

MEETING NOTES

DATE: March 15, 2010

TO: Steering Committee

FROM: John Wills, P.E.
Wills Burke Kelsey Associates

SUBJECT: Steering Committee #9
(WBK Project 09-0039)

MEETING DATE: February 25, 2010

We held the ninth meeting of the Steering Committee for the update of the DuPage County Countywide Stormwater and Floodplain Ordinance on February 25, 2010. The following is a general summary of the major points discussed and does not constitute a verbatim transcript, nor an attempt to capture either the speaker or the exact wording as presented. The following also represents the preparer's understanding of the discussion. If there are any discrepancies, inaccuracies, or major items missed, please notify the preparer.

Agenda Item I- Approval of Meeting Minutes

1. The meeting was called to order by Vice Chairman Kalsted at 9:35 a.m. The following were present at the meeting:

Members: Chairman Christine Klepp, David Winklebleck, Rob Swanson, Clayton Heffter, Karen Laskowski and Chris Vonnahme from DuPage County; Nick Hatfield, Village of Lombard; Vice Chairman Mary Lou Kalsted, Village of Lisle; Bill Novack, City of Naperville; Erskine Klyce; Dale Durfey.

Members absent: Roger Hopkins, Choose DuPage

Alternates: None.

Also Present: John Wills and Kristine Meyer, Wills Burke Kelsey (WBK); Bob Murdock, Baker; Jedd Anderson, Christopher B. Burke Engineering (CBBEL); Anthony Hayman, DuPage County States Attorney Office and Tony Charlton of DuPage County.

A motion was made by Novack and seconded by Hatfield to approve the minutes of the Steering Committee of January 28, 2010. By voice vote, the minutes were approved.

Agenda Item II- Discussion with States Attorney Office

2. Hayman was given the possible outline for the revised ordinance, dated 10/28/09, and asked if there were any concerns with the proposed structure. He stated there was some concern at the location of the Appeals section due to the way the judicial system will interpret the articles before and after it. Additional language may need to be crafted.
3. Headings are not a problem when used in the ordinance when used for general descriptions of a section. There should be language in the ordinance that says "headings are descriptive, not to be used for interpretation."

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4. It was recommended that we leave reserved sections in the ordinance so that when changes are made or added, the ordinance does not have to be renumbered.
5. The definitions should be kept to a minimum, and use definitions of terms as commonly used in the profession.
6. Copies of all previous versions of the ordinance are kept in the county clerk's office.
7. There are not standards for bonds and securities in the current ordinance; this is something the steering committee may want to address. The law says that whenever you accept a letter of credit, you must also accept a bond.
8. Hayman also recommended that we take into account the cost of compliance, when crafting new language
9. Wills said that we have combined multiple ordinances into one single ordinance; should we make them separate. Hayman suggested making them separate divisions of one ordinance. Multiple permits are not needed for each of these divisions; like a building permit, one permit will cover multiple aspects of projects.
10. Hayman urged that in writing the ordinance revision the language be written so that any citizen can understand it.

Agenda Item III- Ordinance Structure

11. This item was not discussed at the last steering committee meeting. However, since that meeting it has become apparent to the consulting team that the ordinance structure itself will no longer be discussed as a standalone item. It will be discussed in more detail, as we begin to address the specific areas of the ordinance, i.e., floodplain, wetlands, etc. This is due to the fact that with the exception of detention there are no other requirements that are tied to existing land use and/or zoning classifications.
12. The idea of a water quality volume was presented. Two handouts were distributed – ILR40 and memo regarding Lake County WDO (attached). The discussion for ILR 40 focused on the provisions to Items 4 and 5.
13. Wills asked, is there political support for going into the water quality issue? Reasons to do so include: findings of the national ordinance review; NPDES permit requirements, response to citizen complaints; appropriate for the majority of future projects we expect to see (redevelopment). Detention requirements were a response to flooding in the 1980's; declare victory and move on to today's issue, which is water quality. It did not seem to be a strong belief of the steering committee that a water quality volume as an additional requirement would get support. We did discuss the change in focus on stormwater infrastructure from infrequent larger events to more frequent events recognizing a water quality and quantity benefit.

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14. It was recognized that municipal buy-in would be necessary on a water quality volume requirement. In addition, municipal support would be needed for municipal maintenance of stormwater facilities. It was the belief of the steering committee that incentives would be an important part of the package for these two items to be successful. It was noted that maintenance of BMPs is an important issue. Charlton said that special service areas don't work – when you need to implement the tax to accomplish work, residents protest and elected officials back off, and the work doesn't get done. The suggestions was made that municipalities should be responsible for the maintenance, just as they are responsible for maintenance of storm, sanitary, and watermain.
15. The steering committee did not reach consensus on how to apply a water quality volume requirement to existing development with this ordinance update. In discussions it was difficult to determine which development(s) would be exempt from this requirement, although it was recognized that single family homes would be a struggle. It was further discussed that municipalities could be given the option of providing BMPs for a whole neighborhood, i.e. bioswales in the parkway, to lieu of each individual homeowner providing BMPs on their lot. Furthermore, in a tear down situation it would be appropriate to implement a volume reduction requirement due to complaints often received by adjacent residents.
16. The consulting team requested and received permission from the steering committee to post a blog regarding a water quality volume requirement.

Agenda Item IV- Naturalization

17. This agenda item will be discussed at the next steering committee meeting.

Agenda Item V- Detention Requirements

18. Refer to discussion in Agenda Item III.

The meeting ended at approximately 11:45 p.m. The next meeting was rescheduled to April 5, 2010 due to schedule conflicts.

Steering Committee Meeting #9 Agenda
February 25, 2010, 9:30 a.m. ~ Room 1500B

- I. Approval of Steering Committee Meeting #8 Minutes
- II. Discussion with State's Attorney
- III. Ordinance Structure
- IV. Naturalization
- V. Detention Requirements
- VI. Reminder - Next Meeting: Thursday, April 1st at 9:30 a.m.

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 29, 2008~~ **March 31, 2014** **Issue Date:** ~~December 20, 2002~~ **February 20, 2009**

Effective Date: ~~March 1, 2003~~ **April 1, 2009**

~~Discharges authorized by this General Permit:~~ 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, as defined and limited herein. Storm water means storm water runoff, snow melt runoff, and surface runoff and drainage.

~~This general permit regulates only storm water discharges. Other discharges such as process wastewater or cooling water shall be regulated by other NPDES permits.~~

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 an application as described in the permit conditions to the Illinois Environmental Protection Agency. Authorization, if granted, will be by letter and include a copy of this permit.

~~Thomas G. McSwiggin, P.E.~~
Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

General NPDES Permit No. ILR40

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PART I. COVERAGE UNDER THIS PERMIT

A. Permit Area

This permit covers all areas of the State of Illinois.

B. Eligibility

1. This permit authorizes discharges of storm water from small municipal separate storm sewer systems (MS4s) as defined in 40 CFR 122.26(b)(16) as designated for permit authorization 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 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 I.B.2.
3. Storm water discharges to any receiving water specified under 35 III. Adm. Code 302.105(d)(6).

D. Obtaining Authorization

In order for storm water discharges from small municipal separate storm sewer systems 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) or the appropriate U.S. EPA NOI form.
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. ~~Where the operator changes, or where a new operator is added after the submittal of an NOI under Part II, a new NOI must be submitted in accordance with Part II within 30 days of the change.~~
3. Unless notified by the Agency to the contrary, submit an NOI in accordance with the requirements of this permit to be authorized to discharge storm water from small municipal storm sewer systems under the terms and conditions of this permit 30 days after the date that the NOI is received. ~~dischargers who submit an NOI in accordance with the requirements of this permit are authorized to discharge storm water from small municipal separate storm sewer systems under the terms and conditions of this permit 30 days after the date that the NOI is received.~~ 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 REQUIREMENTS

A. Deadlines for Notification

1. If you were 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 ~~If you are an operator of a regulated small municipal separate storm sewer system designated under § 122.32(a)(1), you must apply for coverage under an NPDES permit, or apply for a modification of an existing NPDES permit by March 10, 2003.~~
2. If you have coverage under the previous general permit for storm water discharges from small MS4s, you must renew your permit coverage under this part. You must submit a 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.

3. If you are designated by IEPA an operator of a regulated small municipal separate storm sewer system designated under § Section 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. ~~you must apply for coverage under an NPDES permit, or apply for a modification of an existing NPDES permit within 180 days of notice, from the Agency or by a later date as specified by the Agency.~~
4. ~~Submitting a late NOI.~~ You are not prohibited from submitting an NOI after the dates provided in Part H.A.1 and H.A.2. established deadlines for NOI submittals. If a late NOI is submitted, your authorization is only for discharges that occur after permit coverage is granted. ~~The Agency~~ IEPA reserves the right to take appropriate enforcement actions against MS4s that have not submitted a timely NOI for any unpermitted discharges.

B. Contents of Notice of Intent

Dischargers seeking coverage under this permit shall submit either the Illinois MS4 NOI form or the U.S. EPA MS4 NOI form. The Notice(s) of Intent shall be signed in accordance with Standard Condition 11 of this permit and shall include 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;
3. The name of the receiving water(s), their impairments from any approved 303(d) list and any appropriate TMDL or alternative water quality study; and
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 each of the 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 the person or persons responsible for implementing or coordinating your storm water management program;
 - d. identification of a local qualifying program, or any partners of the program if any.

- C. All The required information for the NOI shall be submitted electronically to the following email and office addresses:

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

D. Shared Responsibilities

You may partner with other MS4s to develop and implement your storm water management program. You may also jointly submit an NOI with one or more MS4s. Each MS4 must fill out the NOI form. The description of your 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. Your 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 standard, 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 total maximum daily load (TMDL) allocation or watershed management plan is approved for any waterbody 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's or watershed management plan approval. Where a TMDL or watershed management plan is approved, you 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 Paragraphs 4 above through 7 until two continuous monitoring cycles show that the WLAs are being met or that WQ standards are being met.
- D. If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedures Act and remain in force and effect. Any permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earlier of:
1. Reissuance or replacement of this permit, at which time you must comply with the Notice of Intent conditions of the new permit to maintain authorization to discharge; or
 2. Your submittal of a Notice of Termination; or
 3. Issuance of an individual permit for your discharges; or
 4. A formal permit decision by the Agency not to reissue this general permit at which time you must seek coverage under an alternative general permit or an individual permit.

5. The permittee shall submit a revised or updated NOI to the Agency no later than 180 days prior to the expiration date of this permit in order for permit coverage to be administratively continued.

- E. 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 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 NPDES permit application required by the Agency under this paragraph, then the applicability of this permit to the individual NPDES permittee is automatically terminated at the end of the day specified for application submittal.
- F. 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 or operator are adequate to support the request.
- G. 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.
- H. When an individual NPDES permit is denied to an owner or operator otherwise subject to this permit, or the owner or operator is denied coverage under an alternative NPDES general permit the applicability of this permit to the individual NPDES permitted is automatically terminated on the date of such denial, unless otherwise specified by the Agency.

PART IV. STORM WATER MANAGEMENT PROGRAMS

A. Requirements

The permittee ~~You~~ must develop, implement, and enforce a storm water management program designed to reduce the discharge of pollutants from your small municipal separate storm sewer system to the maximum extent practicable (MEP), 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. Your 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 a program by the date specified in your 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. ~~You must develop and implement your program by five years from your coverage date under this permit.~~

B. Minimum Control Measures

The 6 minimum control measures to be included in your storm water management program are:

1. Public education and outreach on storm water impacts

The permittee ~~You~~ must:

- a. implement a public education program to 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 permittee should incorporate into its education materials 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, evapotranspired or reused, discuss the benefits and costs of such strategies and provide guidance to the public on how to implement them;** and
- 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.

2. Public Involvement/Participation

The permittee ~~You~~ must:

- a. at a minimum, comply with State and local public notice requirements when implementing a public involvement/participation program; and
- 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 your storm water discharges to the maximum extent practicable.

3. Illicit discharge detection and elimination

The permittee ~~You~~ must:

- a. develop, implement and enforce a program to detect and eliminate illicit discharges into your 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;
- c. to the extent allowable under state or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into your 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, implement, and adequately fund a plan to detect and address non-storm water discharges, including illegal dumping, to your system;
- e. inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste **and the requirement and mechanism 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 the fire fighting 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); and
- 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 (annual is recommended) inspections of the storm sewer outfalls for detection of non-storm water discharges and illegal dumping.

4. Construction site storm water runoff control

The permittee ~~You~~ must:

- a. develop, implement, and enforce a program to reduce pollutants in any storm water runoff to your small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. ~~Reduction~~ 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.

Your program must include the development and implementation of, at a minimum:

- 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. requirements for construction site operators to implement appropriate erosion and sediment control best management practices, including green infrastructure storm water management techniques where appropriate and practicable;
 - iii. requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;
 - 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, 2002, or as amended including green infrastructure techniques where appropriate and practicable;
 - v. procedures for site plan review which incorporate consideration of potential water quality impacts and review of individual pre-construction site plans to ensure consistency with local sediment and erosion control requirements;
 - vi. procedures for receipt and consideration of information submitted by the public; and
 - vii. procedures for site inspections and enforcement of control measures.
- 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.

5. Post-construction storm water management in new development and redevelopment

The permittee ~~You~~ must:

- a. develop, implement, and enforce a program to address and minimize storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including 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 your small MS4 within the MS4 jurisdictional control. Your program must ensure that controls are in place that would protect water quality and reduce the discharge of pollutants to the maximum extent practicable; In addition, each permittee should adopt strategies that incorporate storm water infiltration, reuse and evapotranspiration of storm water into the project to the maximum extent practicable;

- b. develop and implement strategies which include a combination of structural and/or non-structural BMPs appropriate for all projects within your community for all new development and redevelopment that will reduce the discharge of pollutants, the volume and velocity of storm water flow to the maximum extent practicable. When selecting BMPs to comply with requirements contained in this Part, the permittee should adopt one or more of the following general strategies, in order of preference. Proposal of a strategy should include a rationale for not selecting an approach from among those with a higher preference. When approving a plan for development, redevelopment, highway construction, maintenance, replacement or repair on existing developed sites or other land disturbing activity covered under this Part, the permittee should require the person responsible for that activity to adopt one or more of these strategies, in order of preference, or provide rationale for selecting a more preferred strategy.
- 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. 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. appropriate 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.
 - ii. appropriate 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.
- d. 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 may contain the following elements:
- i. source identification – establishment of a inventory of storm water pollutants discharged to the MS4.
 - ii. Implementation of appropriate BMPs to accomplish the following:
 - A. education on green infrastructure bmps
 - B. identify a relevant set of bmps for all departments
 - C. evaluation of existing flood control techniques to determine the feasibility of pollution control retrofits
 - 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
 - G. street cleaning in targeted areas

- e. use 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;
- f. require all regulated construction sites to have post-construction management that meets or exceeds the requirements of Section IV (D)(2)(b) 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, 2002;
- g. ensure adequate long-term operation and maintenance of BMPs; and
- h. 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.

6. Pollution prevention/good housekeeping for municipal operations

The permittee ~~You~~ must:

- a. develop and implement an operation and maintenance program that includes a training component and is designed to prevent and reduce the discharge of pollutants to the maximum extent practicable;
- b. using training materials that are available from EPA, the state of Illinois, or other organizations, your program must include 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, new construction and land disturbances, and storm water system maintenance procedures for proper disposal of street cleaning debris and catch basin material, address ways that flood management projects impact water quality, nonpoint source pollution control, **green infrastructure controls**, and aquatic habitat; and
- c. 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. Qualifying State, County, or Local Program

If an existing qualifying local program requires you to implement one or more of the minimum control measures of B. above, you may follow that qualifying program's requirements rather than the requirements of 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 Section B. Any qualifying local programs that you intend to follow shall be specified in your storm water management plan.

D. Sharing Responsibility

- 1. Implementation of one or more of the minimum measures may be shared with another entity, or the entity may fully take over the measure. You may rely on another entity only if:
 - a. the other entity, in fact, 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 the control measure on your behalf. written acceptance of this obligation is expected. this obligation must be maintained as part of the description of your storm water management program. if the other entity agrees to report on the minimum measure,

you must supply the other entity with the reporting requirements contained in section v (c) of this permit. if the other entity fails to implement the control measure on your behalf, then you remain liable for any discharges due to that failure to implement.

E. Reviewing and Updating Storm Water Management Programs

1. Storm Water Management Program Review: You must do an annual review of your Storm Water Management Program in conjunction with preparation of the annual report required under Part V.(C).
2. Storm Water Management Program Update: You may change your Storm Water Management Program during the life of the permit in accordance with the following procedures:
 - a. changes 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; and
 - b. changes replacing an ineffective or unfeasible bmp specifically identified in the storm water management program with an alternate bmp may be requested at any time. unless denied by the agency, changes proposed in accordance with the criteria below shall be deemed approved and may be implemented 60 days from submittal of the request. if request is denied, the agency will send you a written response giving a reason for the decision. your 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. changes replacing or modifying any ordinances relative to the storm water management program;
 - d. change 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. The Agency may require changes to the Storm Water Management Program as needed to:
 - a. address impacts on receiving water quality caused, or contributed to, by discharges from the municipal separate storm sewer system;
 - b. include more stringent requirements necessary to comply with new federal 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.
 - d. changes requested by the Agency must be made in writing, set forth the time schedule for you to develop the changes, and offer you the opportunity to propose alternative program changes to meet the objective of the requested modification. All changes 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.

PART V. MONITORING, RECORDKEEPING AND REPORTING

A. Monitoring

~~You~~ **The permittee** must evaluate program compliance, the appropriateness of your identified best management practices, and progress towards achieving your identified measurable goals, which must include reducing the discharge of pollutants to the maximum extent practicable (MEP). **Monitoring shall include at least annual monitoring of receiving waters upstream and downstream of the MS4 discharges.**

use of indicators to gauge the effect of storm water discharges on the physical/habitat-related aspects of the receiving waters, and/or monitoring of the effectiveness of BMPs.

B. Recordkeeping

~~You~~ The permittee must keep records required by this permit for at least 3 years the duration of the permit. 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, you must submit your records to the Agency only when specifically asked to do so. You must post your Notice of Intent (NOI), your storm water management plan and your annual reports on your website. You must make your records, including your notice of intent (NOI) and your storm water management plan, available to the public at reasonable times during regular business hours within 10 working days of its approval by the permitting authority. (You may assess a reasonable charge for copying. You may require a member of the public to provide advance notice, not to exceed seven working days.) Storm sewer maps may be withheld for security reasons.

C. Reporting

~~You~~ 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 each year. ~~The first report is due June 1, 2004.~~ Each report shall cover the period from March of the previous year through March of the current year. Your report must include:

1. The status of compliance with permit conditions, an assessment of the appropriateness of your identified best management practices and progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and your identified measurable goals for each of the minimum control measures;
2. Results of information collected and analyzed, including monitoring data, if any, during the reporting period;
3. A summary of the storm water activities you plan to undertake during the next reporting cycle (including an implementation schedule);
4. A change in any identified best management practices or measurable goals that apply to the program elements; and
5. Notice that you are relying on another government entity to satisfy some of your permit obligations (if applicable).
6. The annual ~~Municipal storm water inspection~~ reports shall be submitted to the following email and office address(es): epa.ms4annualinsp@illinois.gov.

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

PART VI. DEFINITIONS AND ACRONYMS (SEE ALSO SPECIAL CONDITIONS)

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, but 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 the discharge of pollutants to waters of the United States.

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.

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 and 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 ~~either~~ 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.

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.).

Memo

WDO COMMENTS

FILE



To: Ward Miller, Lake County Stormwater Management Commission
 From: Whitney Brown, CWP
 Re: Lake County Watershed Development Ordinance
 Date: August 3, 1998

The Center for Watershed Protection has reviewed the technical approach presented in the Lake County Watershed Development Ordinance (dated July 12, 1994). The Lake County Stormwater Management Commission staff recommended amendments to the WDO (dated May 20, 1998) were also reviewed. The purpose of the review was to evaluate the existing and recommended stormwater management requirements as outlined in the Watershed Development Ordinance (WDO). The specific areas of focus included:

- I. stormwater discharge into a buffer (Article IV.B.i.(9))
- II. stormwater management for small non-residential sites (Articles IV.A.1.h. and IV.A.1.i.)
- III. the Runoff Volume Reduction Hierarchy (Article IV.B.1.d.)
- IV. channel protection and the 2-year design criteria (Article IV.B.1.c.)
- V. general performance standards for stormwater management

In general, the results of the Center's review indicates that the WDO, as supported by the proposed staff amendments, supports effective stormwater management for new development. Some of the most significant provisions in the WDO include the Runoff Volume Reduction Hierarchy, the (recommended) buffer requirements, the water quality control requirements, and the erosion and sediment control provisions.

An integral part of the WDO are references to nonstructural control practices including open vegetated channels and buffers. The nonstructural practices are promoted as a critical feature of the stormwater management strategy advocated by the WDO. The key benefit of nonstructural practices is that they can reduce the generation of stormwater from the site; thereby reducing the size and cost of stormwater storage.

Although nonstructural practices are referenced throughout the WDO, use of these practices (other than buffers) are not explicitly required nor are incentives provided to encourage their use at development sites. The majority of the Center's comments, therefore, discuss strategies for further fostering the use of nonstructural practices.

The remaining Center commentary focuses on performance criteria for stormwater best management practices (BMPs). Specific criteria reviewed include an alternate channel protection criteria and BMP selection criteria.

ORGANIZATION OF THIS MEMORANDUM

The Center's analysis of the current Lake County WDO and the proposed amendments are presented in the following discussion. The analysis is divided into five sections, corresponding to the five focus areas listed above. Following each section are specific recommendations and brief descriptions of related documents which provide additional guidance. In addition, the Center has provided copies of the following documents:

First Flush of Stormwater Pollutants Investigated in Texas in Watershed Protection Techniques (Volume 1, No. 2)

Maryland Stormwater Design Manual (draft 1997) Maryland Department of the Environment

Experience from Morphological Research on Canadian Streams: Is Control of the Two-Year Frequency Runoff Event the Best Basis for Stream Channel Protection? Effects of Watershed Development and Management on Aquatic Ecosystems in Proceedings from Engineering Foundation Conference (Snowbird UT, August 4-9, 1996) by Craig MacRae

I. STORMWATER DISCHARGE INTO A BUFFER

Article IV.B.i.(9): Buffer Areas

As presently worded, Article IV.B.i.(9) only permits stormwater discharges to buffers in the form of unconcentrated (sheetflow) flow. This restriction could impede development of an integrated stormwater management strategy. Effective stormwater management usually requires some combination of nonstructural and structural BMPs. Further, discharges from most structural BMPs are usually in the form of concentrated flow through a channel or a storm sewer.

It may be prudent to consider additional options for allowing the discharge of stormwater runoff into buffers. Two options include (1) the use of buffers for stormwater treatment [sheetflow discharges] and (2) selective placement of structural BMPs near or within the buffer [concentrated discharges]. These options are in line with the overall goal of the Lake County WDO: to minimize, as much as possible, the impact of stormwater runoff from development.

(1) *The use of buffers for stormwater treatment [sheetflow discharges]*

Buffers can provide limited water quality control. Specifically, the outer portion of the buffer can serve as a combination grass/forest filter strip (Figure 1). Filter strips are vegetated BMPs that function by slowing runoff velocities and filtering out sediments and other pollutants. Runoff from impervious areas (i.e., parking lots) and pervious areas (i.e., backyards) is directed to the buffer. For this BMP to be effective, the runoff must flow as sheetflow across the filter. Once flow concentrates to form a channel, it effectively "short-circuits" the filter. Thus, the length of the overland flow path must be strictly limited. The overland flow from impervious areas should not exceed 75 feet and the overland flow from pervious areas should not exceed 150 feet. In addition, when the runoff comes directly from an impervious area, curb cuts or spacers should be used to ensure sheetflow.

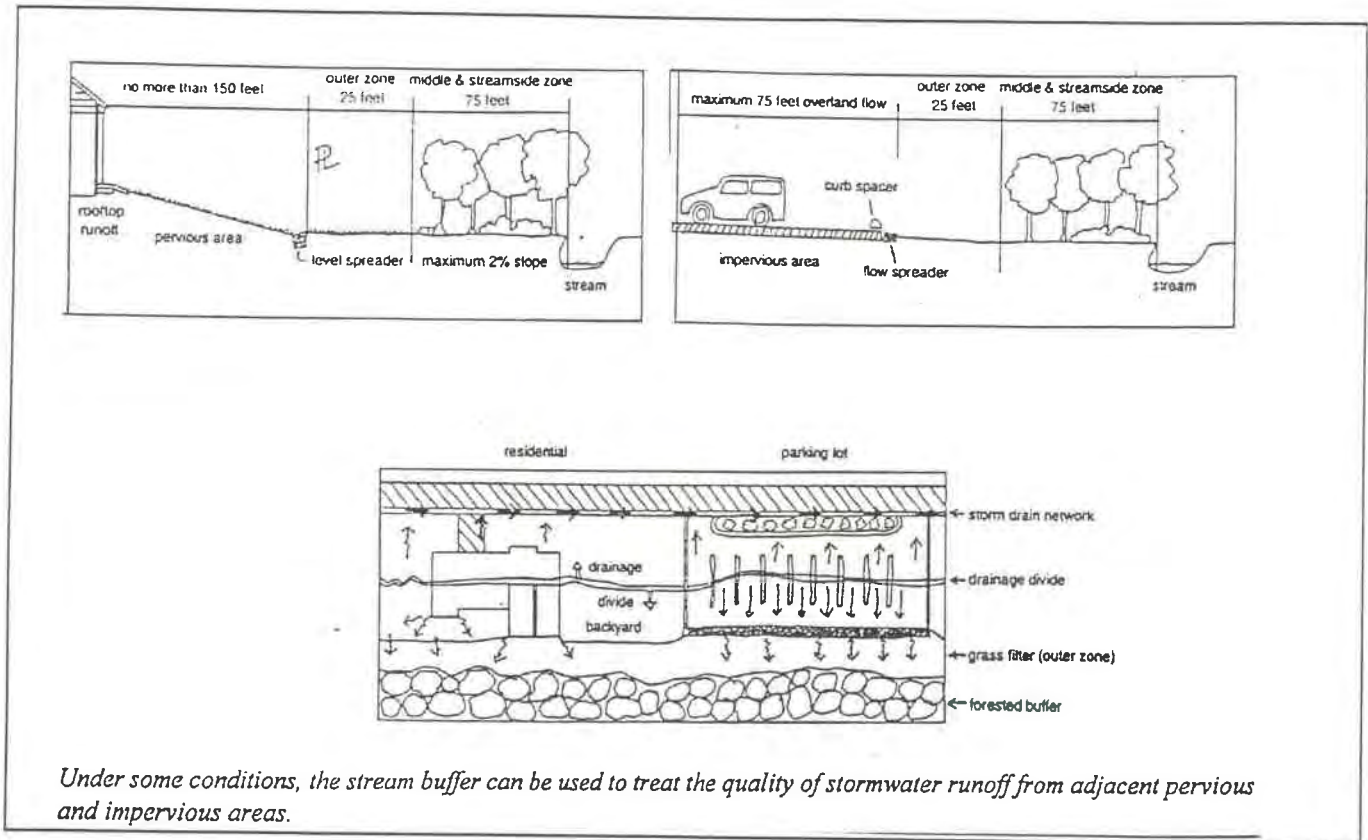
Care should be taken to minimize the potential for erosion in the buffer (filter strip). Therefore, the maximum runoff velocity for both the 6-month and 2-year storm should be computed for all contributing areas (MDE 1997). This computation should be based on the slope, soil, and existing vegetative cover. If the computation indicates that the 6-month or 2-year flow velocities will be erosive, the overland flowpath should be reduced.

(2) *Selective placement of structural stormwater facilities*

There are both benefits and drawbacks to locating structural BMPs such as ponds and wetlands in buffers. For example, constructing ponds on or near the stream allows treatment of the greatest possible drainage area at a topographic point that makes construction easier and cheaper. On the other hand, ponds and wetlands located on the stream may require the sacrifice of stream channels

above the BMP or lead to the creation of barriers to fish migration. Further, BMPs on or near the stream can create additional environmental problems, including the localized clearing of trees, modification of existing wetlands, and stream warming.

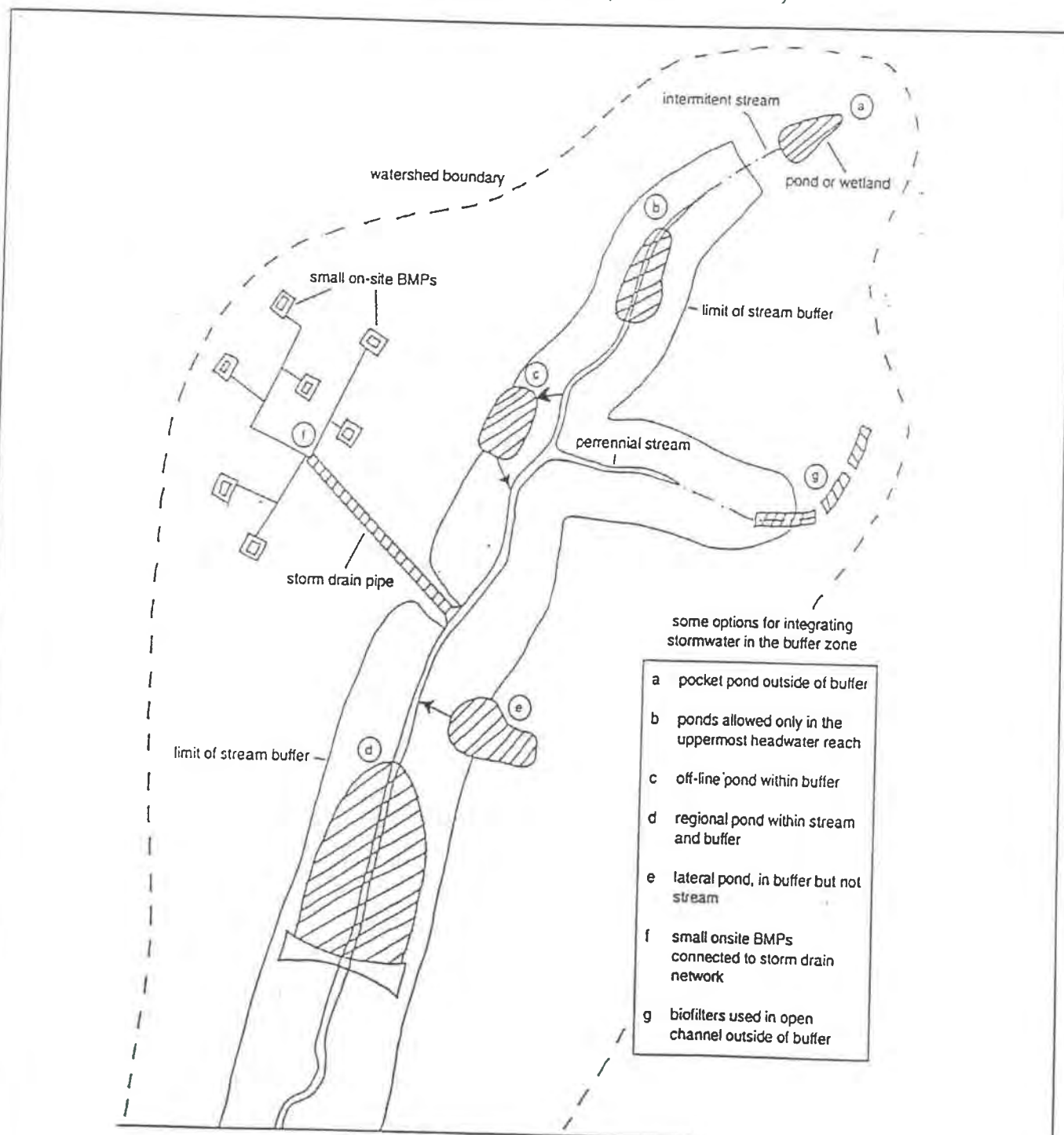
Figure 1: Design Criteria for Using a Stream Buffer as a Filter Strip to Provide Stormwater Treatment



Given the effectiveness of stormwater ponds and wetlands in removing pollutants, however, it is generally not advisable to completely prohibit the use of structural BMPs within the buffer. There are several options to reduce the impact of ponds and wetlands and the associated concentrated discharge on buffers (see Figure 2). These options include the following:

- limiting the contributing drainage area to a maximum of 100 acres;
- limiting online ponds and wetlands to the uppermost 500 feet of the stream channel;
- restricting clearing of the streamside portion of the buffer to the minimum necessary for the outflow channel;
- encouraging offline facilities in the middle and outer portions of the buffer to minimize impacts to the streamside portion of the buffer; and
- using online ponds only to manage stormwater quantity, thus minimizing the size of the BMP.

Figure 2: Options for Locating BMPs in the Buffer (Schueler 1995)



A range of options are available for locating stormwater practices within the stream buffer. Ponds or wetlands can be located only on (a) intermittent streams, (b) in the upper 300 feet of perennial streams, (c) off-line, (d) regional ponds or (e) laterally within the buffer. Alternatively, other BMPs can be located outside of the buffer; although their outfalls may still require a buffer crossing.

Recommendations

- Provide detailed guidance regarding the use of buffers as stormwater BMPs.
- Allow the discharge of concentrated flow from stormwater BMPs into buffers under limited conditions.
- Provide clear guidance outlining acceptable options for integrating structural BMPs into buffer systems.

Additional Guidance

Site Planning for Urban Stream Protection, Chapter 5: The Architecture of Stream Buffers (1995) by Thomas Schueler, Center for Watershed Protection : Describes benefits of stream buffers, community experience with buffer programs, pollutant removal capability of stream buffers, performance criteria, and resources needed for implementation.

Design of Stormwater Filtering Systems (1996) by Richard Claytor and Thomas Schueler, Center for Watershed Protection: Provides design and performance criteria for filter strips.

II. STORMWATER MANAGEMENT FOR SMALL NON-RESIDENTIAL SITES

Articles IV.A.1.h. and IV.A.1.i. (water quality treatment for small non-residential sites)

Many researchers have observed that stormwater pollutants tend to accumulate on impervious surfaces such as parking lots and roofs. During storms, these pollutants can quickly wash off during the early part of the storm. Thus, despite higher runoff rates during the latter part of the storm, the concentration of these pollutants in the runoff tends to decline as the rainfall continues.

Based on this "first-flush" phenomenon, many communities now focus their water quality control efforts on the relatively small runoff volume generated early during storm events. The reasoning is that if the small, initial runoff volume is captured, then most of the pollutants washed off during the start of the storm will be detained and removed. As a practical matter, many communities have adopted the 1/2-inch rule as a basis for determining the water quality control volume (WQ_v). The underlying assumption is that by sizing the BMP to capture and detain the first 1/2-inch of runoff, most of the pollutant load will be captured and treated.

Analysis by Chang et al (1990), however, indicates that the 1/2-inch rule may not always be sufficient for highly impervious sites (i.e., sites with more than 50% impervious cover). While the 1/2-inch rule works well for sites with less than 50% impervious cover, above this threshold the rate of storm volume and pollutant load capture drops off sharply. This drop-off is particularly significant at high levels of impervious cover, such as that associated with fast-food restaurants, convenience stores, and gas stations. The use of the 1/2-inch rule may, therefore, need to be reconsidered, particularly when applied to highly impervious sites.†

90% Rule

An alternative method for computing the WQ_v is to base the computation on impervious cover and a specific design storm. The design storm is the storm event associated with 90% of the annual runoff. This design storm is determined through analysis of the rainfall frequency spectrum. The rainfall frequency spectrum for the Chicago, Illinois area is outlined in Table 1. The data illustrates that the majority of all annual runoff is produced by the small frequent storm events. The data also suggests that a BMP which is sized to capture and treat the 3-month frequency storm (1.06" of rainfall according to Method A) will effectively treat 90% of the annual average rainfall. In practice, such a BMP will also capture and partially treat the first 1.06" of larger rainfall events. Thus, a somewhat smaller design storm can be used to size BMPs. Therefore, we recommend that the 0.85" rainfall event be used for water quality control.

Table 1: Rainfall Frequency Spectrum for the Chicago Illinois Area (Based on data supplied by Nancy Phillips, EPA Region 5)

% of All Storm Events ¹	Return Interval	Rainfall Volume (in inches) ²	
		Method A	Method B
30	7 days	0.20	0.21
50	14 days	0.32	0.34
70	1 month	0.54	0.58
85	2 months	0.85	0.93
90	3 months	1.06	1.15
95	6 months	1.42	1.58
98	1 year	2.06	2.20
99	2 years	2.54	2.77

¹ less than or equal to the given precipitation volume
² The rainfall frequency spectrum is constructed from long-term hourly rainfall records. Storm events are considered to begin and end after 3 hours (Method A) or six hours (Method B) of consecutive zero precipitation readings. Storms that accumulate less than 0.10" of precipitation over 2 hours or more were not considered to produce runoff, therefore were exclude from the analysis.

The "90% rule" provides for greater treatment volume as impervious cover at the site increases. In numerical terms, it is equivalent to a specific rainfall depth (in inches) multiplied by the volumetric runoff coefficient (R_v) and site area. The specific rainfall depth used depends on the site location and allows for capture of 90% of the annual runoff. Based on the previous discussion, an appropriate design storm for BMPs in the Chicago, Illinois area is 0.85 inches. An example computation is presented in Figure 3.

Low Levels of Impervious Cover

An additional consideration when using the 1/2-inch rule is the applicability to sites with limited impervious cover. Use of the 1/2-inch rule can yield a prohibitively large WQ_v , which in turn requires construction of a BMP that is relatively large in comparison to the site's impervious area. A suggested minimum criteria for water quality volume sizing is 0.2 inches per acre for sites that have a low level of impervious cover (i.e., less than 20%).

Figure 3: Calculation of the Water Quality Volume Using the 90% Rule (based on MDE 1997)

The following equations can be used to determine the storage volume, WQ_v (in acre-feet of storage):

$$WQ_v = (P) (R_v) (A) / (12)$$

where:

P = 0.80 inches of rainfall (in Chicago)

WQ_v = water quality volume (in acre-feet)

R_v = $0.05 + 0.009(I)$, where I is percent impervious cover

A = site area in acres

Recommendation

- Consider a water quality volume sizing rule based on a design storm and impervious cover at the site (e.g., the 90% rule).
- Consider setting a minimum water quality volume sizing criteria for less impervious sites.

Additional Guidance

First Flush of Stormwater Pollutants Investigated in Texas in Watershed Protection Techniques (Volume 1, No. 2) by Thomas Schueler, Center for Watershed Protection: Examines first flush phenomenon with respect to imperviousness and type of stormwater pollutant.

III. RUNOFF VOLUME REDUCTION HIERARCHY

Article IV.B.1.d.: Runoff Volume Reduction Hierarchy (RECOMMENDED)

The recommended Runoff Volume Reduction Hierarchy outlines a series of options to minimize the increase in stormwater runoff volumes and rates from development. While all of the options presented can be used to minimize or control stormwater runoff, two steps could be taken to further enhance the effectiveness of the Hierarchy. First, the Hierarchy language could be revised to place additional emphasis on nonstructural practices such as preservation of natural vegetative cover, minimizing the amount of new impervious cover created, and the preservation of natural infiltration and storage characteristics. Second, explicit incentives should be included to encourage the use of nonstructural options.

Suggested Wording for Runoff Volume Reduction Hierarchy

The Runoff Volume Reduction Hierarchy should emphasize preservation of as much of the site in a natural state as possible. The volume and rate of stormwater runoff generated from areas of the site conserved in their natural state is significantly less than that produced from impervious areas such as driveways and parking lots. Thus, the need for stormwater conveyance systems and structural stormwater BMPs at the site will be greatly reduced.

Suggested wording for the Runoff Volume Reduction Hierarchy that more strongly emphasizes nonstructural options is presented below. Note that underlined type indicates suggested revisions to the currently recommended Hierarchy.

- (a) Preservation of natural resource features of the development site (e.g., floodplains, wetlands, prairies, and woodlands);
- (b) Preservation of the existing natural streams, channels, and drainage ways;
- (c) Minimizing the impervious surfaces created at the site (e.g., narrowing road width, minimizing driveway length and width; clustering homes; and shared driveways);
- (d) The use of open vegetated channels to convey stormwater runoff;
- (e) Preservation of the natural infiltration and storage characteristics of the site (e.g., disconnection of impervious cover and on-lot bioretention facilities);
- (f) Structural measures that provide water quality and quantity control;
- (g) Structural measures that provide only quantity control and conveyance.

It may be necessary to provide some guidance regarding disconnection of impervious cover. A brief explanation of this technique is provided below.

Disconnection of Impervious Cover

Most subdivision codes require that yards have a minimum slope to ensure positive drainage away from the home (i.e., runoff moves away from the foundation of a home). A common code requirement is a minimum slope of 2.5% for all overland flow on yards or lawns and a minimum longitudinal gradient for swales, channels or ditches of 2.0%. In northern climates, codes further specify that downspouts from rooftops be directly connected to the stormwater conveyance system. These requirements stem, in part, from a desire to minimize nuisance ponding or puddling of water on private lots, and to prevent ice formation on driveways and sidewalks. Engineers are also accustomed to design criteria that mandates quick movement of stormwater through lots, ditches and roads. These code requirements discourage the storage and treatment of rooftop runoff on individual lots. Thus, a cost-effective opportunity for builders to promote infiltration and reduce the volume of stormwater runoff generated is bypassed.

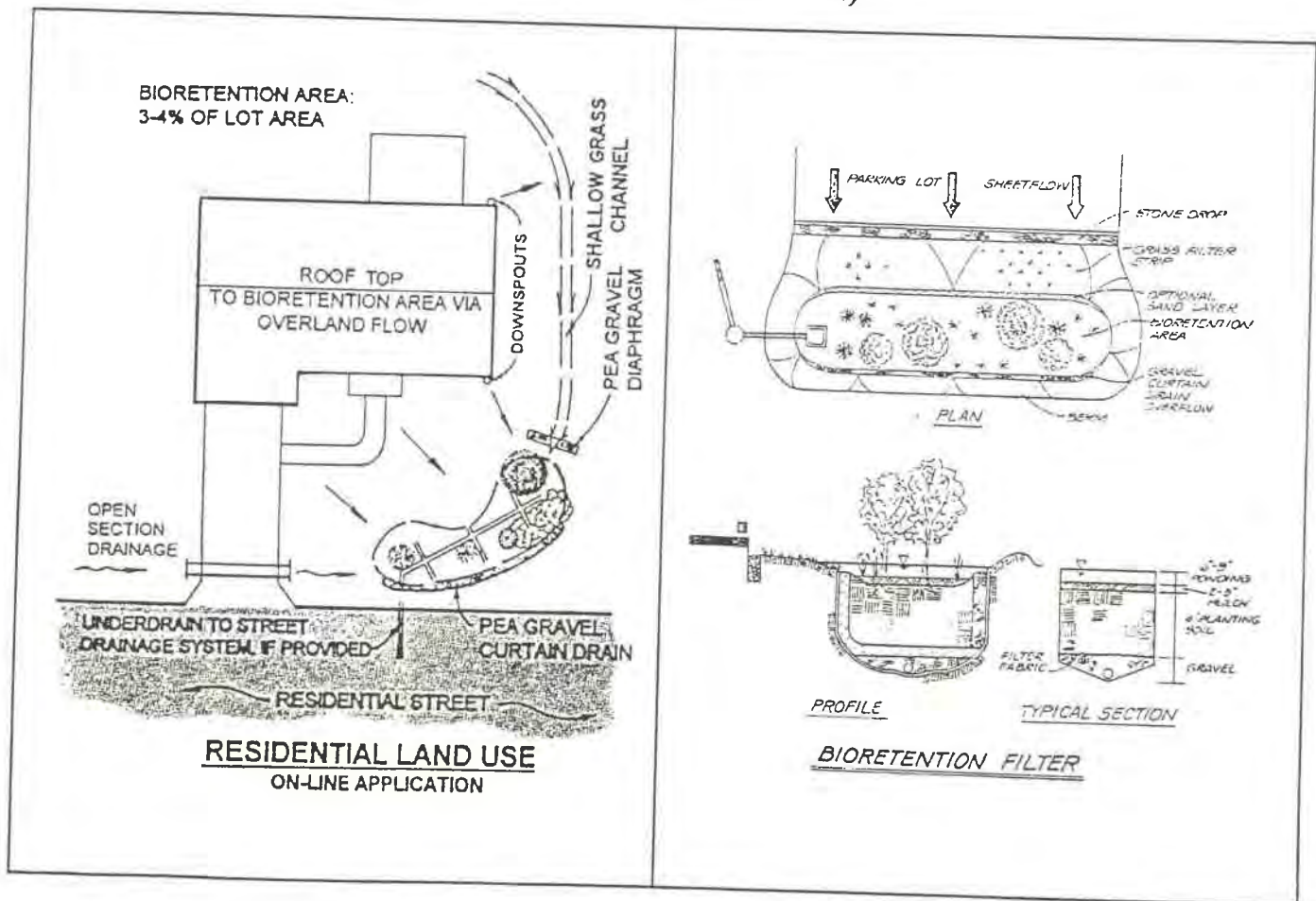
A technique that might be considered to reduce the volume of stormwater generated by development is disconnection of rooftop runoff. Pitt (1987) determined that sending rooftop runoff over a pervious surface before it reaches an impervious surface can decrease the annual runoff volume from residential development sites by as much as 50%. This technique also encourages treatment of stormwater runoff at the source, before the runoff enters the stream system. Other advantages include:

- Requires relatively little engineering design in comparison to structural BMPs; and
- Provides groundwater recharge when the runoff is allowed to infiltrate into the subsurface.

To implement this practice, the rooftop leader must be disconnected from the stormwater conveyance system. Then, the rooftop runoff is directed to a pervious area where it can either infiltrate into the soil or filter over it. Typically, the lot is graded to promote overland filtering. The runoff can be directed to on-lot bioretention areas to promote infiltration and "at-the-source" control of stormwater runoff. A spreading device may be needed to provide sheetflow over grass surfaces. In some cases, dry wells, french drains or other temporary underground storage devices may be needed to compensate for a poor infiltration capability.

Similar techniques can be used to disconnect runoff from non-rooftop areas such as driveways or sidewalks. The runoff from these areas is directed to pervious areas where it is either infiltrated or filtered (by overland flow) into the soil. The site is graded to promote overland vegetative filtering or on-lot bioretention areas are used. Example design criteria is provided in the Maryland Stormwater Management Manual, Chapter 5.

Figure 4: Bioretention Area (Claytor and Schueler 1996)



Bioretention Facilities

Disconnected runoff from rooftops and other impervious areas can be directed to bioretention facilities. These BMPs use planting strips to provide stormwater management (Figure 4). Runoff is directed into a shallow, landscaped area and temporarily detained. The runoff then filters down through the bed of the facility and is either infiltrated into the subsurface or collected in an underdrain pipe for discharge into another stormwater management facility or into a stream. Bioretention facilities can be attractively integrated into landscaped areas and can be maintained by the homeowner or by a commercial landscaping firm. The vegetation recommended for use in bioretention facilities is generally hardier than the species typically used in residential areas. This is a particular advantage in new development where plants often fare poorly due to poor soils.

Stormwater Credits

In general, the runoff volume control targets presented in the WDO (i.e., the 2-year control rate and the water quality control requirement) provide a strong incentive to reduce impervious cover at development sites. However, to promote greater use of nonstructural practices, stormwater credits can be provided for site designers that use these practices. Practical application of the credit is as follows: In exchange for using nonstructural practices that reduce the volume and/or rate of stormwater runoff generated at a site, the water quality control requirement is reduced. In general, greater use of nonstructural practices will minimize the volume of runoff to be controlled. Thus, construction costs for structural BMPs and stormwater conveyance systems will be reduced. Examples of stormwater credits which may be applicable to Lake County are provided in Table 2.

Table 2: Examples of Stormwater Credits (Based on MDE 1997)

Nonstructural Technique	Stormwater Credit Description
Preservation of natural resource features	<ul style="list-style-type: none"> ▪ Reduce site area used to compute water quality volume ▪ Use pre-developed conditions (e.g., meadow, prairie) to determine curve number for natural areas
Disconnect rooftops	<ul style="list-style-type: none"> ▪ Reduce site area used to compute water quality volume ▪ Use longer time of concentration t_c (increased flowpath) ▪ Use smaller curve number to compute control volumes
Filter strip	<ul style="list-style-type: none"> ▪ Reduce site area used to compute water quality volume ▪ Use longer time of concentration t_c (increased flowpath) ▪ Use smaller curve number to compute control volumes
Buffer	<ul style="list-style-type: none"> ▪ Subtract contributing site area to BMP ▪ Use longer time of concentration t_c (increased flowpath) ▪ Use smaller curve number to compute control volumes
Open vegetated channels	<ul style="list-style-type: none"> ▪ Can meet WQ_v, depending on channel length ▪ Use longer time of concentration t_c (increased flowpath)

Recommendation

- Revised the Runoff Volume Reduction Hierarchy to place additional emphasis on nonstructural stormwater management options such as preservation of natural vegetative cover, minimizing the amount of new impervious cover created, and the preservation of natural infiltration and storage characteristics.
- Provided explicit incentives to encourage the use of nonstructural stormwater management options.

Additional Guidance

Maryland Stormwater Design Manual, Chapter 2 (draft 1997) Maryland Department of the Environment: Specifies minimum criteria for stormwater credits and provides examples illustrating how the credit is calculated.

Low Impact Development Design Manual (1997) Prince George's County Department of Environmental Resources: Outlines an innovative suite design approach that focuses on minimizing impacts to natural hydrologic and hydraulic conditions at the site. Highlights techniques that promote on-lot detention of stormwater and protect the natural recharge capability of the site.

IV. CHANNEL PROTECTION AND THE 2-YEAR STORM DESIGN CRITERIA**Article IV.B.1.c.: Release Rates and Discharges**

Stormwater runoff is a powerful force that influences the geometry of streams. After development, both the frequency and magnitude of storm flows increase dramatically. Consequently, stream channels in developed watersheds experience more bankfull and sub-bankfull flow events than stream channels in undeveloped watersheds.

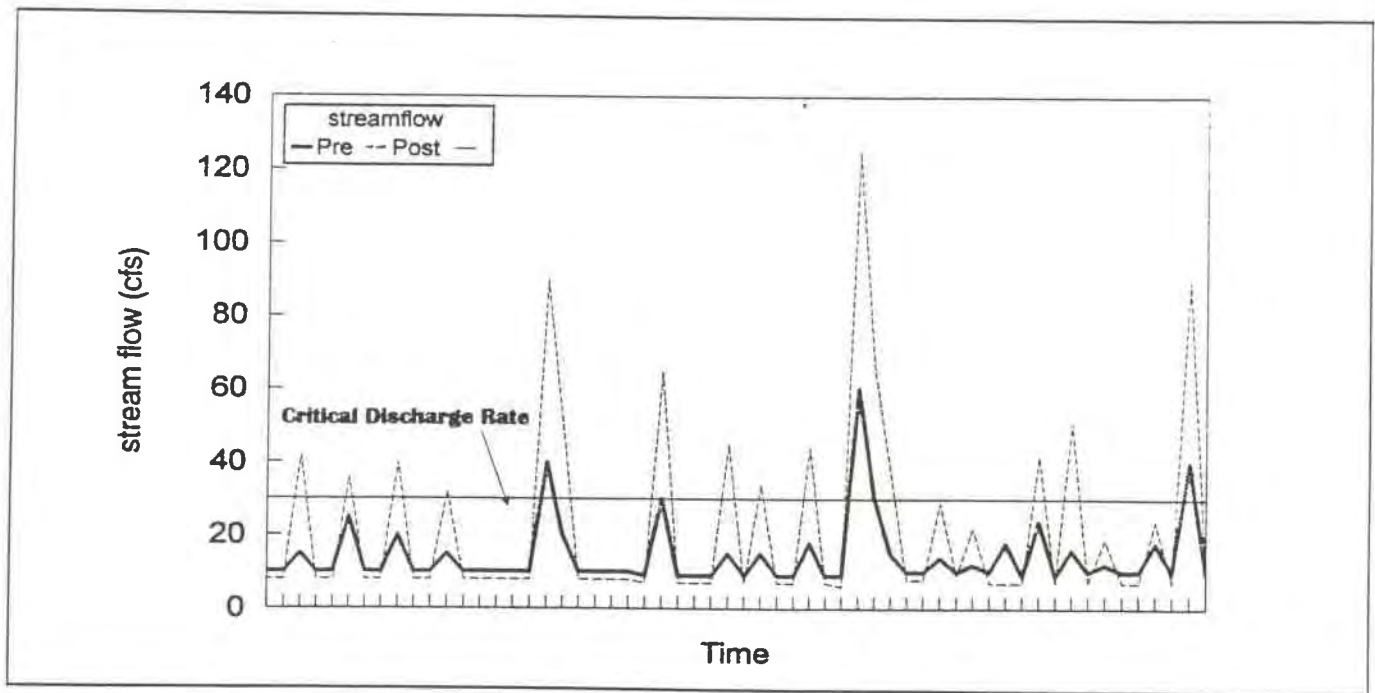
Control of the 2-year storm event is a standard design criteria across the nation. In many communities, this criteria is assumed to minimize streambank erosion. Recent research studies indicate, however, that 2-year control does not adequately protect channels from downstream erosion (MacRae, 1996). In some cases, the 2-year criteria may actually accelerate streambank erosion, because it exposes the channel to a longer duration of erosive flows than it would have otherwise received.

MacRae's work suggests that the actual events of concern in a developed watershed range between the 0.5- to 1.5-year storm event. After development, the rate and volume of runoff increases, leading to a corresponding increase in the magnitude and frequency of bankfull flows (see Figure 5).

Streams typically respond to this change by increasing their cross-sectional area to handle the more frequent and erosive flows either by channel widening or down cutting, or both. The stream enters a highly unstable phase, and experiences severe streambank erosion and habitat degradation. In this phase, the stream often experiences some of the following changes:

- rapid stream widening
- increased streambank and channel erosion
- decline in stream substrate quality (through sediment deposition and embedding of the substrate)
- loss of pool/riffle structure in the stream channel
- degradation of stream habitat structure
- creation of fish barriers by culverts and other stream crossings.

Figure 5: Increased Frequency of Critical Erosive Velocities in a Stream Channel after Development



Development greatly increases the frequency that a stream exceeds the critical discharge rate causing channel erosion and enlargement.

The decline in the physical habitat of the stream, coupled with lower base flows and higher stormwater pollutant loads, has a severe impact on the aquatic community. These impacts include a decline in aquatic insect and freshwater mussel diversity; a decline in fish diversity; and degradation of trout habitat.

1-Year Control

An alternative channel protection criteria is 24-hour detention of the 1-year storm event (MDE 1997). This criteria provides up to 24 hours of detention for runoff generated by the 1-year storm (in the Chicago, Illinois area, the 1-year storm ranges from 2.06 - 2.20 3 inches). Smaller storm events also

experience some detention, but generally much less than 24 hours. The premise of this criteria is that runoff would be stored and released in such a gradual manner that critical erosive velocities would seldom be exceeded in downstream channels. The required volume needed for 1-year extended detention is significant; it is roughly equivalent to about 90 to 95% of the required volume needed for 10-year peak discharge control. Consequently, it is recommended that the 2-year control requirement be eliminated when 1-year extended detention is provided.

Recommendation

- Investigate the need for greater stream channel protection.
- Examine the feasibility of the 1-year design criteria instead of

Additional Guidance

Experience from Morphological Research on Canadian Streams: Is Control of the Two-Year Frequency Runoff Event the Best Basis for Stream Channel Protection? Effects of Watershed Development and Management on Aquatic Ecosystems in Proceedings from Engineering Foundation Conference (Snowbird UT, August 4-9, 1996): Investigates applicability and usefulness of 2-year criteria for channel protection and presents alternative control criteria.

V. GENERAL PERFORMANCE STANDARDS FOR STORMWATER MANAGEMENT

The Lake County WDO depends, in large part, on the Technical Reference Manual. This Manual presents generally detailed design criteria for required runoff volume and water quality controls. BMP design, however, is only one part of an effective stormwater management strategy. Correct design does not guarantee a high level of performance. The best BMP for a site must also satisfy a suite of factors, such as physical site constraints and environmental conditions.

To enhance the effectiveness of the Manual and the WDO, a step-wise process (similar to that provided for erosion and sediment controls) for selecting the best BMP for a development site should be developed. This selection process should outline a series of factors to be considered as the stormwater management strategy for the site is developed. These factors include:

- **Watershed Factors:** Is the development site located in a watershed that has special watershed design objectives or constraints that must be met? Examples: a cold-water watershed, an aquifer protection area, a water supply reservoir, or a shellfish protection zone.
- **Terrain Factors:** Are there special design constraints due to the local terrain or underlying geology? Examples: karst topography, mountainous terrain, or low relief.
- **Stormwater Treatment Suitability:** How well does the BMP(s) meet targeted runoff volume and water quality control targets? Is this BMP appropriate for treating hotspot runoff? How much land is required?

- **Physical Feasibility Factors:** Are there any physical constraints at the project site that may restrict or preclude the use of a particular BMP?
- **Community and Environmental Factors:** Do the BMPs have any important community or environmental benefits or drawbacks (including maintenance requirements, habitat creation or impact, community acceptance, and cost) that might influence the selection process?
- **Locational and Permitting Factors:** What environmental features must be avoided or considered at a site to fully comply with local, state and federal regulations? Examples: wetlands, buffers, floodplains, and forest conservation areas.

Specific examples of how this selection process can be applied is provided in the Maryland Stormwater Design Manual.

Recommendation

- Develop a step-wise BMP selection process to guide site designers as they develop the most appropriate stormwater management strategy for the site.

Additional Guidance

Maryland Stormwater Design Manual, Chapter 4 (draft 1997) Maryland Department of the Environment: Presents guidance on how to select the best BMP or group of practices at a development site, as well as environmental and other factors to consider when actually locating each BMP.

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- Pitt, R. E. 1987. Small Storm Urban Flow and Particulate Washoff Contributions to Outfall Discharges. Doctorate Thesis. University of Wisconsin-Madison.

STEERING COMMITTEE MEETING

DATE: 2/25/10

<u>NAME</u>	<u>ORGANIZATION</u>	MEM.	ALT.	GUEST/ OTHER
1. Jedd Anderson	CBBCE			✓
2. Erskine Klyce		✓		
3. DALE DURFEY		✓		
4. Robert Swanson	DuPage County	✓		
5. CHRIS VONNATHE	DUPAGE COUNTY	✓		
6. NICK HATFIELD	LOMBARD	✓		
7. JOHN WILLS	WBK			✓
8. Kristine Meyer	WBK			✓
9. Bill Neveck	Alexandria	✓		
10. KAREN LASKOWSKI	DUPAGE COUNTY	✓		
11. David Winklebleck	DuPage Co.	✓		
12. Clayton Hettler	DuPage Co.	✓		
13. ANTHONY HAYMAN	DUPAGE SAO			✓
14. Mary Lou Kalisto	Village of Lisle	✓		
15. Christine Klepp	DuPage County	✓		
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