need to conduct a biological investigation or assessment and document the results of the assessment in your SWPPP. The state may reference federal, state, or tribal endangered species protection laws or regulations.

EPA's Construction General Permit contains detailed procedures to assist construction site operators in determining the likely impact of their projects on any endangered species or critical habitat. Construction site operators in areas covered by EPA's Construction General Permit are required to assess the impact of their activities and associated stormwater discharges on species and habitat in the "project area" which may extend beyond the site's immediate footprint.

Assess Whether You Have Historic Sites that Require Protection

The National Historic Preservation Act, and any state, local and tribal historic preservation laws, apply to construction activities. As with endangered species, some permits may specifically require you to assess the potential impact of your stormwater discharges on historic properties. However, whether or not this is stated as a condition for permit coverage, the National Historic Preservation Act and any applicable state or tribal laws apply to you. Contact your State Historic Preservation Officer (**www.ncshpo.org/stateinfolist/fulllist.htm**) or your Tribal Historic Preservation Officer (**grants.cr.nps.gov/thpo/tribaloffices.cfm**).

C. Develop Site Maps

The final step in the site evaluation process is to document the results of your site assessment and your planned phases of construction activity on a detailed site map or maps. This includes developing site maps showing planned construction activities and stormwater practices for the various major stages of construction, protected areas, natural features, slopes, erodible soils, nearby waterbodies, permanent stormwater controls, and so on. You must keep your SWPPP and your site maps up-to-date to reflect changes at your site during the construction process.

Location Maps

A general location map is helpful to identify nearby, but not adjacent, waterbodies in proximity to other properties. You can use any easily available maps or mapping software to create a location map.

Site Maps

The detailed construction site maps should show the entire site and identify a number of features at the site related to construction activities and stormwater management practices.

Figure 6. Example site map.

Map of undeveloped or existing site. For many sites, a map of the undeveloped or existing site, noting the features that you identified in Section A of this Chapter, will help you develop your SWPPP and identify current site features that you want to preserve. On this map note current drainage patterns, storm drains, slopes, soil types, waters and other natural features. Also note any existing structures, roads, utilities, and other features.

Map or series of maps for construction plans. Site maps should show the construction activities and stormwater management practices for each major phase of construction (e.g., initial grading, infrastructure, construction, and stabilization). The site maps should legibly identify the following features:

- Stormwater flow and discharges. Indicate flow direction(s) and approximate slopes after grading activities, as well as locations of discharges to surface waters or municipal storm drain systems.
- Areas and features to be protected. Include wetlands, nearby streams, rivers, lakes, and coastal waters, mature trees and natural vegetation, steep slopes, highly erodible soils, etc.
- Disturbed areas. Indicate locations and timing of soil disturbing activities (e.g. grading). Mark clearing limits.
- BMPs. Identify locations of structural and non-structural BMPs identified in the SWPPP, as well as post-construction stormwater BMPs.
- Areas of stabilization. Identify locations where stabilization practices are expected to occur. Mark areas where final stabilization has been accomplished.
- Other areas and roads. Indicate locations of material, waste, borrow, or equipment storage.

You should complete your site maps after reviewing Chapters 4 and 5 and any applicable BMP design manual to select appropriate BMPs for your site.

Use Site Maps to Track Progress

Develop and keep up-to-date site maps showing non-structural BMPs that change frequently in location as the work on a construction site progresses. Your permit requires that you keep your SWPPP up-to-date, so mark up the site map with the location of these BMPs. Indicate the current location of the following:

- Portable toilets
- Material storage areas
- Vehicle and equipment fueling and maintenance areas
- Concrete washouts
- Paint and stucco washouts
- Dumpsters or other trash and debris containers
- Spill kits
- Stockpiles
- Any other non-structural non-stormwater management BMPs
- Any temporarily removed structural BMPs
- Any changes to the structural BMPs

If a marked-up site map is too full to be easily read, you should date and fold it, put it in the SWPPP for documentation, and start a new one. That way, there is a good hard copy record of what has occurred on-site.

Construction sites are dynamic. As conditions change at the construction site, such as the locations of BMPs, your SWPPP must reflect those changes.

Chapter 4: SWPPP Development—Selecting Erosion and Sediment Control BMPs

▶ **This chapter presents a brief discussion of erosion and sediment control principles and a discussion of some commonly used BMPs.**

This document is not intended as an engineering or design manual on BMPs. The engineer or other qualified person that develops the details of your sediment and erosion control plan should be using the appropriate state or local specifications. The descriptions below provide a kind of checklist of the things to look for and some helpful installation and maintenance hints.

Erosion and sediment controls are the structural and non-structural practices used during the construction process to keep sediment in place (erosion control) and to capture any sediment that is moved by stormwater before it leaves the site (sediment control). Erosion controls—keeping soil where it is—are the heart of any effective SWPPP. Your SWPPP should rely on erosion controls as the primary means of preventing stormwater pollution. Sediment controls provide a necessary second line of defense to properly designed and installed erosion controls.

The suite of BMPs that you include in your SWPPP should reflect the specific conditions at the site. The information that you collected in the previous steps should help you select the appropriate BMPs for your site. An effective SWPPP includes a combination or suite of BMPs that are designed to work together.

Ten Keys to Effective Erosion and Sediment Control (ESC)

The ultimate goal of any SWPPP is to protect rivers, lakes, wetlands, and coastal waters that could be affected by your construction project. The following principles and tips should help you build an effective SWPPP. **Keep in mind that there are many BMP options available to you. We have selected a few common BMPs to help illustrate the principles discussed in this chapter.**

Erosion Control (keeping the dirt in place) and Minimizing the Impact of Construction

1. **Minimize disturbed area and protect natural features and soil**
2. **Phase construction activity**
3. **Control stormwater flowing onto and through the project**
4. **Stabilize soils promptly**
5. **Protect slopes**

Sediment Controls (the second line of defense)

6. **Protect storm drain inlets**
7. **Establish perimeter controls**
8. **Retain sediment on-site and control dewatering practices**
9. **Establish stabilized construction exits**
10. **Inspect and maintain controls**

Take a Closer Look…

BMPs in Combination

BMPs work much better when they are used in combination. For instance, a silt fence should not be used alone to address a bare slope. An erosion control BMP should be used to stabilize the slope, and the silt fence should serve as the backup BMP.

What does this mean to me?

Wherever possible, rely on erosion controls to keep sediment in place. Back up those erosion controls with sediment controls to ensure that sediment doesn't leave your site. Continually evaluate your BMPs. Are they performing well? Could the addition of a supplemental BMP improve performance? Should you replace a BMP with another one that might work better? Using BMPs in series also gives you some protection in case one BMP should fail.

Erosion Control and Minimizing the Impact of Construction

ESC Principle 1: Minimize disturbed area and protect natural features and soil. As you put together your SWPPP, carefully consider the natural features of the site that you assessed in Chapter 3. By carefully delineating and controlling the area that will be disturbed by grading or construction activities, you can greatly reduce the potential for soil erosion and stormwater pollution problems. Limit disturbed areas to only those necessary for the construction of your project. Natural vegetation is your best and cheapest erosion control BMP.

Figure 7. Protect vegetated buffers by using silt fence or other sediment controls.

Protecting and preserving topsoil is also a good BMP. Removing topsoil exposes underlying layers that are often more prone to erosion and have less infiltration capacity. Keeping topsoil in place preserves the natural structure of the soils and aids the infiltration of stormwater.

ESC Principle 2: Phase construction activity. Another technique for minimizing the duration of exposed soil is phasing. By scheduling or sequencing your construction work and concentrating it in certain areas, you can minimize the amount of soil that is exposed to the elements at any given time. Limiting the area of disturbance to places where construction activities are underway and stabilizing them as quickly as possible can be one of your most effective BMPs.

ESC Principle 3: Control stormwater flowing onto and through your project. Plan for any potential stormwater flows coming onto the project area from upstream locations, and divert (and slow) flows to prevent erosion. Likewise, the volume and velocity of on-site stormwater runoff should be controlled to minimize soil erosion.

Example BMP: Diversion Ditches or Berms

Description: Diversion ditches or berms direct runoff away from unprotected slopes and may also direct sediment-laden runoff to a sediment-trapping structure. A diversion ditch can be located at the upslope side of a construction site to prevent surface runoff from entering the disturbed area. Ditches or berms on slopes need to be designed for erosive velocities. Also, ensure that the diverted water is released through a stable outlet and does not cause downslope or downstream erosion or flooding.

Installation Tips:

- Divert run-on and runoff away from disturbed areas
- Ensure that the diversion is protected from erosion, using vegetation, geotextiles, or other appropriate BMPs
- Divert sediment-laden water to a sediment-trapping structure
- Use practices that encourage infiltration of stormwater runoff wherever possible

Maintenance:

- Inspect diversions and berms, including any outlets, regularly and after each rainfall
- Remove any accumulated sediment

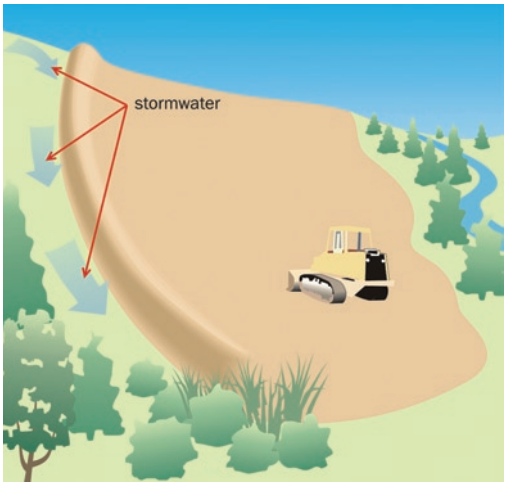


Figure 8. Illustration of a construction berm to divert stormwater away from the disturbed construction area.

ESC Principle 4: Stabilize soils promptly. Where construction activities have temporarily or permanently ceased, you should stabilize exposed soils to minimize erosion. You should have stabilization measures in place after grading activities have ceased (many permits require stabilization within a specified time frame). You can provide either temporary or permanent cover to protect exposed soils. Temporary measures are necessary when an area of a site is disturbed but where activities in that area are not completed or until permanent BMPs are established. Topsoil stockpiles should also be protected to minimize any erosion from these areas. Temporary-cover BMPs include temporary seeding, mulches, matrices, blankets and mats, and the use of soil binders (there may be additional state and local requirements for the use of chemical-based soil binders). Permanent-cover BMPs include permanent seeding and planting, sodding, channel stabilization, and vegetative buffer strips. Silt fence and other sediment control measures are not stabilization measures.

SWPPP Tip!

Final Stabilization

Once construction activity in an area is completed and the area is stabilized (typically by achieving 70 percent permanent vegetative cover), you can mark this area on your SWPPP and discontinue inspections in that area. By bringing areas of your site to final stabilization, you can reduce your workload associated with maintaining and inspecting BMPs. For more information on final stabilization, see Chapter 9.

Example BMP: Temporary Seeding

Description: Temporarily seeding an area to establish vegetative cover is one of the most effective, and least expensive, methods of reducing erosion. This approach, as a single BMP, might not be appropriate on steep slopes, when vegetation cannot be established quickly enough to control erosion during a storm event, or when additional activities might occur soon in the area.

Installation Tips:

- Seed and mulch area (the mulch provides temporary erosion protection by protecting the soil surface, moderating temperature, and retaining moisture while seeds germinate and grow)
- Water regularly, if needed, to ensure quick growth
- Maintain backup BMPs, such as silt fence or settling ponds

SWPPP Tip!

Wind Control BMPs

In areas where dust control is an issue, your SWPPP should include BMPs for wind-erosion control. These consist of mulching, wet suppression (watering), and other practices.

ESC Principle 5: Protect slopes. Protect all slopes with appropriate erosion controls. Steeper slopes, slopes with highly erodible soils, or long slopes require a more complex combination of controls. Erosion control blankets, bonded fiber matrices, or turf reinforcement mats are very effective options. Silt fence or fiber rolls may also be used to help control erosion on moderate slopes and should be installed on level contours spaced at 10- to 20-foot intervals. You can also use diversion channels and berms to keep stormwater off slopes.

Example BMP: Rolled erosion control products

Description: Erosion control products include mats, geotextiles, and erosion control blankets and products that provide temporary stabilization and help to establish vegetation on disturbed soils. Such products help control erosion and help establish vegetation and are often used on slopes, channels, or stream banks.

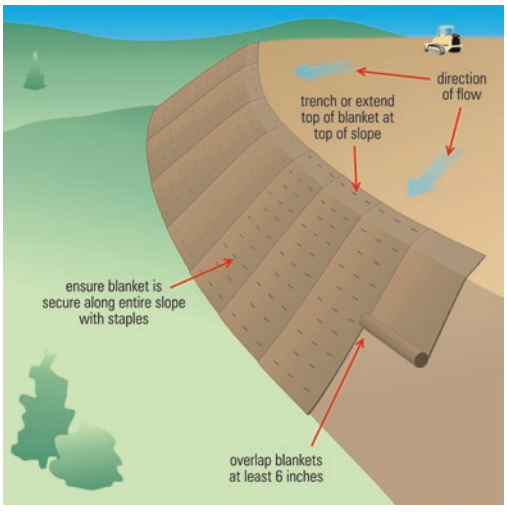


Figure 9. Illustration of erosion control blankets installed on slope.

Installation Tips:

- Use rolled erosion-control products on slopes steeper than 3 to 1 (horizontal to vertical) and in swales or long channels

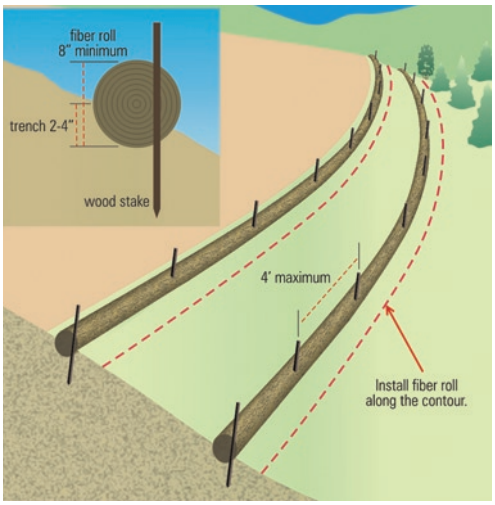


Figure 10. Illustration of a fiber roll installation along a slope.

- Trench the top of the blanket into the ground to prevent runoff from flowing under the blanket
- Overlap the lower end of the top mat over the top of the downslope mat to ensure that runoff stays on top of the blankets and mats
- Staple blankets and mats according to specifications

Maintenance:

- Periodically inspect for signs of erosion or failure
- Repair the blanket or mat if necessary
- Continue inspections until vegetation is established at the level required to qualify as final *stabilization*

ESC Principle 6: Protect storm drain inlets. Protect all inlets that could receive stormwater from the project until final stabilization of the site has been achieved. Install inlet protection before soil-disturbing activities begin. Maintenance throughout the construction process is important. Upon completion of the project, storm drain inlet protection is one of the temporary BMPs that should be removed. Storm drain inlet protection should be used not only for storm drains within the active construction project, but also for storm drains outside the project area that might receive stormwater discharges from the project. If there are storm drains on private property that could receive stormwater runoff from your project, coordinate with the owners of that property to ensure proper inlet protection.

Example BMP: Storm Drain Inlet Protection

Description: Storm drain inlet protection prevents sediment from entering a storm drain by surrounding or covering the inlet with a filtering material. Several types of filters are commonly used for inlet protection: silt fence, rock-filled bags, or block and gravel. The type of filter used depends on the inlet type (for example, curb inlet, drop inlet), slope, and volume of flow. Many different commercial inlet filters are also available. Some commercial inlet filters are placed in front of or on top of an inlet, while others are placed inside the inlet under the grate.

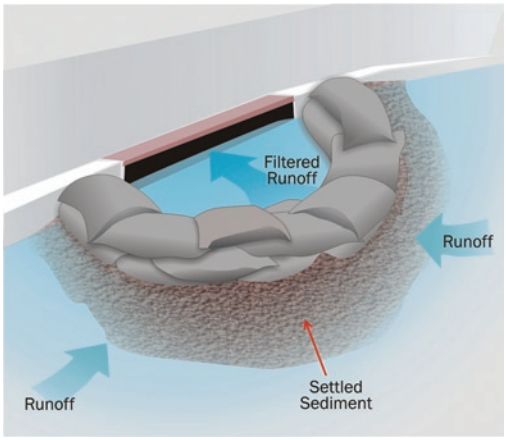


Figure 11. Illustration of a storm drain inlet with rock-filled bags filtering stormwater.

Installation Tips:

- Install inlet protection as soon as storm drain inlets are installed and before land-disturbance activities begin in areas with existing storm drain systems
- Protect all inlets that could receive stormwater from your construction project
- Use in conjunction with other erosion prevention and sediment control BMPs—remember, inlet protection is a secondary BMP!
- Design your inlet protection to handle the volume of water from the area being drained. Ensure that the design is sized appropriately.

Maintenance:

- Inspect inlets frequently and after each rainfall

- Remove accumulated sediment from around the device and check and remove any sediment that might have entered the inlet
- Replace or repair the inlet protection if it becomes damaged
- Sweep streets, sidewalks, and other paved areas regularly

SWPPP Tip!

Storm drain inlet protection should never be used as a primary BMP! Use erosion control techniques such as hydromulching or erosion-control blankets to prevent erosion. Use inlet protection and other sediment control BMPs as a *backup* or last line of defense.

ESC Principle 7: Establish perimeter controls. Maintain natural areas and supplement them with silt fence and fiber rolls around the perimeter of your site to help prevent soil erosion and stop sediment from leaving the site. Install controls on the downslope perimeter of your project (it is often unnecessary to surround the entire site with silt fence). Sediment barriers can be used to protect stream buffers, riparian areas, wetlands, or other waterways. They are effective only in small areas and should not be used in areas of concentrated flow.

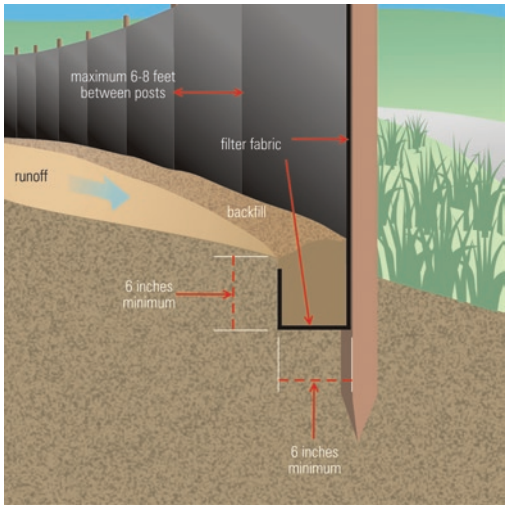


Figure 12. Illustration of proper techniques to use in installing silt fence.

Example BMP: Silt Fence and Fiber Rolls

Description: A silt fence is a temporary sediment barrier consisting of a geotextile attached to supporting posts and trenched into the ground. Silt fencing is intended to retain sediment that has been dislodged by stormwater. It is designed only for runoff from small areas and is not intended to handle flows from large slopes or in areas of concentrated flow. Fiber rolls serve the same purpose and consist of an open mesh tubular sleeve filled with a fibrous material which traps sediment. Fiber rolls are generally staked to the ground.

Installation Tips:

DO:

- Use silt fence or fiber rolls as perimeter controls, particularly at the lower or down slope edge of a disturbed area
- Leave space for maintenance between toe of slope and silt fence or roll
- Trench in the silt fence on the uphill side (6 inches deep by 6 inches wide)
- Install stakes on the downhill side of the fence or roll
- Curve the end of the silt fence or fiber roll up-gradient to help it contain runoff

DON'T:

- Install a silt fence or fiber rolls in ditches, channels, or areas of concentrated flow
- Install it running up and down a slope or hill
- Use silt fencing or fiber rolls alone in areas that drain more than a quarter-acre per 100 feet of fence

Maintenance:

- Remove sediment when it reaches one-third of the height of the fence or one-half the height of the fiber roll
- Replace the silt fence or roll where it is worn, torn, or otherwise damaged
- Retrench or replace any silt fence or roll that is not properly anchored to the ground

ESC Principle 8: Retain sediment on-site and control dewatering practices. Sediment barriers described in ESC Principle 7 can trap sediment from small areas, but when sediment retention from a larger area is required, consider using a temporary sediment trap or sediment basin. These practices detain sediment-laden runoff for a period of time, allowing sediment to settle before the runoff is discharged. Proper design and maintenance are essential to ensure that these practices are effective.

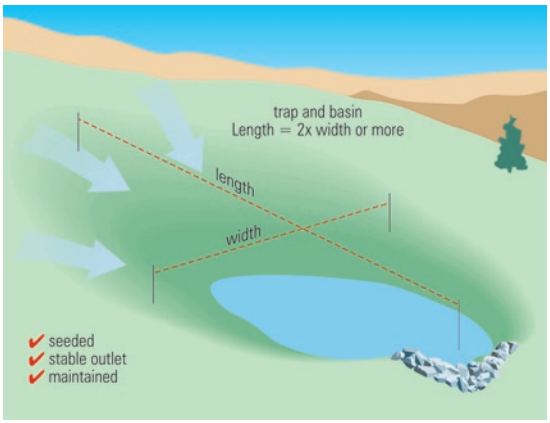


Figure 13. Illustration of a sediment basin.

You should use a sediment basin for common drainage locations that serve an area with 10 or more acres disturbed at any one time. The basin should be designed to provide storage for the volume of runoff from the drainage area for at least a 2-year, 24-hour storm (or 3,600 cubic feet of storage per acre drained, which is enough to contain 1 inch of runoff, if the 2-year, 24-hour calculation has not been performed). Check your permit for exact basin sizing requirements. Sediment basins should be located at low-lying areas of the site and on the down-gradient side of bare soil areas where flows converge. Do not put sediment traps or basins in or immediately adjacent to flowing streams or other waterways.

Where a large sediment basin is not practical, use smaller sediment basins or sediment traps (or both) where feasible. At a minimum, use silt fences, vegetative buffer strips, or equivalent sediment controls for all down-gradient boundaries (and for those side-slope boundaries deemed appropriate for individual site conditions).

Dewatering practices are used to remove ground water or accumulated rain water from excavated areas. Pump muddy water from these areas to a temporary or permanent sedimentation basin or to an area completely enclosed by silt fence in a flat vegetated area where discharges can infiltrate into the ground. Never discharge muddy water into storm drains, streams, lakes, or wetlands unless the sediment has been removed before discharge.

Keep in mind that some states and local jurisdictions require a separate permit for dewatering activities at a site.

ESC Principle 9: Establish stabilized construction exits. Vehicles entering and leaving the site have the potential to track significant amounts of sediment onto streets. Identify and clearly mark one or two locations where vehicles will enter and exit the site and focus stabilizing measures at those locations. Construction entrances are commonly made from large crushed rock. They can be further stabilized using stone pads or concrete. Also, steel wash racks and a hose-down system will remove even more mud and debris from vehicle tires. Divert runoff from wash areas to a sediment trap or basin. No system is perfect, so sweeping the street regularly completes this BMP.

Example BMP: Stabilized Construction Exit

Description: A rock construction exit can reduce the amount of mud transported onto paved roads by vehicles. The construction exit does this by removing mud from vehicle tires before the vehicle enters a public road.

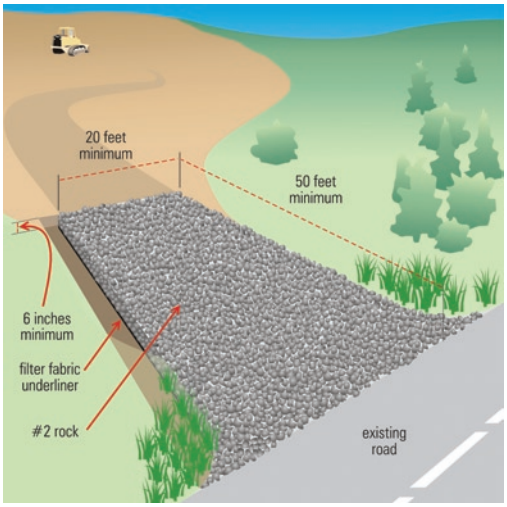


Figure 14. Illustration of a stabilized construction exit.

You might also want to install a wheel wash when mud is especially difficult to remove or space doesn't allow sufficient tire revolutions (four or five are needed) before exiting the site. Direct wash water to a suitable settling area—do not discharge wash water to a stream or storm drain!

Installation tips:

- Ensure that the exit is at least 50 feet long (generally, the length of two dump trucks) and graded so runoff does not enter the adjacent street
- Place a geotextile fabric under a layer of aggregate at least 6–12 inches thick. The stones or aggregate should be 3–6 inches in diameter
- Train employees and subcontractors to use the designated construction exits. Empower your employees to provide directions to subcontractors and others that are not on the site every day

Maintenance:

- Replenish or replace aggregate if it becomes clogged with sediment
- Sweep the street regularly

ESC Principle 10: Inspect and maintain controls. Inspection and maintenance is just as important as proper planning, design, and installation of controls. Without adequate maintenance, erosion and sediment controls will quickly fail, sometimes after just one rainfall, and cause significant water quality problems and potential violations of the NPDES construction general permit. Your permit likely requires you to maintain your BMPs at all times. To do this effectively, you should establish an inspection and maintenance approach or strategy that includes both regular and spot inspections. Inspecting both prior to predicted storm events and after will help ensure that controls are working effectively. Perform maintenance or corrective action as soon as problems are noted. **Inspection and maintenance of BMPs are addressed in more detail in Chapter 6.**

Other Sediment and Erosion Control Techniques

As mentioned at the beginning of this chapter, there are many other erosion and sediment control techniques that can be used effectively. The BMPs highlighted in this chapter are among those more commonly used and highlight many general erosion and sediment control principles for which other BMPs may be used effectively. Check to see if your state or local government has developed a BMP design manual for detailed information on any BMP you are considering. Appendix D lists several good BMP design manuals. You can also find out more about various BMPs by visiting EPA's Menu of BMPs at **www.epa.gov/npdes/menuofbmps**

The following BMPs are also commonly used at construction sites.

Erosion control measures:

- Surface roughening, trackwalking, scarifying, sheepsfoot rolling, imprinting
- Soil bioengineering techniques (e.g., live staking, fascines, brush wattles)
- Composting
- Sodding

Sediment control and runoff management measures:

- Gravel bag barrier
- Compost berm
- Rock or brush filters
- Baffles or skimmers in sediment basins to increase effectiveness
- Lowering soil levels near streets and sidewalks to prevent runoff
- Level spreaders
- Energy dissipaters
- Check dams

Chapter 5: SWPPP Development—Selecting Good Housekeeping BMPs

> This chapter presents a brief discussion of good housekeeping principles to consider to ensure your construction site does not contaminate stormwater runoff.
>
> As noted in Chapter 3, sediment is the principal pollutant of concern in stormwater discharges from construction sites. But, EPA's CGP and many state construction general permits require that the SWPPP describe good housekeeping measures for other pollutants that might be found on construction sites. This chapter discusses these measures.

Six Key Pollution Prevention Principles for Good Housekeeping

Construction projects generate large amounts of building-related waste, which can end up polluting stormwater runoff if not properly managed. The suite of BMPs that are described in your SWPPP must include pollution prevention (P2) or good housekeeping practices that are designed to prevent contamination of stormwater from a wide range of materials and wastes at your site. The six principles described below are designed to help you identify the pollution prevention practices that should be described in your SWPPP and implemented at your site.

1. Provide for waste management
2. Establish proper building material staging areas
3. Designate paint and concrete washout areas
4. Establish proper equipment/vehicle fueling and maintenance practices
5. Control equipment/vehicle washing and allowable non-stormwater discharges
6. Develop a spill prevention and response plan

P2 Principle 1: Provide for waste management. Design proper management procedures and practices to prevent or reduce the discharge of pollutants to stormwater from solid or liquid wastes that will be generated at your site. Practices such as trash disposal, recycling, proper material handling, and cleanup measures can reduce the potential for stormwater runoff to pick up construction site wastes and discharge them to surface waters.

Figure 15. Illustration showing construction materials with secondary containment and overhead cover to prevent stormwater contamination.

Provide convenient, well-maintained, and properly located toilet facilities. Provide for regular inspections, service, and disposal. Locate toilet facilities away from storm drain inlets and waterways to prevent accidental spills and contamination of stormwater. Treat or dispose of sanitary and septic waste in accordance with state or local regulations.

Proper material use, storage, waste disposal, and training of employees and subcontractors can prevent or reduce the discharge of hazardous and toxic wastes to stormwater. Implement a comprehensive set of waste-management practices for hazardous or toxic materials, such as paints, solvents, petroleum products, pesticides, wood preservatives, acids, roofing tar, and other materials. Practices should include storage, handling, inventory, and cleanup procedures, in case of spills (see the following P2 principles).

Waste Management Checklist

Solid or Construction Waste

- ✓ Designate trash and bulk waste-collection areas on-site
- ✓ Recycle materials whenever possible (e.g., paper, wood, concrete, oil)
- ✓ Segregate and provide proper disposal options for hazardous material wastes
- ✓ Clean up litter and debris from the construction site daily
- ✓ Locate waste-collection areas away from streets, gutters, watercourses, and storm drains. Waste-collection areas (dumpsters, and such) are often best located near construction site entrances to minimize traffic on disturbed soils. Consider secondary containment around waste collection areas to further minimize the likelihood of contaminated discharges.

Sanitary and Septic Waste

- ✓ Provide restroom facilities on-site
- ✓ Maintain clean restroom facilities and empty porta-johns regularly
- ✓ Provide secondary containment pans under porta-johns, where possible
- ✓ Provide tie-downs or stake downs for porta-johns in areas of high winds
- ✓ Educate employees, subcontractors, and suppliers on locations of facilities
- ✓ Do not discharge or bury wastewater at the construction site
- ✓ Inspect facilities for leaks, repair or replace immediately

Hazardous Materials and Wastes

- ✓ Develop and implement employee and subcontractor education, as needed, on hazardous and toxic waste handling, storage, disposal, and cleanup
- ✓ Designate hazardous waste-collection areas on-site
- ✓ Place all hazardous and toxic material wastes in secondary containment
- ✓ Hazardous waste containers should be inspected to ensure that all containers are labeled properly and that no leaks are present

P2 Principle 2: Establish proper building material handling and staging areas.
Your SWPPP should include comprehensive handling and management procedures for building materials, especially those that are hazardous or toxic. Paints, solvents, pesticides, fuels and oils, other hazardous materials or any building materials that have the potential to contaminate stormwater should be stored indoors or under cover whenever possible or in areas with secondary containment. Secondary containment prevents a spill from spreading across the site and include dikes, berms, curbing, or other containment methods. Secondary containment techniques should also ensure the protection of ground water. Designate staging areas for activities such as fueling vehicles, mixing paints, plaster, mortar, and so on. Designated staging areas will help you to monitor the use of materials and to clean up any spills. Training employees and subcontractors is essential to the success of this pollution prevention principle.

SWPPP Tip!

Material Staging Area Measures

Your SWPPP should include procedures for storing materials that can contribute pollutants to stormwater. Consider the following:

- Train employees and subcontractors in proper handling and storage practices
- Designate site areas for storage. Provide storage in accordance with secondary containment regulations and provide cover for hazardous materials when necessary. Ensure that storage containers are regularly inspected for leaks, corrosion, support or foundation failure, or any other signs of deterioration and tested for soundness
- Reuse and recycle construction materials when possible

P2 Principle 3: Designate washout areas.
Concrete contractors should be encouraged, where possible, to use the washout facilities at their own plants or dispatch facilities. If it is necessary to provide for concrete washout areas on-site, designate specific washout areas and design facilities to handle anticipated washout water. Washout areas should also be provided for paint and stucco operations. Because washout areas can be a source of pollutants from leaks or spills,

EPA recommends that you locate them at least 50 yards away from storm drains and watercourses whenever possible.

Several companies rent or sell prefabricated washout containers, and some provide disposal of waste solids and liquids along with the containers. These prefabricated containers are sturdy and provide a more reliable option for preventing leaks and spills of wash water than self-constructed washouts. Alternatively, you can construct your own washout area, either by digging a pit and lining it with 10 mil plastic sheeting or creating an aboveground structure from straw bales or sandbags with a plastic liner. If you create your own structure, you should inspect it daily for leaks or tears in the plastic because these structures are prone to failure.

Regular inspection and maintenance are important for the success of this BMP. Both self-constructed and prefabricated washout containers can fill up quickly when concrete, paint, and stucco work are occurring on large portions of the site. You should also inspect for evidence that contractors are using the washout areas and not dumping materials onto the ground or into drainage facilities. If the washout areas are not being used regularly, consider posting additional signage, relocating the facilities to more convenient locations, or providing training to workers and contractors.

SWPPP Tip!

Washout Area Measures

When concrete, paint, or stucco is part of the construction process, consider these practices which will help prevent contamination of stormwater. Include the locations of these areas and your maintenance and inspection procedures in your SWPPP.

- Do not washout concrete trucks or equipment into storm drains, streets, gutters, uncontained areas, or streams
- Establish washout areas and advertise their locations with signs
- Provide adequate containment for the amount of wash water that will be used
- Inspect washout structures daily to detect leaks or tears and to identify when materials need to be removed
- Dispose of materials properly. The preferred method is to allow the water to evaporate and to recycle the hardened concrete. Full service companies may provide dewatering services and should dispose of wastewater properly. Concrete wash water can be highly polluted. It should not be discharged to any surface water, storm sewer system, or allowed to infiltrate into the ground. It should not be discharged to a sanitary sewer system without first receiving written permission from the system operator

P2 Principle 4: Establish proper equipment/vehicle fueling and maintenance practices. Performing equipment/vehicle fueling and maintenance at an off-site facility is preferred over performing these activities on the site, particularly for road vehicles (e.g., trucks, vans). For grading and excavating equipment, this is usually not possible or desirable. Create an on-site fueling and maintenance area that is clean and dry. The on-site fueling area should have a spill kit, and staff should know how to use it. If possible, conduct vehicle fueling and maintenance activities in a covered area; outdoor vehicle fueling and maintenance is a potentially significant source of stormwater pollution. Significant maintenance on vehicles and equipment should be conducted off-site.

SWPPP Tip!

Equipment/Vehicle Fueling and Maintenance Measures

Consider the following practices to help prevent the discharge of pollutants to stormwater from equipment/vehicle fueling and maintenance. Include the locations of these areas and your inspection and maintenance procedures in your SWPPP.

- Train employees and subcontractors in proper fueling procedures (stay with vehicles during fueling, proper use of pumps, emergency shut-off valves, and such)
- Inspect on-site vehicles and equipment daily for leaks, equipment damage, and other service problems
- Clearly designate vehicle/equipment service areas away from drainage facilities and water-courses to prevent stormwater run-on and runoff
- Use drip pans, drip cloths, or absorbent pads when replacing spent fluids
- Collect all spent fluids, store in appropriate labeled containers in the proper storage areas, and recycle fluids whenever possible

P2 Principle 5: Control equipment/vehicle washing and allowable non-stormwater discharges. Environmentally friendly washing practices can be practiced at every construction site to prevent contamination of surface and ground water from wash water. Procedures and practices include using off-site facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water or routing to the sanitary sewer; and training employees and subcontractors in proper cleaning procedures.

Take a Closer Look...

Non-Stormwater Runoff

A construction site might have sources of runoff that are not generated by stormwater. These non-stormwater discharges include fire hydrant flushing, vehicle or equipment wash water (no detergents!), water used to control dust, and landscape irrigation.

What does this mean to me?

Take steps to infiltrate these sources of uncontaminated water into the ground. You can also route these sources of water to sediment ponds or detention basins or otherwise treat them with appropriate BMPs.

SWPPP Tip!

Equipment/Vehicle Washing Measures

The following equipment/vehicle washing measures will help prevent stormwater pollution. Include the location of your washing facilities and your inspection and maintenance procedures in your SWPPP.

- Educate employees and subcontractors on proper washing procedures
- Clearly mark the washing areas and inform workers that all washing must occur in this area
- Contain wash water and treat and infiltrate it whenever possible
- Use high-pressure water spray at vehicle washing facilities without any detergents because water can remove most dirt adequately
- Do not conduct any other activities, such as vehicle repairs, in the wash area

P2 Principle 6: Develop a spill prevention and response plan. Most state and EPA construction general permits require the preparation of spill prevention and response plans. Generally, these plans can be included or incorporated into your SWPPP. The plan should clearly identify ways to reduce the chance of spills, stop the source of spills, contain and clean up spills, dispose of materials contaminated by spills, and train personnel responsible for spill prevention and response. The plan should also specify material handling procedures and storage requirements and ensure that clear and concise spill cleanup procedures are provided and posted for areas in which spills may potentially occur. When developing a spill prevention plan, include, at a minimum, the following:

- Note the locations of chemical storage areas, storm drains, tributary drainage areas, surface waterbodies on or near the site, and measures to stop spills from leaving the site
- Specify how to notify appropriate authorities, such as police and fire departments, hospitals, or municipal sewage treatment facilities to request assistance
- Describe the procedures for immediate cleanup of spills and proper disposal
- Identify personnel responsible for implementing the plan in the event of a spill

SWPPP Tip!

Spill Prevention Measures

Additional spill prevention measures that will help prevent spills and leaks include the following:

- Describe and list all types of equipment to be used to adequately clean up the spill
- Provide proper handling and safety procedures for each type of waste
- Establish an education program for employees and subcontractors on the potential hazards to humans and the environment from spills and leaks
- Update the spill prevention plan and clean up materials as changes occur to the types of chemicals stored and used at the facility

Take a Closer Look...

Spill Prevention, Control and Countermeasure (SPCC) Plan

Construction sites may be subject to 40 CFR Part 112 regulations that require the preparation and implementation of a SPCC Plan to prevent oil spills from aboveground and underground storage tanks. Your facility is subject to this rule if you are a nontransportation-related facility that:

- Has a total storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons and
- Could reasonably be expected to discharge oil in quantities that may be harmful to navigable waters of the United States and adjoining shorelines

Furthermore, if your facility is subject to 40 CFR Part 112, your SWPPP should reference the SPCC Plan. To find out more about SPCC Plans, see EPA's website on SPPC at **www.epa.gov/oilspill/spcc.htm**

What does this mean to me?

Reporting Oil Spills

In the event of an oil spill, you should contact the National Response Center toll free at 1-800-424-8802 for assistance, or for more details, visit their website: ***www.nrc.uscg.mil/nrchp.html***

Chapter 6: **SWPPP Development—Inspections, Maintenance, and Recordkeeping**

▶ **This chapter describes the inspection and maintenance procedures your SWPPP should include, as well as recordkeeping requirements.**

A. Describe Your Plans and Procedures for Inspecting BMPs

Earlier discussions in this manual pointed out that the effectiveness of erosion and sediment control BMPs and good housekeeping and pollution prevention measures depend on consistent and continual inspection and maintenance. This step focuses on developing a plan for BMP inspection and maintenance to ensure that a schedule and procedures are in place.

Inspections

Your responsibility does not stop after BMPs are installed. Your BMPs must be maintained in good working order at all times. Further, your permit requires that you conduct regular inspections and document the findings of those inspections in your SWPPP.

Your construction general permit describes the ***minimum*** frequency of inspections, which is typically weekly or bi-weekly and after each rainfall event exceeding one-half inch. To meet the requirement to maintain all BMPs in good working order, EPA recommends that you develop an inspection schedule that goes beyond these minimums and is customized for your site and the conditions affecting it.

In developing your inspection schedule consider the following:

- Consider using *spot* inspections. You may want to inspect certain parts of your site more frequently or even daily. Target places that need extra attention, such as areas around construction site entrances, check nearby streets for dirt, check inlet protection, and so on.
- Consider using informal inspections. Your permit outlines the minimum requirements for formal inspections that must be documented and included in your SWPPP. You can also add informal inspections that wouldn't require documentation, unless of course, a problem is identified. Always document any problems you find and those that are identified by staff.
- Consider adding inspections *before or even during* rain events. Many permits require inspections of BMPs after rain events. You should consider adding inspections ***before or during*** predicted rain events. Consult a local weather source and initiate inspections before predicted storm events as a way to ensure that controls are operational.
- Train staff and subcontractors. Use your staff and subcontractors to help identify any potential problems with your BMPs. Again, document any issues that are confirmed problems.

SWPPP Tip!

Inspection Guide

The State of Minnesota has developed a *Stormwater Construction Inspection Guide* to assist municipal site inspectors in procedures for conducting a compliance inspection at construction sites. This guide can also be useful for construction operators conducting self-inspections. Available at **www.pca.state.mn.us/water/stormwater/stormwatr-c.html**

EPA recommends that you develop an inspection schedule that meets the needs of your site. You'll probably also want to update and refine this schedule based on your experiences, the findings of your inspections, and the changing conditions at your site.

SWPPP Tip!

Selecting BMP Inspectors

A BMP inspection is only as good as the inspector. Therefore, it is important to select qualified personnel to conduct BMP inspections. The SWPPP should identify who has the responsibility for conducting inspections. Personnel selected to conduct inspections should be knowledgeable in the principles and practices of erosion and sediment controls, possess the technical skills to assess conditions at the construction site that could impact stormwater quality, and assess the effectiveness of any sediment and erosion control measures selected.

Several states and other organizations offer training that will help prepare inspectors to accurately evaluate BMPs, decide when maintenance is appropriate, or when a different BMP should be substituted. (Several states require that sites be inspected by someone that the state certifies as a qualified inspector.) One national organization offers two certification programs that would be useful for personnel who are developing and implementing SWPPPs and conducting inspections. These certification programs are called: "*Certified Professional in Erosion and Sediment Control (CPESC)*" and "*Certified Professional in Stormwater Quality (CPSWQ)*." You can find more information on these programs at **www.cpesc.org**

Inspection Reports

Complete an inspection report after each inspection. You should retain copies of all inspection reports and keep them with or in your SWPPP. Generally, the following information is required to be included in your inspection report:

- Inspection date
- Inspector information, including the names, titles, and qualifications of personnel conducting the inspection
- Weather information for the period since the last inspection (or for the first inspection since commencement of construction activity) including a best estimate of the beginning of each storm, its duration, approximate amount of rainfall for each storm (in inches), and whether any discharges occurred. You may create a log to record the basic weather information or you may keep copies of weather information from a reliable local source, such as the internet sites of local newspapers, TV stations, local universities, etc.
- Current weather information and a description of any discharges occurring at the time of the inspection
- Descriptions of evidence of previous or ongoing discharges of sediment or other pollutants from the site
- Location(s) of BMPs that need to be maintained
- Location(s) of BMPs that failed to operate as designed or proved inadequate for a location
- Location(s) where additional BMPs are needed but did not exist at the time of inspection
- Corrective action required, including any necessary changes to the SWPPP and implementation dates
- Reference to past corrective actions documenting follow-up actions taken

Consider taking digital photographs during inspections to document BMPs, problems identified, and progress in implementing the SWPPP.

Appendix B includes an example stormwater inspection report. You should use this report, or a similar report, to document your stormwater construction site inspections. Check to see if your state or local authority has developed an inspection checklist for your use. The inspection report is broken up into two main sections—site-specific BMPs and overall site issues. For the site-specific BMPs, you should number the structural and non-structural BMPs in your SWPPP on a copy of your site map (preferably in the order in which you would inspect them on the site). Then as you conduct your inspections, you can verify whether each BMP has been installed and maintained. If a BMP has not been installed or needs maintenance, describe this in the corrective action section and list a date for when the corrective action will be completed and who will be responsible for completing the action. The overall site issues section describes 11 common issues at construction sites you should inspect for. You can customize this form to meet the needs of your particular situation.

Make sure each inspection report is signed and certified consistent with your permit's requirements.

Chapter 8, Section D contains more information on implementing an inspection program. Also, see the suggested inspection report form in Appendix B.

SWPPP Tip!

Consider More Effective BMPs

During inspections, consider whether the installed BMPs are working effectively. If you find a BMP that is failing or overwhelmed by sediment, you should consider whether it needs to be replaced with a more effective BMP or enhanced by the addition of another, complimentary BMP. Ensure that you record such changes in your SWPPP and on your site map.

B. BMP Maintenance

Implementing a good BMP maintenance program is essential to the success of your SWPPP and to your efforts to protect nearby waterways. You should conduct maintenance of BMPs regularly and whenever an inspection (formal or informal) identifies a problem or potential issue. For instance, trash and debris should be cleaned up, dumpsters should be checked and covered, nearby streets and sidewalks should be swept daily, and so on. Maintenance on erosion and sediment controls should be performed as soon as site conditions allow. Consider the following points when conducting maintenance:

- Follow the designers or manufacturer's recommended maintenance procedures for all BMPs
- Maintenance of BMPs will vary according to the specific area and site conditions
- Remove sediment from BMPs as appropriate and properly dispose of sediment into controlled areas to prevent soil from returning to the BMP during subsequent rain events
- Remove sediment from paved roadways and from around BMPs protecting storm drain inlets
- Ensure that construction support activities, including borrow areas, waste areas, contractor work areas, and material storage areas and dedicated concrete and asphalt batch plants are cleaned and maintained
- Replace damaged BMPs, such as silt fences, that no longer operate effectively

You should keep a record of all maintenance activities, including the date, BMP, location, and maintenance performed in your SWPPP.

C. Recordkeeping

You must keep copies of the SWPPP, inspection records, copies of all reports required by the permit, and records of all data used to complete the NOI to be covered by the permit for a period of at least 3 years from the date that permit coverage expires or is terminated.

Records should include:

- A copy of the SWPPP, with any modifications
- A copy of the NOI and Notice of Termination (NOT) and any stormwater-related correspondence with federal, state, and local regulatory authorities
- Inspection forms, including the date, place, and time of BMP inspections
- Names of inspector(s)
- The date, time, exact location, and a characterization of significant observations, including spills and leaks
- Records of any non-stormwater discharges
- BMP maintenance and corrective actions taken at the site (Corrective Action Log)
- Any documentation and correspondence related to endangered species and historic preservation requirements
- Weather conditions (e.g., temperature, precipitation)
- Date(s) when major land disturbing (e.g. clearing, grading, and excavating) activities occur in an area
- Date(s) when construction activities are either temporarily or permanently ceased in an area
- Date(s) when an area is either temporarily or permanently stabilized

Chapter 7: **Certification and Notification**

▶ **This chapter describes how, after developing your SWPPP, you can obtain permit coverage for your stormwater discharges.**

A. Certification

Signature and Certification

The construction site operator must sign the permit application form, which is often called a *Notice of Intent* or *NOI*. (In some instances, the construction general permit may not require the submission of an NOI or application. Construction activities may be covered automatically.)

All reports, including SWPPPs and inspection reports, generally must be signed by the construction site operator or a duly authorized representative of that person. The authorized representative is typically someone who has direct responsibility for implementing the SWPPP. If the operator chooses to designate an authorized representative, a signed letter or statement to that effect must be included in the SWPPP. Check your permit for exact requirements.

Your SWPPP must include the signature of the construction site operator or authorized representative and the certification statement provided in the general permit. An example of the certification language from EPA's Construction General Permit follows:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

This ensures that the SWPPP was developed and reviewed by a responsible party with the ability to implement the BMPs and other commitments described in the SWPPP.

SWPPP Tip!

Posting a sign at the construction entrance

EPA and many state general permits require that you post a sign or other notice conspicuously near the main entrance of the construction site. EPA's permit requires that the sign contain a copy of the NOI, the location of the SWPPP, and a contact person for viewing the SWPPP.

Copy of Permit Requirements

Most general permits require you to keep a copy of the permit and your NOI with your SWPPP. This allows you to quickly check the permit if a question arises about a permit requirement.

Other State, Tribal, and Local Programs

Include in your SWPPP a description of any other federal, state, tribal, or local requirements for erosion and sediment control and stormwater management that apply to your site. Many local governments also impose erosion and sediment control requirements; your SWPPP should comply with both the general permit and any applicable local requirements.

SWPPP Tip!

Making your SWPPP available

While EPA and most states do not require you to submit a copy of your SWPPP for review, your SWPPP must be available to these and other government agencies for inspection. Your permit may also require you to make your SWPPP available to the public, if requested. If you have the ability, you should consider posting your SWPPP on the Internet and publicizing the URL. Check your permit for exact requirements.

B. Notification

Now that you have developed your SWPPP and before you begin construction, you must begin the process of obtaining permit coverage from your authorized state or EPA. Authorized states and EPA use *general* permits to cover all construction sites. These broadly written general or *umbrella* permits apply to all construction activities in a given state.

Obtaining Coverage Under a General Permit

Important! Before obtaining permit coverage, you should read a copy of the appropriate construction general permit *and* develop your SWPPP.

To obtain coverage under a state or EPA construction general permit, you will typically need to fill out and submit an application form, often called a Notice of Intent or NOI. Submitting this form to the permitting authority indicates your *intent* to be authorized to discharge stormwater under the appropriate general permit for construction activities. Depending on the permit, you may be authorized to discharge immediately or at some later time. In some cases, you are not authorized to discharge until the state has notified you accordingly. EPA's Construction General Permit requires a 7-day waiting period after a complete NOI is received and posted on EPA's website (**www.epa.gov/npdes/noisearch**). The waiting period expires when the permit's status changes from *waiting* to *active*.

Take a Closer Look...

Information on the Application or Notice of Intent (NOI)

The NOI provides the permitting authority with pertinent information about your construction site, such as owner/operator information, site location, estimated project start and completion dates, approximate area to be disturbed, information about your SWPPP, receiving waters, and endangered species review certification. An appropriate person who is authorized to represent your organization must sign and verify that the facts contained in the NOI are true and accurate. For businesses, a certifying official is typically a corporate officer, such as a president, vice president, or manager of operations. For municipalities, it's typically a principal executive officer or ranking elected official. Check your permit for exact signature requirements.

In general, the only information you need to submit to the permitting authority is the NOI. EPA and most authorized state agencies do not require you to submit your SWPPP for approval. However, many local governments review and approve at least the erosion and sediment control component of your SWPPP.

What does this mean to me?

There are significant penalties for failing to obtain authorization to discharge or for submitting inaccurate information. If you are the certifying official, make sure you are authorized to discharge before construction activities begin.

SWPPP Tip!

Deadline for submitting NOIs under EPA's Construction General Permit

For EPA's construction general permit, the fastest and easiest way to obtain permit coverage is to use EPA's electronic permit application system, called "eNOI" at **www.epa.gov/npdes/stormwater/enoi**. Using this approach, you may be authorized to discharge in as little as 7 days after submission of your electronic NOI. If you choose to submit your NOI by mail, EPA recommends that you send it at least one month before you need permit coverage.

Chapter 8: **SWPPP Implementation**

Your SWPPP is your guide to preventing stormwater pollution. However, it is just a plan. Implementing your SWPPP, maintaining your BMPs, and then constantly reevaluating and revising your BMPs and your SWPPP are the keys to protecting your local waterways.

A. Train Your Staff and Subcontractors

Your site's construction workers and subcontractors might not be familiar with stormwater BMPs, and they might not understand their role in protecting local rivers, lakes and coastal waters. Training your staff and subcontractors in the basics of erosion control, good housekeeping, and pollution prevention is one of the most effective BMPs you can institute at your site.

Basic training should include

- Spill prevention and cleanup measures, including the prohibition of dumping any material into storm drains or waterways
- An understanding of the basic purpose of stormwater BMPs, including what common BMPs are on-site, what they should look like, and how to avoid damaging them
- Potential penalties associated with stormwater noncompliance

Staff directly responsible for implementing the SWPPP should receive comprehensive stormwater training, including

- The location and type of BMPs being implemented
- The installation requirements and water quality purpose for each BMP
- Maintenance procedures for each of the BMPs being implemented
- Spill prevention and cleanup measures
- Inspection and maintenance recordkeeping requirements

You can train staff and subcontractors in several ways: short training sessions (food and refreshments will help increase attendance), posters and displays explaining your site's various BMPs, written agreements with subcontractors to educate their staff members, signs pointing out BMPs and reminders to keep clear of them. Every construction site operator should try to train staff and subcontractors to avoid damaging BMPs. By doing so, operators can avoid the added expense of repairs.

SWPPP Tip!

Train your staff and subcontractors!

Here are a few key things you will want to cover with each person working on your site:

- Use only designated construction site entrances
- Keep equipment away from silt fences, fiber rolls, and other sediment barriers
- Know the locations of disposal areas, and know the proper practices for trash, concrete and paint washout, hazardous chemicals, and so on
- Keep soil, materials, and liquids away from paved areas and storm drain inlets. Never sweep or wash anything into a storm drain
- Know the location and understand the proper use of spill kits
- Know the locations of your site's designated protection areas. Keep equipment away from stream banks, valuable trees and shrubs, and steep slopes. Clearly mark these areas with signs
- Keep equipment off mulched, seeded, or stabilized areas. Post signs on these areas, too
- Know who to contact when problems are identified!

B. Ensure Responsibility—Subcontractor Agreements

At any given site, there might be multiple parties (developer, general contractor, builders, subcontractors) that have roles and responsibilities for carrying out or maintaining stormwater BMPs at a given site. These roles and responsibilities should be documented clearly in the SWPPP (see Chapter 2, Section D). In some cases (state requirements vary), there may be one entity that has developed the SWPPP and filed for permit coverage and, therefore, is designated as the *operator*. When other parties at a site are not officially designated as operators, many operators are incorporating the roles and responsibilities of these *non-operators* in the agreements and contracts they have with these companies and individuals. This contract language should spell out responsibilities implementing and maintaining stormwater BMPs, for training staff, and for correcting damage to stormwater BMPs on the site. Several states have stormwater regulations that hold other parties liable even if they are not identified as the *operator*.

C. Implement Your SWPPP Before Construction Starts

Once you have obtained permit coverage and you are ready to begin construction, it is time to implement your SWPPP. You must implement appropriate parts of your SWPPP before construction activity begins. This generally involves installing storm drain inlet protection, construction entrances, sediment basins, and perimeter silt fences before clearing, grading, and excavating activities begin.

After construction activities begin, your SWPPP should describe when additional erosion and sediment controls will be installed (generally after initial clearing and grading activities are complete). You should also begin BMP inspections once clearing and grading activities begin.

SWPPP Tip!

Take Photographs During Inspections

Taking photographs can help you document areas that need maintenance and can help identify areas where subcontractors might need to conduct maintenance. Photographs can also help provide documentation to EPA or state inspectors that maintenance is being performed.

SWPPP Tip!

Prepare for the rain and snowmelt!

In some areas of the country, construction site operators are required to develop *weather triggered* action plans that describe additional activities the operator will conduct 48 hours before a predicted storm (at least a 50 percent forecasted chance of rain). It is also a good idea to stockpile additional erosion and sediment control BMPs (such as silt fencing, and fiber rolls) at the site for use when necessary.

D. Conduct Inspections and Maintain BMPs

As mentioned earlier (Chapter 6), EPA recommends that you develop an inspection schedule for your site that considers the size, complexity, and other conditions at your site. This should include regularly scheduled inspections and less formal inspections. EPA recommends that you develop a plan that includes inspections before and after anticipated rain events. You might also want to inspect some BMPs during rain events to see if they are actually keeping sediment on site! Conducting inspections during rain events also allows a construction site operator to address minor problems before they turn into major problems.

Temporarily Removed BMPs

BMPs sometimes need to be temporarily removed to conduct work in an area of the site. These temporarily removed BMPs should be noted on the site plan and replaced as soon as possible after the completion of the activity requiring their removal. If a rain is forecast, the BMPs should be replaced as soon as possible before the rain event.

Recommended Inspection Sequence

You should conduct thorough inspections of your site, making sure to inspect all areas and BMPs. The seven activities listed below are a recommended inspection sequence that will help you conduct a thorough inspection (adapted from MPCA 2004).

1. Plan your inspection

- ☑ Create a checklist to use during the inspection (see Appendix B)
- ☑ Obtain a copy of the site map with BMP locations marked
- ☑ Plan to walk the entire site, including discharge points from the site and any off-site support activities such as concrete batch plants should also be inspected
- ☑ Follow a consistent pattern each time to ensure you inspect all areas (for example, starting at the lowest point and working uphill)

2. Inspect discharge points and downstream, off-site areas

- ☑ Inspect discharge locations to determine whether erosion and sediment control measures are effective
- ☑ Inspect nearby downstream locations, if feasible
- ☑ Walk *down the street* to inspect off-site areas for signs of discharge. This is important in areas with existing curbs and gutters
- ☑ Inspect downslope municipal catch basin inlets to ensure that they are adequately protected

3. Inspect perimeter controls and slopes

- ☑ Inspect perimeter controls such as silt fences to determine if sediment should be removed
- ☑ Check the structural integrity of the BMP to determine if portions of the BMP need to be replaced
- ☑ Inspect slopes and temporary stockpiles to determine if erosion controls are effective

4. Compare BMPs in the site plan with the construction site conditions

- ☑ Determine whether BMPs are in place as required by the site plan
- ☑ Evaluate whether BMPs have been adequately installed and maintained
- ☑ Look for areas where BMPs are needed but are missing and are not in the SWPPP

5. Inspect construction site entrances

- ☑ Inspect the construction exits to determine if there is tracking of sediment from the site onto the street
- ☑ Refresh or replace the rock in designated entrances
- ☑ Look for evidence of additional construction exits being used that are not in the SWPPP or are not stabilized
- ☑ Sweep the street if there is evidence of sediment accumulation

6. Inspect sediment controls

- ☑ Inspect any sediment basins for sediment accumulation
- ☑ Remove sediment when it reduces the capacity of the basin by the specified amount (many permits have specific requirements for sediment basin maintenance. Check the appropriate permit for requirements and include those in your SWPPP)

7. Inspect pollution prevention and good housekeeping practices

- ☑ Inspect trash areas to ensure that waste is properly contained
- ☑ Inspect material storage and staging areas to verify that potential pollutant sources are not exposed to stormwater runoff
- ☑ Verify that concrete, paint, and stucco washouts are being used properly and are correctly sized for the volume of wash water
- ☑ Inspect vehicle/equipment fueling and maintenance areas for signs of stormwater pollutant exposure

Common Compliance Problems During Inspections

The following are problems commonly found at construction sites. As you conduct your inspections, look for these problems on your site (adapted from MPCA 2004).

Problem #1—Not using phased grading or providing temporary or permanent cover (i.e., soil stabilization)

In general, construction sites should phase their grading activities so that only a portion of the site is exposed at any one time. Also, disturbed areas that are not being actively worked should have temporary cover. Areas that are at final grade should receive permanent cover as soon as possible.

Problem #2—No sediment controls on-site

Sediment controls such as silt fences, sediment barriers, sediment traps and basins must be in place before soil-disturbance activities begin. Don't proceed with grading work out-of-phase.

Problem #3—No sediment control for temporary stockpiles

Temporary stockpiles must be seeded, covered, or surrounded by properly installed silt fence. Stockpiles should never be placed on paved surfaces.

Problem #4—No inlet protection

All storm drain inlets that could receive a discharge from the construction site must be protected before construction begins and must be maintained until the site is finally stabilized.

Problem #5—No BMPs to minimize vehicle tracking onto the road

Vehicle exits must use BMPs such as stone pads, concrete or steel wash racks, or equivalent systems to prevent vehicle tracking of sediment.

Problem #6—Improper solid waste or hazardous waste management

Solid waste (including trash and debris) must be disposed of properly, and hazardous materials (including oil, gasoline, and paint) must be properly stored (which includes secondary containment). Properly manage portable sanitary facilities.

Problem #7—Dewatering and other pollutant discharges at the construction site

Construction site dewatering from building footings or other sources should not be discharged without treatment. Turbid water should be filtered or allowed to settle.

Problem #8—Poorly managed washouts (concrete, paint, stucco)

Water from washouts must not enter the storm drain system or a nearby receiving water. Make sure washouts are clearly marked, sized adequately, and frequently maintained.

Problem #9—Inadequate BMP maintenance

BMPs must be frequently inspected and maintained if necessary. Maintenance should occur for BMPs that have reduced capacity to treat stormwater (construction general permits or state design manuals often contain information on when BMPs should be maintained), or BMPs that have been damaged and need to be repaired or replaced (such as storm drain inlet protection that has been damaged by trucks).

Problem #10—Inadequate documentation or training

Failing to develop a SWPPP, keep it up-to-date, or keep it on-site, are permit violations. You should also ensure that SWPPP documentation such as a copy of the NOI, inspection reports and updates to the SWPPP are also kept on-site. Likewise, personnel working on-site must be trained on the basics of stormwater pollution prevention and BMP installation/maintenance.

E. Update and Evaluate Your SWPPP

Like your construction site, your SWPPP is dynamic. It is a document that must be amended to reflect changes occurring at the site. As plans and specifications change, those changes should be reflected in your SWPPP. If you find that a BMP is not working and you decide to replace it with another, you must reflect that change in your SWPPP. Document in your SWPPP transitions from one phase of construction to the next, and make sure you implement new BMPs required for that next phase.

Are Your BMPs Working?

You should evaluate the effectiveness of your BMPs as part of your routine inspection process. An informal analysis of both your inspection's findings and your list of BMP repairs will often reveal an inadequately performing BMP. An inspection immediately after a rain event can indicate whether another approach is needed.

You may decide to remove an existing BMP and replace it with another, or you may add another BMP in that area to lessen the impact of stormwater on the original installation.

When you update your SWPPP, you can simply mark it up, particularly for relatively simple changes and alterations. More significant changes might require a rewriting of portions of the SWPPP. The site map should also be updated as necessary.

Chapter 9: **Final Stabilization and Permit Termination**

▶ **This chapter describes what you must do to stabilize your construction site and end permit coverage.**

Stabilize Disturbed Areas

As your construction project progresses, you must stabilize areas not under construction. EPA and most states have specific requirements and time frames that must be followed. Generally, it is a wise management practice to stabilize areas as quickly as possible to avoid erosion problems that could overwhelm silt fences, sediment basins, and other sediment control devices.

SWPPP Tip!

Stabilize as soon as practicable

EPA's Construction General Permit states that, "stabilization measures must be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased."

Temporary stabilization can be achieved through a variety of BMPs, including mulching, seeding, erosion control blankets, hydroseeding, and other measures.

Permanent or final stabilization of areas on your site is generally accomplished by installing the final landscape requirements (e.g., trees, grass, gardens, or permanent stormwater controls). Once the site has been stabilized, you can terminate your permit coverage.

Sediment controls, such as silt fence, berms, sediment ponds or traps, alone, are not stabilization measures. You should continue to use these kinds of measures (e.g., silt fence around an area that has been seeded) until full stabilization is achieved.

A. Final Stabilization

When you have completed your construction project or an area within the overall project, you must take steps to permanently and finally stabilize it. Check your permit for the specific requirements you must meet. After a project or an area in the project has been fully stabilized, you should remove temporary sediment and erosion control devices (such as silt fences). You might also be able to stop routine inspections in these stabilized areas. However, in some states such as Colorado, inspections are required every 30 days (after the construction has been completed and the site is stabilized) until permit coverage has been terminated. In general, you should be aware that

Figure 16. Seeding is an effective BMP that can be used to temporarily or permanently stabilize disturbed areas.

final stabilization often takes time (weeks or even months), especially during times of low rainfall or during the colder months of the year. You should not discontinue routine inspections until you have met the final stabilization requirements in your permit.

EPA and many states define final stabilization as occurring when a uniform, evenly distributed perennial vegetative cover with a density of 70 percent of the native background cover has been established on all unpaved areas and areas not covered by permanent structures. Some states have a higher percentage of vegetative cover required (e.g., New York requires 80 percent). Please review your state's construction general permit for specific requirements.

Native vegetation must be established uniformly over each disturbed area on the site. Stabilizing seven of ten slopes, or leaving an area equivalent to 30 percent of the disturbed area completely unstabilized will not satisfy the *uniform vegetative cover* standard.

The contractor must establish vegetation over the entire disturbed soil area at a minimum density of 70 percent of the native vegetative coverage. For example, if native vegetation covers 50 percent of the undisturbed ground surface (e.g., in an arid or semi-arid area), the contractor must establish 35 percent vegetative coverage uniformly over the entire disturbed soil area ($0.70 \times 0.50 = 0.35$ or 35 percent). Several states require perennial native vegetative cover that is *self-sustaining* and capable of providing *erosion control equivalent to preexisting conditions* to satisfy the 70 percent coverage requirement.

In lieu of vegetative cover, you can apply alternate measures that provide equivalent soil stabilization to the disturbed soil area. Such equivalent measures include blankets, reinforced channel liners, soil cement, fiber matrices, geotextiles, or other erosion-resistant soil covering or treatments. Your construction general permit might allow all or some of these alternate measures for equivalent soil stabilization for final stabilization; check your general permit.

B. Permit Termination

Once construction activity has been completed and disturbed areas are finally stabilized, review your general permit for specific steps to end your coverage under that permit. EPA and many states require you to submit a form, often called a notice of termination (NOT), to end your coverage under that construction general permit. Before terminating permit coverage, make sure you have accomplished the following:

- Remove any construction debris and trash
- Remove temporary BMPs (such as silt fence). Remove any residual sediment as needed. Seed and mulch any small bare spots. BMPs that will decompose, including some fiber rolls and blankets, may be left in place
- Check areas where erosion-control blankets or matting were installed. Cut away and remove all loose, exposed material, especially in areas where walking or mowing will occur. Reseed all bare soil areas
- Ensure that 70 percent of background native vegetation coverage or equivalent stabilization measures have been applied for final soil stabilization of disturbed areas
- Repair any remaining signs of erosion
- Ensure that post-construction BMPs are in place and operational. Provide written maintenance requirements for all post-construction BMPs to the appropriate party
- Check all drainage conveyances and outlets to ensure they were installed correctly and are operational. Inspect inlet areas to ensure complete stabilization and remove any brush or debris that could clog inlets. Ensure banks and ditch bottoms are well vegetated. Reseed bare areas and replace rock that has become dislodged
- Seed and mulch or otherwise stabilize any areas where runoff flows might converge or high velocity flows are expected
- Remove temporary stream crossings. Grade, seed, or re-plant vegetation damaged or removed
- Ensure subcontractors have repaired their work areas before final closeout

You might also be required to file an NOT if you transfer operational control to another

Take a Closer Look…

Is there a deadline to submit an NOT?

Many states require a Notice of Termination (NOT) or similar form to indicate that the construction phase of a project is completed and that all the terms and conditions have been met. This notification informs the permitting authority that coverage under the construction general permit is no longer needed. If your permitting authority requires such a notification, check to see what conditions must be met in order to submit it and check to see if there is a deadline for submission. EPA's Construction General Permit requires that you submit an NOT when you have met all your permit requirements. The NOT is due no later than 30 days after meeting these requirements.

What does this mean to me?

Check your permit carefully for details and conditions relating to terminating your permit coverage.

party before the project is complete. The new operator would be required to develop and implement a SWPPP and to obtain permit coverage as described above.

EPA and most states allow homebuilders to terminate permit coverage when the property has been transferred to the homeowner with temporary or final stabilization measures in place. If the transfer is made with temporary stabilization measures in place, EPA expects the homeowner to complete the final landscaping. Under these circumstances, EPA and most states do not require homeowners to develop SWPPPs and apply for permit coverage.

C. Record Retention

EPA's regulations specifies that you must retain records and reports required in the permit, including SWPPPs and information used to complete the NOI, for at least 3 years from the termination of coverage or expiration of the permit. You should also keep maintenance and inspection records related to the SWPPP for this same time frame. General permits issued by states may have a longer period for retention.

Figure 17. Make sure inlets, outlets, and slopes are well stabilized before leaving the site and filing your "Notice of Termination" for ending permit coverage.

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Appendix A: **SWPPP Template**

An electronic copy of the SWPPP template is available on EPA's web site at:
http://www.epa.gov/npdes/swpppguide

Appendix B: **Sample Inspection Report**

An electronic copy of the sample inspection report is available on EPA's web site at:
http://www.epa.gov/npdes/swpppguide

Appendix C: **Calculating the Runoff Coefficient**

The following information is largely taken from EPA's 1992 guidance *Stormwater Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-005).

It is important to estimate your development's impact on runoff after construction is complete. This can be done by estimating the runoff coefficient for pre- and post-construction conditions. The runoff coefficient ("C" value) is the partial amount of the total rainfall which will be come runoff. The runoff coefficient is used in the "rational method" which is:

$$Q = CiA,$$

Where Q = the rate of runoff from an area,
i = rainfall intensity, and
A = the area of the drainage basin.

There are many methods which can be used to estimate the amount of runoff from a construction site. You are not required to use the rationale method to design stormwater conveyances or BMPs. Consult your State/local design guides to determine what methods to use for estimating design flow rates from your development.

The less rainfall that is absorbed (infiltrates) into the ground, evaporates, or is otherwise absorbed on site, the higher the "C" value. For example, the "C" value of a lawn area is 0.2, which means that only 20 percent of the rainfall landing on that area will run off, the rest will be absorbed or evaporate. A paved parking area would have a "C" value of 0.9, which means that 90 percent of the rainfall landing on that area will become runoff. You should calculate the runoff coefficient for conditions before construction and after construction is complete. It is suggested that a runoff coefficient be calculated for each drainage basin on the site. The following is an example of how to calculate the "C" value.

The runoff coefficient or "C" value for a variety of land uses may be found in Table C-1 (NOTE: Consult your State/local design guide, if available, to determine if specific "C" values are specified for your area). The "C" values provide an estimate of anticipated runoff for particular land uses. Most sites have more than one type of land use and therefore more than one "C" value will apply. To have a "C" value that represents your site you will need to calculate a "weighted C value."

Calculating a "Weighted C value"

When a drainage area contains more than one type of surface material with more than one runoff coefficient a "weighted C" must be calculated. This "weighted C" will take into account the amount of runoff from all the various parts of the site. A formula used to determine the "weighted C" is as follows:

$$C = \frac{A_1C_1 + A_2C_2 + \ldots + A_xC_x}{(A_1 + A_2 + \ldots + A_x)}$$

Where A = acres and C = coefficient.

Therefore, if a drainage area has 15 acres (ac.) with 5 paved acres ($C = 0.9$), 5 grassed acres ($C = 0.2$), and 5 acres in natural vegetation ($C = 0.1$), a "weighted C" would be calculated as follows:

$$C = \frac{(5 \text{ ac} \times 0.9) + (5 \text{ ac} \times 0.2) + (5 \text{ ac} \times 0.1)}{(5 \text{ ac} + 5 \text{ ac} + 5 \text{ ac})} = 0.4$$

Table C-1. Typical "C" Values

Description of Area	Runoff Coefficients
Business	
Downtown Areas	0.70 – 0.95
Neighborhood Areas	0.50 – 0.70
Residential	
Single-family areas	0.30 – 0.50
Multi-units, detached	0.40 – 0.60
Multi-units, attached	0.60 – 0.75
Residential (suburban)	0.25 – 0.40
Apartment dwelling areas	0.50 – 0.70
Industrial	
Light Areas	0.50 – 0.80
Heavy Areas	0.60 – 0.90
Parks, cemeteries	0.10 – 0.25
Playgrounds	0.20 – 0.35
Railroad yard areas	0.20 – 0.40
Unimproved areas	0.10 – 0.30
Streets	
Asphalt	0.70 – 0.95
Concrete	0.80 – 0.95
Brick	0.70 – 0.85
Drives and Walks	0.75 – 0.85
Roofs	0.75 – 0.95
Lawns – course textured soil (greater than 85% sand)	
Slope: Flat, 2%	0.05 – 0.10
Average, 2-7%	0.10 – 0.15
Steep, 7%	0.15 – 0.20
Lawns – fine textured soil (greater than 40% clay)	
Slope: Flat, 2%	0.13 – 0.17
Average, 2-7%	0.18 – 0.22
Steep, 7%	0.25 – 0.35

Appendix D: **Resources List**

The following are just a few of the many resources available to assist you in developing your SWPPP. The inclusion of these resources does not constitute an endorsement by EPA.

EPA Resources

EPA Stormwater Construction Website
http://www.epa.gov/npdes/stormwater/construction

- EPA's Construction General Permit (**http://www.epa.gov/npdes/stormwater/cgp**)
  EPA's general permit that applies to all construction activity disturbing greater than one acre in the states and territories where EPA is the permitting authority.
- Construction SWPPP Guide, SWPPP Template and inspection form (**www.epa.gov/npdes/swpppguide**)
  A downloadable copy of this guide, the SWPPP template and inspection form.
- Menu of BMPs (**http://www.epa.gov/npdes/stormwater/menuofbmps**)
  Site containing over 40 construction BMP fact sheets. Also contains fact sheets on other stormwater program areas, and case studies organized by program area.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas
http://www.epa.gov/owow/nps/urbanmm/index.html

Managing Your Environmental Responsibilities: A Planning Guide for Construction and Development
http://www.epa.gov/compliance/resources/publications/assistance/sectors/constructmyer/index.html

Expedited Settlement Offer Program for Stormwater (Construction)
http://www.epa.gov/Compliance/resources/policies/civil/cwa/esoprogstormwater.pdf
A supplemental program to ensure consistent EPA enforcement of stormwater requirements at construction sites for relatively minor violations.

Construction Industry Compliance Assistance
http://www.cicacenter.org
Plain language explanations of environmental rules for the construction industry. Links to stormwater permits and technical manuals for all 50 states.

Smart Growth and Low Impact Development Resources

Using Smart Growth Techniques as Stormwater Best Management Practices
http://www.epa.gov/livablecommunities/pdf/sg_stormwater_BMP.pdf

Stormwater Guidelines for Green, Dense Development
http://www.epa.gov/smartgrowth/pdf/Stormwater_Guidelines.pdf

Protecting Water Resources with Smart Growth
http://www.epa.gov/smartgrowth/pdf/waterresources_with_sg.pdf

Parking Spaces / Community Places: Finding the Balance Through Smart Growth Solutions
http://www.epa.gov/smartgrowth/parking.htm

EPA Nonpoint Source Low Impact Development site
http://www.epa.gov/owow/nps/lid/

Better Site Design: A Handbook for Changing Development Rules in Your Community
Available from **http://www.cwp.org**

State BMP/Guidance Manuals

Kentucky Erosion Prevention and Sediment Control Field Guide
http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/storm/
Easy to read field guide describing erosion and sediment control BMP selection, installation and maintenance.

Minnesota Stormwater Construction Inspection Guide
http://www.pca.state.mn.us/publications/wq-strm2-10.pdf
A manual designed to assist municipal construction inspectors in the procedures for conducting a compliance inspection at construction sites.

California Stormwater Quality Association's Construction Handbook
http://www.cabmphandbooks.org/Construction.asp

Delaware Erosion and Sediment Control Handbook
http://www.dnrec.state.de.us/dnrec2000/Divisions/Soil/Stormwater/StormWater.htm

Western Washington Stormwater Management Manual – Volume II – Construction Stormwater Pollution Prevention
http://www.ecy.wa.gov/programs/wq/stormwater/manual.html

Eastern Washington Stormwater Management Manual
http://www.ecy.wa.gov/biblio/0410076.html
A guidance document addressing stormwater design and management in more arid climates.

Certification Programs

Certified Professional in Erosion and Sediment Control
http://www.cpesc.org

Virginia Erosion and Sediment Control Certification Program
http://www.dcr.virginia.gov/sw/estr&crt2.htm

Florida Stormwater, Erosion and Sedimentation Control Inspector Certification
http://www.dep.state.fl.us/water/nonpoint/erosion.htm

Other Resources

International Erosion Control Association
http://www.ieca.org
A non-profit organization helping members solve the problems caused by erosion and its byproduct—sediment.

Erosion Control Magazine
http://www.erosioncontrol.com
A journal for erosion and sediment control professionals.

Designing for Effective Sediment & Erosion Control on Construction Sites by Jerald S. Fifield, PH.D., CPESC. Available from Forester Press
http://www.foresterpress.com
Book describing proven and practical methods for minimizing erosion and sedimentation on construction sites.

Stormwater Permitting: A Guide for Builders and Developers by National Association of Home Builders (NAHB). Available from NAHB **http://www.nahb.org**

MAINTENANCE YARD CHECKLIST

Agency _____ Facility/ Department_____

Completed By _____ Date_____

Vehicles

- ☐ Inspect for leaks *every 3 months*
- ☐ Maintain vehicles in designated area with collection of oil, fuel, fluids

Vehicle Washing

- ☐ Trucks & equipment washed at designated vehicle washing area
- ☐ Maintain / clean out sediment basin or alternative
- ☐ Wash waters drain to sanitary sewer

Trash

- ☐ Sufficient number of bins provided (trash, recycling, landscape waste)
- ☐ Collect trash from grounds and place in bin *weekly*
- ☐ Check for leaks and repair/ replace bins *weekly*
- ☐ Trash bins have lids
- ☐ Hazardous materials- see labels for proper disposal
- ☐ Inspect for and pickup roadkill regularly and properly dispose *weekly*

Pavement

- ☐ Sweep and dispose of debris- do not rinse into storm sewer *monthly*
- ☐ Clean off inlet grates – remove and dispose of debris *monthly*

Catch Basins/ Hydrodynamic separators/ BMPs

- ☐ Inspect *monthly*
- ☐ Clean out catch basins as needed. Dispose in Vactor receiving station or alternative
- ☐ Maintain hydrodynamic separators according to manufacturer instructions

Chemicals

- ☐ Store in labeled containers
- ☐ Fertilizers, pesticides, herbicides, and other chemicals in covered storage area
- ☐ Refer to MSDS for specific storage and handling information
- ☐ Check for leaks and exposed materials *weekly*

Salt

- ☐ Salt covered. Stored in permanent structure by March 1, 2018
- ☐ Check for leaks in salt storage area *monthly*

Landscape materials

- ☐ Landscape materials in collection bin
- ☐ Check for leaks in bins *monthly*

Outdoor Storage

- ☐ Silt fence or other sediment control around spoil piles
- ☐ Outdoor storage and loading areas should be located away from storm drains, drainage swales, rivers, ponds
- ☐ Containment curbs around storage areas to prevent leakage

Spills

- ☐ Spill kits onsite
- ☐ Secondary containment curb around tanks
- ☐ Secondary containment within storm sewers (triple basin) inspect & maintain
- ☐ Spill kits suitable for materials onsite (chemicals, oils)
- ☐ Employees trained in locating/ using spill kits

Training

- ☐ All new employees trained in techniques to prevent and reduce stormwater pollution
- ☐ Annual training for all employees
- ☐ Annual training for contractors

DUPAGE COUNTY

DuPage County Operations & Maintenance Plan for Transportation

June 2020

DuPage County Division of Transportation
MS4 Phase II Stormwater Program
Operations and Maintenance Plan

Purpose

The purpose of this document is to standardize activities of the DuPage County Division of Transportation located at 140 N County Farm Road, Wheaton, IL 60187. Specifically, this document addresses facility activities and procedures that could potentially impact storm water runoff from this site. This is required as part of the DuPage County Storm Water NPDES (MS4) discharge permit as submitted with the permit Notice of Intent (NOI). These procedures are meant to protect the storm water runoff from the Service Street facility.

Facility Descriptions

The DuPage County Division of Transportation Department maintenance facilities are located at 140 N County Farm Road, Wheaton, IL 60187. The facility consists of the main building, vehicle storage, offices, salt domes and outside storage. Outside equipment and material storage areas are paved in concrete or black top services. The property drains to the west. The main building drainage goes through a triple separator for discharging out to the main sanitary line. The triple basin is cleaned out every six months or as needed by an outside contractor.

Potential Sources of Stormwater Pollution and Best Management Practices

a. Fueling

The unleaded, diesel, and CNG (Compressed Natural Gas) pumps are located in the upper parking lot of the main Department of Transportation building. Barriers are in place around the pump island to protect them from vehicle traffic. We have 4 unleaded pumps, 2 diesel pumps, and 2 CNG pumps. For storage we have two 10,000 gallon tanks and one 12,000 gallon diesel tank, and two spheres of CNG. The entire area is done in concrete.

The fuel island has emergency shutoff controls installed in the area of the pumps. Fuel for small implements is stored in the vehicle maintenance building in an enclosed fire safe cabinet.

The Best Management Practices to minimize the impact to stormwater include

- Fuel is stored only in the designated fueling areas in proper containment.
- The fuel dispenser area is surrounded by barriers to prevent vehicles from damaging the dispensers.
- We have a vendor that performs routine inspections of the storage tanks, including overfill protection, and all appurtenances.
- Signs are prominently posted describing spill response/prevention procedures.
- Spill containment and cleanup materials are stored adjacent to the fueling area.
- If a spill or leak occurs the Department Head is notified immediately and the proper authorities called if warranted. Materials used to clean up spilled fuel are properly disposed of.

b. Vehicle and Equipment Maintenance

Vehicle fluid changes and maintenance are performed by DuPage County fleet staff in the vehicle maintenance building. The MSDS sheets for all chemicals are compiled and a copy stored in the maintenance building. The entire work area is cleaned periodically as needed. Waste oil is collected in a waste oil container and recycled. The floor drain system includes and oil/water separator, which is serviced regularly. Materials such as hydraulic oils, mineral spirits, and detergents for cleaning are stored inside and in spill containment systems. Chemicals are stored in their original containers or in labeled containers.

The Best Management Practices to minimize the impact to stormwater include

- Vehicles and equipment are inspected regularly for leaks.
- Maintain current MSDS sheets on all chemicals used in maintenance operations.
- Spill cleanup materials are kept close at hand when performing maintenance operations.
- All spills are wiped up immediately with rags or absorbent materials and the entire area is swept.
- Oil/Water separator are inspected regularly for accumulation of sediment and floating contaminants. Documentation of inspection and service/material disposal are kept electronically. Oil/water separator is cleaned out every six months or as needed by an outside contractor.
- All used oil is collected and recycled.

c. Street Sweeping

DuPage County Division of Transportation sweeps all county-maintained roads on a rotating schedule, all roads are swept three times per year. Every catch basin is cleaned on a 4 year cycle. Collected waste is disposed of at the DuPage County Waste Water Vactor Station in Woodridge, IL and also collected at a storage yard in West Chicago, IL. The material is hauled away by a special waste hauler.

The Best Management Practices to minimize the impact to stormwater include

- Clean streets on a regular basis.
- Always use the designated disposal area and pick up litter.

d. Vehicle and Equipment Painting

DuPage County Division of Transportation does not paint any vehicle or equipment and does not intend to do so in the future, with the exception of touch up using spray cans. For touch up on any vehicle or equipment only spray paint is utilized and all paint materials and solvents are stored inside.

e. Vehicle and Equipment Washing

Vehicles and equipment are washed in the three bays of the maintenance building. The bay floor is sloped towards its center and drains directly into the oil/water separator which discharges into the main sanitary system. Cleaning detergents are stored inside these bays.

The Best Management Practices to minimize the impact to stormwater include

- When using soap or other detergents, all vehicle and equipment washing is done at the designated location.
- When rinsing rock salt and/or brine residue, all vehicle and equipment washing is done at the designated location.
- Inspect vehicles prior to washing outside and remove any fuel or other contaminants prior to rinsing, to the greatest extent possible.

f. Materials Loading and Unloading

Materials are stored in designated areas. For any bulk liquid deliveries a trained DuPage County Division of Transportation employee with knowledge of the storage system must be

present during offloading activities to prevent spills and any unwanted mixing of the products. The employee must also be knowledgeable of this plan and emergency notification should a spill occur.

If a manageable spill, the following spill equipment is available for use to control and clean up the spill:

Equipment	Location
Shovels, brooms, Etc.	Maintenance Building
Absorbent Material	Maintenance Building
Sand	On site
Back-Hoes	On site

g. Ditch Maintenance

Ditch maintenance is carried out by the DuPage County Division of Transportation employees on DuPage County roads only.

The Best Management Practices to minimize the impact to stormwater include

- Use established BMPs to protect against soil erosion.
- Dispose of debris in proper locations.
- Collect aggregate and leaf piles prior to rain events where appropriate.

h. Outdoor Storage of Materials

Gravel and other types of aggregate are stored outside in six three-sided containment bins. Culverts are stored in an established area on the property and at an offsite facility in an organized fashion. Scrap materials are stored on the south side of the yard in a 40-yard roll-off dumpster and are taken for recycling on a regular basis. Two other roll off dumpsters are kept in the yard for garbage collected from the road and DuPage County campus. We also have numerous smaller trash/recycle bins on the property for the main DuPage County Division of Transportation building and fleet building. Dumpsters are checked for leaks and lids closed.

The Best Management Practices to minimize the impact to stormwater include

- Materials stored outdoors that are highly susceptible to erosion, or contain potentially harmful materials are placed on impermeable surfaces such as pavement or a tarp.
- Aggregate or soil can be placed on the ground if protected from surface erosion. Otherwise, it should be placed in a building.

i. Facility Maintenance and Drainage Monitoring Procedures

The DuPage County Division of Transportation yard facility is continuously maintained. As part of this maintenance, an inspection and general policing of the facility property is performed. The purpose of this activity is to pick up any loose trash and inspect drainage facilities for anything that could impact storm water runoff.

j. Salt and Brine Storage

Salt and brine are used for road treatment during the winter months. Salt is contained in 3 dedicated salt storage domes, all domes have a curtain system on each door to contain all salt and protect it from rain events. Brine and other de-icing liquid products are contained in tanks, next to the main DuPage County Division of Transportation building with concrete barriers protecting the tanks from vehicle traffic.

The Best Management Practices to minimize the impact to stormwater include

- Any salt spilled during loading and unloading is to be swept back into the salt dome after each operation.
- Salt equipment and vehicles are cleaned routinely during the winter season in the designated wash area.
- Staff are trained on the potential risk of a release of the salt brine.

k. Landscape Materials

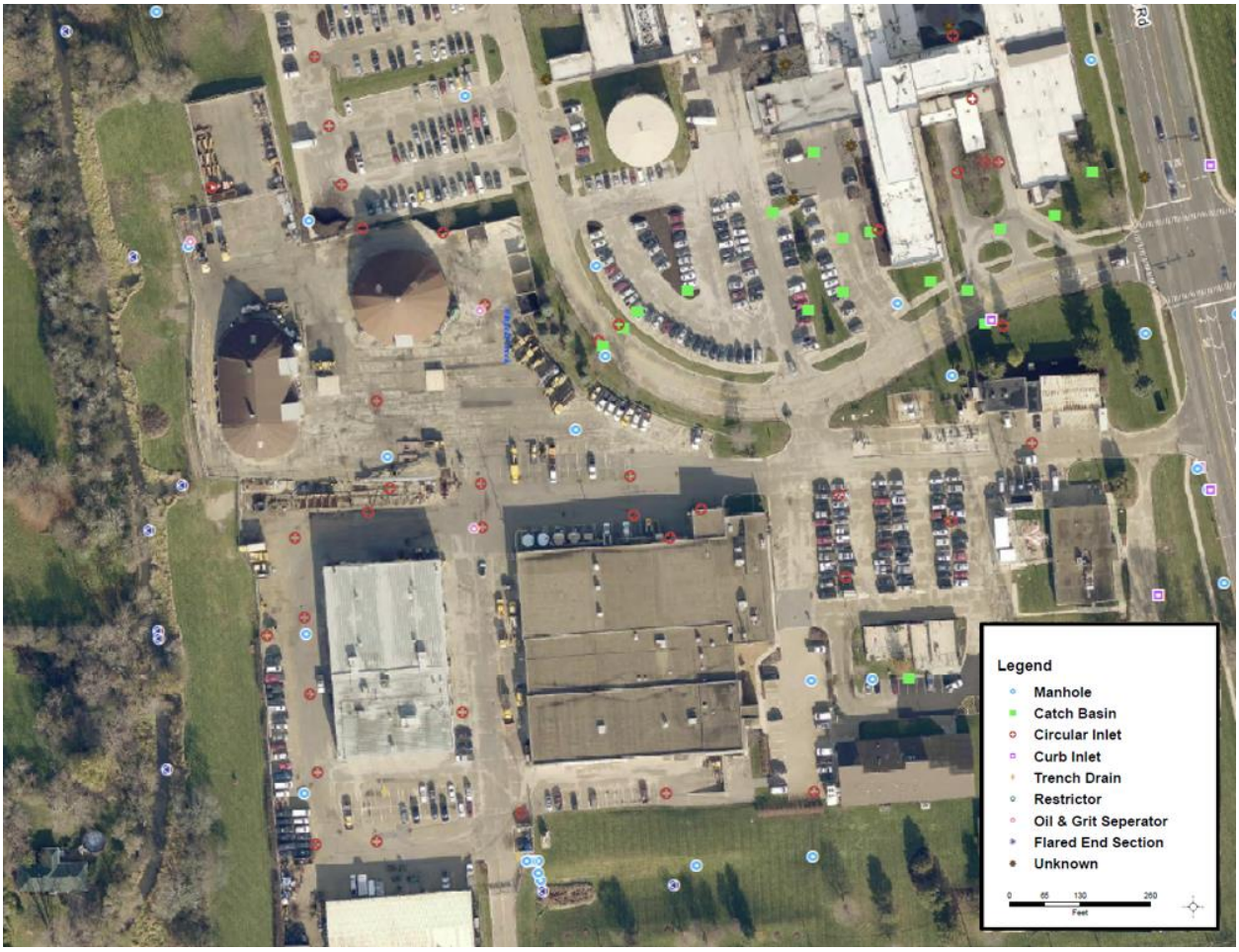
Any landscape materials collected from either the road or the campus is disposed of in a designated landscape waste bin that a vendor comes and picks up periodically which is kept in the southwest corner of the DuPage County Division of Transportation property.

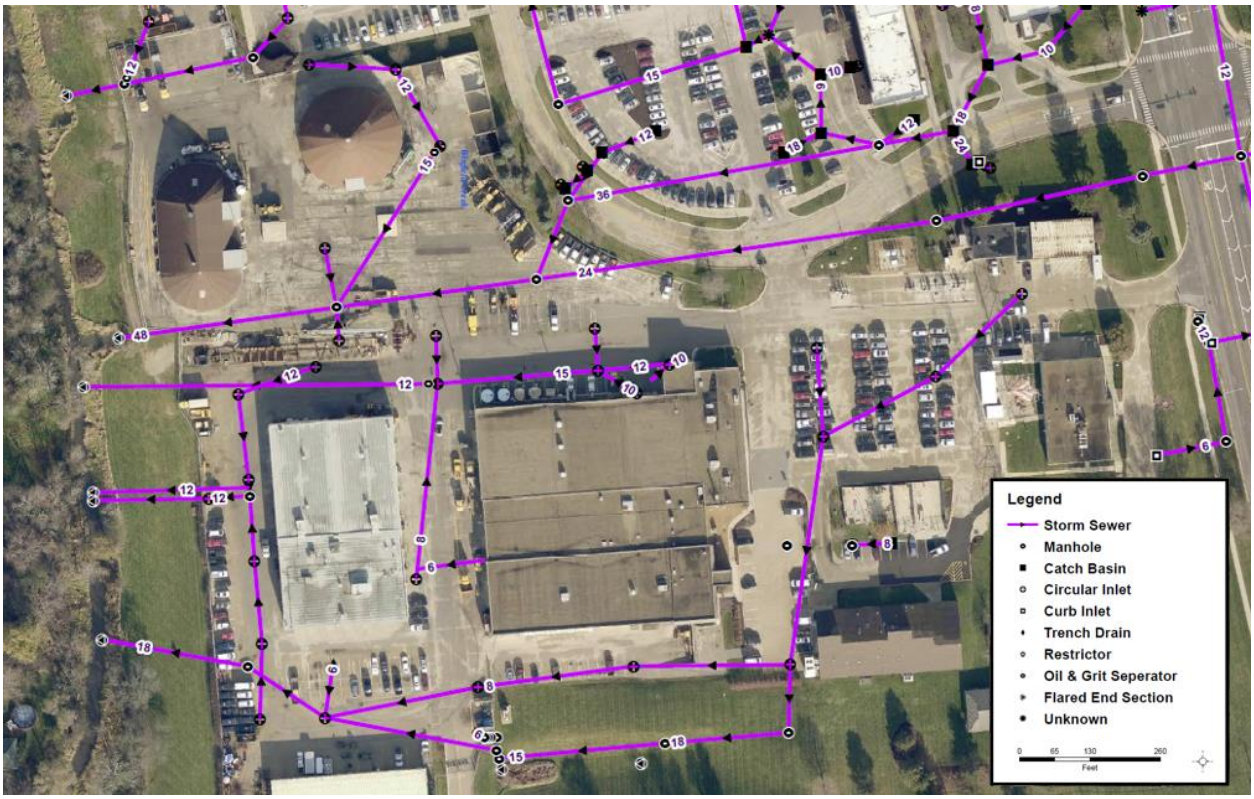
DuPage County Division of Transportation County Engineer: Chris Snyder 1-630-407-6900

DuPage County Division of Transportation Asst. County Engineer: Mike Tuman 1-630-407-6900

DuPage County Highway Maintenance Manager: Jeff Pieroni 1-630-407-6920

Stormwater Drainage System Maps

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Manhole
Catch Basin
Circular Inlet
Curb Inlet
Trench Drain
Restrictor
Oil & Grit Seperator
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