

BOONE COUNTY COMPREHENSIVE STORMWATER MANAGEMENT PLAN

Approved by the Boone County Stormwater Committee

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CHAPTER 1

AUTHORITY, PURPOSE, GOALS AND OBJECTIVES

1.1 BACKGROUND

Boone County lies west of the Northeastern Illinois region in an area that has been described as the “Ring around the Collar” referencing the fact that the County lies just outside of the region immediately surrounding the Chicago Metropolitan region. The County contains approximately 282 square miles and had an estimated population in 2008 of 54,142 (Census estimate). Boone County is the smallest county by area in Illinois and is one of the smallest by population in the Northern Illinois region (Number 27 out of all 102 counties in Illinois) but has been one of the fastest growing counties in Illinois over the last 20 years.

The incorporated areas of Boone County include one (1) city and four (4) villages wholly contained within its borders and one (1) village and one (1) city which are located both in Boone County and Winnebago County. The size of the villages ranges from around 200 for the Village of Caledonia to 26,461 (Census estimate) for the City of Belvidere.

The County’s principal watershed is the Kishwaukee River which has its headwaters in next door McHenry County. The total watershed of the Kishwaukee River is 1,250 square miles, of that 226 square miles lies in Boone County. The second largest watershed within Boone County is that of the Rock River. The Lower Rock River watershed is located mainly in Northwestern Boone County and encompasses 51 square miles. The final watershed is the Turtle Creek watershed which encompasses four (4) square miles.

Flooding within Boone County is generally localized flooding resulting from large rain events or the spring thaw. Major overbank flooding that effects developed properties is not a widespread problem in Boone County. Boone County has some of the highest quality rivers and streams in Northern Illinois, which provide a wide variety of aquatic life and recreational opportunities. The high quality water resources are a great asset to Boone County. However, the high population growth in the area, if not properly regulated, could quickly put those resources at risk. This has been shown time and time again as growth has expanded out from the Chicago Metropolitan area.

Understanding the link between continued growth and the degradation of water resources as well as the potential for increased flood levels, the Boone County Board established the Boone County Stormwater Management Planning Committee (SMPC)

on April 12, 2006. The first meeting of the Committee was held on October 26, 2006. As required by the state legislation, the Committee has six (6) members composed of three (3) municipal representatives and three (3) county board representatives.

1.2 AUTHORITY AND PURPOSE

1.2.1 Authority

Illinois State Law under 55 ILCS 5/5-1062.2 granted Madison, St. Clair, Monroe, Kankakee, Grundy, LaSalle, DeKalb, Kendall, and Boone County authority to allow the management and mitigation of the effects of urbanization on stormwater drainage. This law allows Boone County to create a Stormwater Management Planning Committee for the purpose of developing a stormwater management plan for presentation to and approval by the county board, and to direct the plan's implementation and revision.

After the completion and adoption by ordinance of a stormwater management plan, the County Board may adopt reasonable rules and regulations for stormwater and floodplain management in accordance with the adopted plan. Upon approval of those regulations, they shall apply to both unincorporated and incorporated areas of the county.

1.2.2 Purpose

As outlined in the Resolution adopted by the Boone County Board creating the Stormwater Management Planning Committee, the purpose of the Committee is:

That the Boone County SMPC is created to consolidate and establish minimum stormwater management practices and develop and adopt a countywide plan for stormwater management.

In addition, it is the purpose of the SMPC to fulfill the requirements outlined in Illinois State Law.

1.3 GOALS AND OBJECTIVES

The following presents the Goals and Objectives of the Boone County Stormwater Plan along with details specific to each item. Building on these Goals and Objectives to serve as a foundation for the rest of the Stormwater Plan is the intent of the SMPC. The Goals and Objectives were first adopted by the SMPC on September 27, 2007.

Goal #1

Establishment of county-wide uniform minimum stormwater regulations.

Minimum standards will be established using state of the art procedures and up to date information to control stormwater runoff to ensure consistent management and protection throughout the county.

Objectives

A) Compliance with all applicable State and Federal Laws.

The National Flood Insurance Act allows the Federal Insurance Administration to make flood insurance available only in those areas where the appropriate public body has adopted adequate floodplain management regulations for its flood-prone areas.

B) Promote responsible land use practices within floodways and floodplains.

Environmental features of floodways and floodplains will differ from watershed to watershed because each has its own character developed from existing topography, water resources, and drainage patterns. To protect the environmental features of floodways and floodplains, land use practices should be consistent in their preparation, review and enforcement.

C) Control erosion and sedimentation in and from drainage, developments and construction sites.

Land modification and the associated soil disturbance will cause soil erosion and sedimentation. Because sediment can be a major source of water pollution, it must be controlled to protect and improve the water quality of Boone County wetlands, lakes and streams; maintain stormwater conveyance systems and protect aquatic and wildlife habitats.

D) Encourage new development to meet the natural topography of the site.

Municipal codes for control of stormwater runoff have historically evolved based on the general public's perception of runoff as a disposable nuisance. This philosophy has led to restrictive and narrowly defined development standards. Standards which require man-made structural solutions to control runoff either ignore or give low priority to natural site features and processes, such as the use of existing swales,

depressional storage and soil infiltration. Structural solutions are also more costly than making use of those natural runoff reduction processes.

Increasing the options available in municipal codes and development standards and redirecting the emphasis of those standards towards the use of natural solutions to control runoff will: improve the quality as well as reduce the quantity of runoff; stimulate creativity and innovation in development planning and design; make use of existing topography and natural storage and drainageways; and lower construction and long term maintenance costs.

Natural systems often improve water quality more efficiently than manmade structures through plant transpiration and infiltration, thereby reducing initial structural construction costs and long term maintenance. The natural system is more aesthetically pleasing in keeping with the surrounding landscape of Boone County and can provide open space, recreational opportunities and wildlife, plant and aquatic habitat.

The development of steep slopes poses special challenges in stormwater management including high erosion potential during construction, high post-construction stormwater velocities and minimal infiltration. Avoidance of the disturbance of steep slopes during planning and design will reduce construction and long term maintenance costs.

Goal #2

The preservation, protection and restoration of water resources (waterways, floodplains, wetlands, ponds, lakes, groundwater recharge areas and aquifers).

Water resources are characterized by healthy, diverse communities of aquatic and riparian plant and animal life. In addition to providing conveyance, flood storage and water quality mitigation efficiently, naturally, and at little cost, these areas provide recreational opportunities including fishing, boating, swimming, hiking and camping which are vital to the economy and character of Boone County. Consistent with the Boone County land use planning philosophy, water resources are to be protected.

Objectives

- A) Incorporate water quality and habitat protection measures in all stormwater management activities.

Natural depressional storage areas provide runoff volume reduction, water quality treatment and flood reduction efficiently and at little cost. Unlike detention basins

which are drained by surface outlet, natural storage areas generally drain only by infiltration and evaporation reducing the volume of storm runoff. Other natural storage areas such as floodplains also provide temporary storage of floodwater. By capturing runoff, natural storage areas also capture pollutants transported by the runoff and prevent those pollutants from being discharged downstream. For larger floods which fill depressional storage capacity, flood volumes are reduced and the timing of the flood peak is delayed such that the impacts of those floods downstream are substantially reduced.

Wetlands have the ability to absorb significant amounts of sediments and pollutants and are often referred to as the “kidneys” of the landscape. However, without adequate protection to avoid overloading their capacities, the stormwater management functions of the wetlands, ponds and lakes will be severely reduced. Wetlands, ponds, lakes and other depressional storage areas also provide significant stormwater storage and attenuation capacities which reduce downstream flooding and drainage problems.

Since wetlands and lakes are an important part of the Boone County landscape, they must be protected to preserve not only their stormwater functions but to preserve the character and recreational opportunities of the county. Adverse impacts that may occur without adequate stormwater controls include:

- 1) Excessive sediment loads which cause reduced water depths, diminished storage capacities, burial of natural substrates, and high turbidity that adversely affects aquatic life.
- 2) Increases in nutrient loads which lead to increases in undesirable aquatic plant and algae growth.
- 3) Large fluctuations in runoff rates which changes the character of wetland plant and animal species and causes shoreline erosion.

Forested areas are another important part of the Boone County landscape. Their preservation will provide areas for runoff infiltration as well for wildlife habitat and human recreation.

B) Eliminate, to the maximum extent practical, nonpoint source pollution.

Substantial improvements have been made to the water quality of Boone County streams and lakes through public expenditures on wastewater treatment. However, beneficial uses of these streams and lakes can also be impaired by nonpoint sources of pollution. Elimination and prevention of nonpoint sources requires a comprehensive, coordinated management approach which recognizes the existing and potential sources of problems in the watershed. A coordinated approach recognizes that different waterbody types are sensitive to different sources of degradation. The

location in the watershed of the source often affects the waterbodies capacity to assimilate changes in runoff characteristics.

Goal #3

Promote an awareness and understanding of stormwater management issues by the residents through a public information and education program.

Training, education and information programs for the public, local officials, consultants and other parties must communicate the fundamental theories and relationships of stormwater to the problems that exist now and may develop in the future. As policies and standards are developed for stormwater management, training will ensure they are uniformly understood, applied and enforced. Implementation of the stormwater plan may be easier as the public becomes more aware of stormwater management issues.

Objectives

A) Periodic newsletter mailings.

The Stormwater Committee shall develop and deliver information regarding stormwater issues to the public on a regular basis to keep them aware of and updated on stormwater activities in Boone County.

B) Development, updating and dissemination of guidance documents, including plans and maps.

The Stormwater Committee shall identify, collect, catalog and maintain existing data pertinent to stormwater management.

Understanding the watershed and its natural resource variables is the fundamental basis for effective stormwater management. Each watershed has its unique set of physical features. The first step in stormwater management is to acknowledge each watershed variable as the basis for determining the specific approach for a watershed plan.

The creation of a technical reference manual will provide uniform and consistent technical guidance for all users of land in Boone County. Further, this one source will contain current Best Management Practices (BMP's) and the technical procedures necessary to implement the minimum standards of the Stormwater Plan and its regulations. The manual should be annually reviewed and updated to reflect observed maintenance concerns and new, innovative technologies.

- C) Development of workshops involving key development players to educate them on stormwater management and what it entails.

The creation of workshops will provide the ability to ensure that all entities involved in the development process are aware of the minimum requirements found within the County. In addition, the workshops will provide a forum to present and explain new technologies and procedures that have been developed.

Goal #4

Identify, prioritize and remedy existing areas of concern.

In addition to new development, the Stormwater Plan must address existing areas of concern including, but not limited to, flooding, streambank erosion and water quality, and develop timely, cost effective remedies for these concerns.

Objectives

- A) Develop and maintain a comprehensive data base (hydrologic, hydraulic, demographic & cartographic) for each watershed within the County.

Watersheds and subwatersheds involved in basin planning have different natural resource bases, land uses and population densities which affect all phases of basin stormwater management, therefore, each basin plan must include consideration of these variables. Basin plans should consider methodologies to target spending. Consideration should also be given to the role of active and inactive drainage districts. Active drainage districts should be a participant in basin planning to the extent possible.

Basin specific regulations for stormwater detention are needed since each watershed and subwatershed contains a unique set of problems, existing conditions and a variety of land uses. Due to these variables, an approach to resolve, mitigate and prevent problems will need to be as unique and specific as the basin itself.

- B) Establishment of project priorities through consideration of regional effectiveness, historical significance, consistency with watershed plan, compliance with stormwater management objectives, cost effectiveness, implementation time and effect on risk to human health, safety or inconvenience.

A priority list of remedial action for deficiencies in the existing stormwater facilities in Boone County should be developed and reviewed on a yearly basis to ensure that all areas of concern are properly addressed.

- C) Involve the community to gather their unique insight and input on existing stormwater issues.

Oftentimes local residents are better aware of potential issues relative to stormwater. Their advantage lies in the ability to constantly monitor and observe their property and the issues found thereon.

Goal #5

Coordinate the short and long term maintenance of natural waterways, manmade drainage ways and stormwater management facilities located within the County.

Stormwater facilities must be properly maintained and managed to function effectively. Preventative maintenance and operational needs must be identified and addressed before damage to the facility occurs, possibly leading to system failure, local flooding and water quality degradation.

Objectives

- A) Develop guidelines and procedures for conducting inspection and maintenance.

Uniform guidelines will ensure that all stormwater management facilities will be maintained equally, regardless of jurisdiction.

- B) Determine entity responsible for inspection and/or maintenance.

Jurisdiction of stormwater management facilities will ensure proper inspection and maintenance without a duplication of effort and unnecessary expense.

- C) Create a regular inspection and maintenance schedule.

Regularly scheduled inspection and maintenance activities will enable the stormwater management facilities to function as designed.

Goal #6

Develop a consistent and equitable funding mechanism.

Developing adequate funding of the stormwater management program should be assigned a high priority. While grants may be used to supplement the program, a consistent source of dedicated funding must be identified to provide for a consistent level of service and to allow for long term planning and implementation of the program.

Objectives

- A) Federal Funds
- B) State Funds
- C) Local Funds
- D) Conservation Groups
- E) Permit Fees

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CHAPTER 2

DESCRIPTION OF EXISTING STORMWATER MANAGEMENT FRAMEWORK

The purpose of this Chapter is to provide a description of the current stormwater management framework in Boone County and the role of the various local, regional, state and federal agencies within that framework. Prior to the description, a functional framework is defined which provides the basis for the subsequent discussion as well as the assessments and recommendations in later chapters.

2.1 FUNCTIONAL FRAMEWORK

To develop a comprehensive stormwater program, it is important that a functional framework in which that program operates be defined. Only then can specific tasks be organized and the function of the various agencies be defined. For the purposes of this plan, the following functional categories are described:

- Administration and Management
- Regulation
- Planning
- Maintenance

1. Administration and Management

This component represents the administrative and management functions to oversee a stormwater management program. It includes priority setting, program plan development, budgeting, identification of funding sources and management of technical staff. In addition to these basic program management activities, technical assistance, public information, countywide development data storage and disaster assistance activities fall under this functional category. Stormwater technical assistance is provided to municipalities, site designers and land owners to assist them with drainage design, review and problem remediation. Public educational programs keep the public aware of stormwater management issues and their role in addressing those issues. Development data provides information regarding watershed conditions which is necessary to provide coordination between development projects and to prepare watershed plans. Coordination with disaster officials provides technical

assistance and coordination of flood fighting activities to ensure that those activities are consistent with adopted stormwater plans and policies.

2. Regulation

The regulatory component consists of administration of a permit program including development of permit review, inspection and enforcement mechanisms and providing guidance in meeting ordinance standards. It also includes coordination with other regulatory entities which include local municipalities, the Illinois Department of Natural Resources - Office of Water Resources (IDNR-OWR), the Federal Emergency Management Agency (FEMA) regarding floodplain management and the U.S. Army Corps of Engineers regarding wetland management. This component includes review of construction documents and on-site inspection of stormwater management facilities during construction as well.

3. Planning

Comprehensive watershed planning has several purposes including preventing increased flooding and degradation of watershed resources, remediating existing flooding and water quality problems and restoring aquatic habitat. Preventative planning is performed at two levels; watershed level and site level. For example, watershed level planning is used to establish watershed specific stormwater standards while site level planning is performed to meet the watershed standards in the most cost effective manner.

In the context of this stormwater management plan, the discussion of planning is focused on countywide and watershed planning. Countywide and watershed planning objectives can include identification and remediation of problems, development of watershed specific standards, identification of significant natural storage areas, identification of major groundwater recharge areas, identification of high quality wetlands and potential wetland banking sites and delineation of floodplains.

Capital improvements are also included under this element. While not all watershed plans will lead to capital improvements, watershed planning should be performed prior to making any significant stormwater related capital improvements.

The watershed planning process generally consists of establishing goals and objectives for the watershed, collecting detailed data on watershed conditions, modeling the watershed to analyze floodplains and quantify problems, developing

recommendations based on the goals and objectives and analysis, and developing an implementation plan.

4. Maintenance

Stormwater management facility maintenance includes such tasks as cleaning debris from detention ponds, stream channels, catch basins and storm sewers. It also includes inspection and regular upkeep and repair of facilities to maintain system performance. Maintenance and management of the natural system is also needed including inspection and removing debris from streams, proper oversight of wetlands and addressing streambank erosion. This functional component refers to development of a mechanism to ensure maintenance of both stormwater infrastructure and the natural drainage system.

2.2 AGENCY ROLES AND RESOURCES

2.2.1 Local

MUNICIPALITIES, TOWNSHIPS AND COUNTY: The various municipalities and Boone County government play the primary stormwater management role in Boone County.

Administration and Management: Municipalities and the county are essentially the only agencies that have stormwater administration and management roles in Boone County. However, numerous other agencies provide support for certain elements of administration and management (particularly training).

Regulation: Virtually all municipalities have adopted some form of stormwater regulations. Municipalities also have authority to enforce soil erosion and sediment control standards and protect wetlands. However, they are not required to do so by state or federal regulations. To participate in the National Flood Insurance Program communities must regulate development in the floodplain.

Planning: Although assistance from state and federal agencies may be requested, virtually all stormwater planning activities that occur within a municipality or the county are performed by or for that local government.

Capital improvements to address local drainage problems are generally made by municipalities.

Maintenance: Maintenance of stormwater infrastructure within municipal boundaries is the responsibility of the municipalities. Outside the municipalities, the townships and the county generally maintain culverts and ditches within the rights of way of township and county roads.

PROPERTY AND HOMEOWNER ASSOCIATIONS: Homeowner Associations are becoming increasingly responsible for stormwater management within their subdivisions as municipalities search for ways to reduce their cost of providing services.

Administration and Management: These associations are not responsible for administration of a stormwater program.

Regulation: These associations have no regulatory authority and fall under the authority of the governing municipality or the county. However, covenants may occasionally be placed on individual lots by the developer. Covenants may include requirements to maintain drainage paths, roadside swales or native vegetation within and adjacent to wetlands that may lie on individual lots. Although the homeowners association would have certain responsibilities in this regard, enforcement activities may ultimately be performed by municipal or higher agencies. (i.e. Army Corps of Engineers if a wetland on the property was required for mitigation.)

Planning: These associations are rarely involved in planning activities and fall under the planning jurisdiction of the municipalities or the county. The largest and most active association in Boone County is the Candlewick Lake Homeowners Association which has expressed a growing interest in stormwater planning in the past. Candlewick was involved with the creation of the Beaver Creek Watershed Management Plan.

Maintenance: These associations are often responsible for maintenance of components of the stormwater infrastructure; generally the detention basins. However, this varies between municipalities.

BOONE COUNTY SOIL AND WATER CONSERVATION DISTRICT (SWCD): The Boone County Soil and Water Conservation District (SWCD) is entirely contained within Boone County and while often associated with the rural areas of the

county, they have continued to work at being more involved at the municipal level. The SWCD is governed by a board of directors elected by landowners, farmers and residents of the county.

Administrative and Management: The SWCD provides technical assistance to rural and urban customers. SWCDs have the limited ability to tax through referendum to fund their activities. However, none of the SWCDs in the State of Illinois are doing so. The SWCDs are funded through grants from the county, the Illinois Department of Agriculture, and internal programs.

Regulation: The SWCDs have no inherent regulatory authority but do assist with several NRCS programs. The Boone County SWCD has entered into Memorandums of Agreement with Boone County and the City of Belvidere for development and enforcement of adequate soil erosion and sediment control during construction. In addition, the SWCD is contracted to perform inspections for the Illinois Environmental Protection Agency.

Planning: The Boone County SWCD has been participating in SMPC meetings and provided information during preparation of this plan. The Boone County SWCD, along with the NRCS, has also taken the lead on the creation of the Beaver Creek Watershed Management Plan.

Maintenance: The SWCD plays no direct role in maintenance activities but does provide technical assistance and historical drainage data to urban and rural customers regarding maintenance of drainage systems.

BOONE COUNTY CONSERVATION DISTRICT (BCCD): The BCCD is responsible for acquisition and management of open space in Boone County with a particular focus on natural areas. BCCD is governed by a board of five trustees appointed by the Boone County Board.

Administration and Management: BCCD plays no role in stormwater management under this functional category.

Regulation: BCCD plays no role in stormwater management under this functional category.

Planning: The BCCD has been active in participating in SMPC and has provided their technical expertise towards the creation of this plan. Their internal planning is not directed towards stormwater; rather it is directed

towards property acquisition and restoration. As a result, significant opportunities may exist to coordinate with the BCCD's open space program to acquire areas of regional stormwater significance.

Maintenance: BCCD maintains streams, lakes, and wetlands within their properties and has been a significant technical resource for appropriate and effective maintenance and restoration practices.

BOONE COUNTY HIGHWAY DEPARTMENT: The Boone County Highway Department is responsible for construction, expansion and maintenance of county roads and bridges. The Highway Department is also responsible for transportation planning within the county.

Administration and Management: The Highway Department plays the primary role in review of stormwater management plans during the platting process. In addition, the Highway Department takes the lead in enforcement of violations found under the Boone County Subdivision Code.

Regulation: The Highway Department is part of the "Staff Plat Review Committee" for all developments in unincorporated Boone County. In addition to review for impacts on the county transportation system, the Highway Department also reviews drainage system plans within subdivisions and involving county roads.

Planning: Although the Highway Department performs many transportation related planning activities, their role in stormwater or watershed planning is generally limited to highway drainage infrastructure to handle runoff draining from and onto their right-of-ways. However, the Highway Department has been involved throughout the SMPC planning process in the creation of this plan.

Maintenance: The Highway Department is responsible for maintenance of all county highway drainage systems.

BOONE COUNTY DEPARTMENT OF HEALTH: The Department of Health is the Boone County agency responsible for the protection of public health. The Department of Health is governed by the Board of Health composed of twelve members appointed by the County Board.

Administration and Management: The Department of Health plays no role in stormwater management under this functional category.

Regulation: The Department of Health is part of the “Staff Plat Review Committee” for all developments in unincorporated Boone County. The Department of Health review is generally focused on elements related to the disposal of wastewater which is affected by drainage and soils.

Planning: The Department of Health plays no role in stormwater management under this functional category.

Maintenance: The Department of Health plays no role in stormwater management under this functional category.

DRAINAGE DISTRICTS: Drainage districts are the entities historically responsible for providing drainage of agricultural lands. Within the last few years one drainage district has been active and levied a tax for legal fees and maintenance activities (Coon Creek Drainage District).

Administration and Management: Drainage districts play no role in stormwater management under this functional category.

Regulation: Drainage districts play no role in stormwater management under this functional category.

Planning (Capital Improvements): Drainage districts have historically been responsible for draining the land to improve agricultural productivity. However, with only one currently active drainage district, this role has largely been taken over by individual property owners. In the past, several larger drainage projects were accomplished through the use of drainage districts.

Maintenance: With only one active drainage district, they are mostly unable to play a role in stormwater management under this functional category. Maintenance responsibilities have largely passed onto the individual property owners.

2.2.2 Regional

None are active at this time regarding Stormwater Administration, Management, Regulation, Planning or Maintenance.

2.2.3 State

There are two state agencies involved with stormwater management: The Illinois Department of Natural Resources (IDNR) and the Illinois Environmental Protection Agency (IEPA). The IDNR is composed of several, previously separate state agencies. Those former agencies concerned with stormwater related issues were the Illinois Department of Transportation-Division of Water Resources (IDOT-DWR), Illinois Department of Conservation (IDOC), and the Illinois Department of Energy and Natural Resources. The IDNR was officially created July 1, 1995 and the stormwater related Operational Offices under IDNR are identified and discussed below after the discussion of IEPA.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY (IEPA): IEPA is the state of Illinois' agency responsible for water quality issues including regulation and management of both point and nonpoint sources of pollution.

Administration and Management: IEPA administers the Municipal Separate Storm Sewer Systems (MS4) permit which oversees storm water in Boone County. The IEPA also offers technical assistance, educational outreach and reviews, investigates, prepares and participates in various reports.

IEPA (with USEPA funds) has partially funded preparation of a course curriculum to educate designers and permit reviewers in the application of stormwater BMPs on urban development sites. IEPA (also with USEPA funds) has partially funded, as part of other projects, preparation of public education materials such as guidance to riparian land owners.

Regulation: IEPA is the regulatory agency for water quality and issues National Pollutant Discharge Elimination System (NPDES) permits in the State of Illinois. Recently, NPDES has been expanded to include construction activities of one or more acres. Under this recent expansion, the developer is required to prepare a "Stormwater Pollution Prevention Plan" addressing construction site runoff as well as post construction runoff and file a "Notice of Intent". The Bureau of Water's regional office reviews the prevention plans and inspects the regulations to ensure compliance with the prepared plans while assisting local government agencies with enforcement. The permit requires compliance with local government ordinances, in addition to the state requirements. IEPA provided funding to NRCS to prepare the "Illinois Urban Manual - A Technical Manual Designed for Urban Ecosystem Protection and

Enhancement" (USDA, 1995), which provides guidance in designing soil erosion and sediment control as well as stormwater best management practices for new development.

Additionally, certain industries must file for a permit for stormwater discharges, regardless of the time that the property was developed unless they qualify for the no exposure exemption. The requirements for these industrial discharges are considerably greater than for construction activities. The requirements include water quality monitoring of selected storm events to characterize the runoff from the site and development of detailed pollution prevention plans that are reviewed by IEPA. Follow up water quality monitoring is required after installation of the measures in the pollution prevention plan.

Although the Army Corps of Engineers is the agency responsible for issuing wetland permits, IEPA makes determinations regarding water quality impacts of wetland disturbances and issues water quality certification under Section 401 of the Clean Water Act.

Planning: IEPA collects water quality data on streams and lakes throughout the state including Boone County. The data is reported in a biannual water quality report which identifies levels of use attainment for each of the waterbodies. For lakes, the data is also reported in an annual Lake Water Quality Assessment Report. Finally, IEPA maintains the Illinois Water Quality Management Plan which includes recommendations for stormwater, soil erosion and sediment control, and stream and wetland BMPs.

USEPA provides grants for water quality related planning and demonstration projects under Section 319(h), Section 314, and 104(b)(3) of the Clean Water Act. All three of these programs are administered by IEPA and provide funds for local governments to implement projects or prepare plans.

Section 319 is the nonpoint source program and provides grants annually for water quality demonstration projects which can include treatment systems for urban runoff as well as in-stream activities to reduce erosion and sedimentation that can lead to degradation of water quality. On the preventative side, such activities as ordinance implementation and preparation of workshops on stormwater best management practices have been funded under Section 319.

Section 314 is the Clean Lakes Program which provides annual grants for Phase I lake diagnostics and alternative evaluation and Phase II

implementation. While EPA encourages a watershed approach to addressing these problems, the focus of the program is on remediation of problems rather than prevention and funding is unlikely to be available to study lakes that are currently unimpaired.

Funding under 104(b) (3) is sporadic and is the only one of the programs that provides funding for watershed planning.

Maintenance: IEPA is not directly involved in maintenance activities, however, grants have been awarded to local governments to assist in stream maintenance activities that address water quality concerns including streambank erosion. These grants have partially funded removal of debris from streams, removal of non-native undesirable riparian vegetation, and installation of erosion control measures, all to address eroding streambanks.

ILLINOIS DEPARTMENT OF NATURAL RESOURCES-OFFICE OF WATER RESOURCES (IDNR-OWR): IDNR-OWR is the regulatory agency for floodplain construction in Illinois. IDNR-OWR is also the State's flood control and flood mitigation agency. The state stormwater legislation specifies that all county stormwater plans be sent to IDNR-OWR for review and comment and this plan will be forwarded to IDNR-OWR.

Administration and Management: IDNR-OWR plays no direct role in the administration and management of stormwater activities in Boone County. However, OWR often co-sponsors training opportunities.

Regulation: As stated previously, IDNR-OWR is the state regulatory agency for floodways construction in Illinois. Their authority extends only to those floodways with drainage areas of one square mile or more in urban areas and 10 square miles in rural areas. IDNR-OWR, along with NIPC, developed a model floodplain management ordinance for those communities wishing to participate in the National Flood Insurance Program (NFIP). IDNR-OWR provides advice and technical assistance to local permit review officials.

Planning/Capital Improvements: At the request of local government(s), IDNR-OWR will perform flood control studies to identify alternatives and determine financial feasibility to address overbank flooding problems. Historically plans developed by IDNR-OWR have focused on structural flood control measures. For eligible flood control projects, where the benefits exceed the costs, IDNR-OWR can fund 100% of project analysis, design, and

construction. For projects where the benefits do not exceed the costs, IDNR-OWR can fund capital improvements up to an amount equal to the benefits. IDNR-OWR generally performs the analysis leading to flood control projects in-house. However, they may also fund projects recommended in local plans and meeting certain criteria.

IDNR-OWR also has a small projects program that is often used to address local drainage problems and can fund flood related improvements up to \$100,000. A less rigorous quantification of benefits is required under this program.

IDNR-OWR also has limited flood mitigation funds for flood proofing and buyouts of floodprone structures. IDNR-OWR also provides assistance in flood mitigation planning and has funded preparation of local flood hazard mitigation plans which are required to receive flood mitigation funds.

Many of the stream gauges in Illinois maintained by the USGS are jointly funded by IDNR-OWR. Also, IDNR-OWR has a few gauges that they have installed and maintain themselves.

Maintenance: IDNR-OWR is not involved in maintenance activities, with the exception of facility maintenance of structures owned by the agency.

ILLINOIS DEPARTMENT OF NATURAL RESOURCES-OFFICE OF NATURAL RESOURCE MANAGEMENT (IDNR-NRM): NRM is responsible for the preservation and enhancement of the natural resources in Illinois and manages the state parks. NRM works with a variety of public and private agencies involved in the protection of natural resources in Illinois. The state stormwater legislation specifies that all county stormwater plans be sent to IDNR-NRM for review and comment and this plan will be forwarded to NRM.

Administration and Management: NRM plays no role in the administration and management of stormwater related programs in Boone County.

Regulation: Section 404 permit applications for wetland disturbances on sites which contain state endangered or threatened plant or wildlife species are reviewed by NRM for impacts to fish and wildlife resources.

Planning: NRM administers state and federal open space programs. The state's program is entitled Open Space Lands Acquisition and Development

(OSLAD) and the corresponding federal program is entitled Land and Water Conservation Fund (LWCF but also known as LAWCON). These programs provide funding for open space acquisition and development on a 50% reimbursement basis. It may be possible to use these funds to assist in the purchase and enhancement of significant wetland, depression storage and floodplain areas that are important to the management of stormwater in Boone County.

Maintenance: Maintenance activities of NRM are limited to their own properties on which they generally perform stream maintenance activities. NRM may be able to provide technical assistance regarding appropriate stream maintenance and restoration activities.

ILLINOIS DEPARTMENT OF NATURAL RESOURCES-OFFICE OF SCIENTIFIC RESEARCH AND ANALYSIS (IDNR-OSRA): IDNR-OSRA conducts research, provides information and formulates policy related to Illinois' natural resources.

Administration and Management: IDNR-OSRA plays no role in the administration and management of stormwater related programs in Boone County.

Regulation: IDNR-OSRA has no regulatory authority.

Planning: The IDNR-OSRA can provide research and technical assistance for projects involving natural resources. The Water Survey, a division of IDNR-OSRA, conducts hydrologic studies and provides design rainfall data for the state of Illinois (Bulletin 70 authored by Huff and Angel, 1989). The Natural History Survey, also a division of IDNR-OSRA, is currently developing new techniques for studying soil erosion and helping to identify Illinois streams which are biologically significant. The Natural History Survey can also perform assessments of flora and fauna of natural areas.

Maintenance: IDNR-OSRA plays no role in maintenance of stormwater infrastructure or natural drainage systems.

2.2.4 Federal

U.S. ARMY CORPS OF ENGINEERS: The U.S. Army Corps of Engineers is responsible for the management of navigable rivers, lakes and shorelines. The Corps

is primarily involved with large flood control projects on regional river systems. However, the Clean Water Act charges the Corps with regulating activities which involve the dredging and filling of the waters of the United States, including wetlands.

Administration and Management: The Corps of Engineers plays no role in the administration and management of stormwater programs in Boone County.

Regulation: Historically, dredge and fill have been the only activities in wetlands regulated by the Corps of Engineers. More recently, the Corps of Engineers is paying closer attention to other wetland disturbances such as drainage and excavation. Still other wetland disturbances, such as vegetation removal and impoundment, remain unregulated unless part of a dredge and fill activity. Like the NPDES program, no local government involvement is required.

Planning/Capital Improvements: The Corps of Engineers has funding available for flood control projects. After a reconnaissance level study has shown that a project is likely to be cost effective (i.e. benefits exceed costs), the Corps will proceed with project analysis which must be funded locally by 50% matching funds. For approved projects, the Corps funds 75% of design and construction costs with the remaining 25% to be funded locally. Projects are generally limited to structural flood control measures. However, the Corps has also provided design services for floodproofing of residences as part of an overall flood control project. Corps studies are generally performed with in-house staff. However, local government assistance with those studies can be applied to the local cost share.

Maintenance: The Corps of Engineers is not involved in maintenance activities except for maintenance of their own facilities.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA): FEMA administers the National Flood Insurance Program (NFIP). The Federal Insurance Administration, a part of FEMA, produces floodplain maps which are used for both insurance and regulatory purposes.

Administration and Management: FEMA is the lead agency related to disaster assistance in terms of federal funding and technical assistance for relief and recovery programs.

Regulation: FEMA has minimum floodplain standards that must be enforced by local governments to maintain eligibility in the NFIP. Participation in the NFIP allows residents of the community to purchase flood insurance and makes the communities eligible for federal emergency relief funds if a presidential declaration has been received. Flood insurance is required for structures located within the floodplain if the owner applies for a federal grant or loan, or federally insured or subsidized loans (e.g. mortgage). In support of the local regulatory programs, floodplain mapping was produced for all communities participating in the program. Most of these maps for Boone County were produced in the early 1980s. FEMA is currently in the process of updating the maps for Boone County and goes into effect on February 18, 2011.

Planning: FEMA has several flood hazard mitigation funding programs, including funding for plan development and an acquisition program for areas which have experienced repeated flood damage. Unlike IDNR-OWR and the Corps, FEMA generally does not develop plans in-house but may provide funding to local governments to prepare their own plans. Funding may also be available from FEMA to update floodplain maps.

Maintenance: FEMA is not involved in maintenance activities.

U.S. DEPARTMENT OF AGRICULTURE-NATURAL RESOURCE CONSERVATION SERVICE (NRCS): NRCS (formerly the Soil Conservation Service) is primarily concerned with the wise use of soil, water and other related natural resources.

Administration and Management: NRCS works through and provides technical assistance to local soil and water conservation districts to assist the agricultural community. NRCS also co-sponsors training opportunities including courses and workshops in design and implementation of stormwater best management practices, soil erosion and sediment control, wetland management and hydrologic computer modeling to support the urban community.

Regulation: NRCS utilizes a voluntary, rather than a regulatory, approach to implement its conservation program authorities. In agricultural areas, producers who want to participate in USDA programs and receive benefits must implement conservation requirements. NRCS has developed

conservation practice standards and specifications that may be utilized in regulatory programs.

Planning/Capital Improvements: Under the Watershed Protection and Flood Protection Act (Public Law 93-566, as amended) NRCS has planned, designed and constructed flood control facilities to address overbank flooding in the Chicago metropolitan region. Also under this program, NRCS has performed floodplain management studies and updated floodplain mapping for local governments.

In recent years, the NRCS has initiated an urban conservation program because of the need for urban erosion, sediment and flood control assistance. Under this program, NRCS provides (or will provide) technical assistance (and possibly financial assistance) in urban natural resource planning and restoration. To staff these activities the NRCS has opened the Chicago Metro Urban and Community Assistance Office in Palatine, Illinois. The NRCS has also provided technical assistance in development of the Beaver Creek Watershed Management Plan.

Maintenance: NRCS has no direct role in maintenance activities but does provide technical assistance to land users and public works officials regarding the maintenance of stormwater management system components in both agricultural and urban areas.

U.S. GEOLOGICAL SURVEY-WATER RESOURCES DIVISION (USGS-WRD): USGS-WRD is responsible for providing the hydrologic information necessary to achieve the best use and management of the nation's water resources.

Administration and Management: The USGS plays no direct role in administration and management.

Regulation: The USGS has no regulatory authority and is not involved in regulatory activities in Boone County.

Planning: Through a cooperative program, the USGS-WRD (Illinois District) maintains a stream gauging network and publishes an annual report containing daily streamflow data and water quality information for selected sites around the state. The USGS also has funding for site specific hydrologic and water quality data collection and analysis. Some mapping efforts may also be fundable through USGS. USGS funds 50% of project in-house labor and

expenses. On a 50% cost basis, the USGS-WRD can provide technical assistance in developing watershed models and other hydrologic and water quality related assistance.

Maintenance: USGS plays no role in maintenance activities

U.S. ENVIRONMENTAL PROTECTION AGENCY: Protecting the nation's waters from pollution is one of the many concerns of the USEPA. The Clean Water Act enables the USEPA to regulate water quality on a national level.

Administration and Management: USEPA plays no direct role in administration or management of stormwater programs except to the extent that USEPA may be the ultimate source of funds used to assist in implementing certain administration and management activities such as public and professional education as described under IEPA.

Regulation: NPDES authority ultimately rests with the USEPA. However, that authority has been delegated to the IEPA in Illinois. Although not directly involved in the permitting process, the USEPA works with the U.S. Army Corps of Engineers to establish wetlands policy and has veto authority over Section 404 permits. USEPA is the only agency with staff and authority for enforcement of environmental crimes.

Planning: USEPA provides grants for water quality related planning and demonstration projects under Section 319(h), Section 314, and 104(b)(3) of the Clean Water Act as discussed under IEPA. USEPA also holds national conferences on such topics as urban runoff management, watershed nonpoint source pollution monitoring, ecological restoration, and others. These conferences are intended for state and local planners but are attended by consultants as well.

Maintenance: USEPA plays no direct role in maintenance activities. However, USEPA is the ultimate source of grant funds to assist in performing maintenance activities as discussed under IEPA.

U.S. FISH AND WILDLIFE SERVICE: The U.S. Fish and Wildlife Service (USFWS) is responsible for protection of aquatic and wildlife habitats and is actively involved in water quality and wetland preservation. USFWS also works with numerous agencies, such as NRM, on a variety of wetland protection projects.

Administration and Management: USFWS plays no role in administration and management of stormwater activities in Boone County.

Regulation: Section 404 permit applications for wetland disturbances on sites which contain federally endangered or threatened plant or wildlife species are reviewed by the USFWS for impacts to fish and wildlife resources.

Planning: The USFWS can provide technical review and support for the planning and design of wetland restoration projects which enhance water quality and wildlife habitat. USFWS has a field office in Barrington, Illinois specializing in urban issues.

Maintenance: USFWS may be able to provide technical assistance to land owners performing stream and wetland maintenance and maintenance activities which would enhance their wildlife habitat functions.

NATIONAL PARK SERVICE (NPS): The NPS is charged with preservation of the nation's natural, cultural and recreational resources through acquisition and technical assistance. The NPS carries out their mission through acquisition, development and maintenance of the nation's parks and by providing technical assistance to state and local governments as well as private organizations.

Administration and Management: NPS has no role in administration and management of stormwater activities in Boone County.

Regulation: NPS has no regulatory authority.

Planning: The Rivers, Trails and Conservation Assistance (RTCA) Program provides technical assistance in support of local conservation projects. NPS staff will work with local governments and private groups on river corridor projects to help them achieve multiple benefits including floodwater retention, wetland protection, habitat restorations, water quality improvements and recreational opportunities. NPS staff can assist with citizen involvement activities, facilitate local discussion and decision making and assist in development and implementation of plans.

Maintenance: The NPS manages and maintains streams, lakes and wetlands within the national park system and may be able to provide technical assistance related to appropriate and effective stream maintenance and restoration practices.

2.2.5 Boone County Stormwater Management Planning Committee

The Boone County Stormwater Management Planning Committee (SMPC) is an intergovernmental entity with representation from both municipalities and the county. The SMPC will, through adoption of this Stormwater Plan, be the ultimate authority for stormwater management in Boone County. While many activities may continue to occur at the local level, the SMPC will establish minimum standards and coordinate local activities.

Administration and Management: The SMPC is composed of half municipal and half County Board representation. State legislation gives county stormwater committees the authority to implement countywide stormwater management plans and levee taxes to fund implementation. This authority allows the agencies to tax up to a maximum 0.20% of assessed valuation to fund their activities. However, in order to exercise that authority other county programs would have to be reduced or a referendum would be required due to the current legislative tax cap.

The primary role of the SMPC at this time is to develop this countywide Stormwater Plan which defines the future role of the committee as well as the role of other entities within the county relative to stormwater management.

One advisory subcommittee has been formed under the SMPC, the Technical Subcommittee. The Technical Subcommittee was originally created to include the Conservation District, Soil & Water Conservation District, Belvidere Public Works, Village of Poplar Grove, Village of Capron, Boone County Highway, Kishwaukee River Ecosystem Partnership and a developer representative. The Technical Subcommittee has been working with staff on technical matters such as identifying county stormwater data sources and preparing documents for the SMPC.

The county has assigned the Planning Department to coordinate the SMPC. The department was also responsible for data collection and much of the background information contained within this document. The recommendations section of this document (Chapter 5) identifies in greater detail SMPC's ultimate roles related to administration and management.

Regulation: The SMPC currently has no role under this functional category. However, the state legislation allows the SMPC to adopt and enforce a

countywide stormwater ordinance. See the recommendations in Chapter 5 for the recommended regulatory role of SMPC.

Planning: The primary planning activity at this time is preparation of this countywide plan. The state legislation allows the SMPC to prepare and implement watershed plans including issuing bonds and levying taxes to fund implementation of the watershed plans. See Chapter 5 for recommendations regarding watershed planning and implementation.

Maintenance: The SMPC is not currently involved in maintenance activities. However, state legislation allows SMPC to enter onto private land to perform maintenance activities. Through this Stormwater Plan, the SMPC will develop a mechanism to ensure maintenance of stormwater facilities and the natural drainage system (see the recommendations in Chapter 5).

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CHAPTER 3

ASSESSMENT OF STORMWATER CONDITIONS AND PROBLEMS

This Stormwater Plan is primarily concerned with development of an institutional framework. However, knowledge of current problems is needed both to assess the adequacy of existing stormwater programs and to prioritize activities once the framework is in place.

Surveys were sent out to each municipality regarding the types and locations of stormwater problems. The findings presented in this chapter reflect review of surveys returned by the municipalities, review of local stormwater studies, review of IEPA water quality data and personal observation of the SMPC and those participating in preparation of this plan. Three main problems areas: flooding, streambank erosion and water quality, currently exist in Boone County. Before discussing them, statistics on the watersheds within Boone County are presented.

3.1 WATERSHED STATISTICS

For planning purposes, the county has been divided into three primary watersheds: Kishwaukee Watershed, Upper Rock Watershed and the Turtle Creek Watershed. The three watersheds are shown in Figure 3-1 along with watershed sub-basins, municipal boundaries, major roads and perennial streams. The statistics presented in this section are based on data contained within the Geographic Information System (GIS) database of Boone County. The data layers within the GIS and used for this project include a current land use database (Boone County GIS, 2009), digital flood insurance rate maps (ISWS, 1982) and watershed boundaries (USDA, 1994).

Through a digital overlay of the watershed boundaries on the land use layer, statistics on land use area were computed by watershed. Table 3-1 presents the land use area in acres for each of the three watersheds. Table 3-2 presents the same information in terms of percentages. Maps depicting the land uses, water and wetlands, floodplains and major roads are available for viewing at the Boone County Planning and GIS offices.

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**Reserved for
Figure 3.1
Boone County Watersheds**

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Land Use	Upper Rock	Kishwaukee	Turtle Creek	Total
Agriculture	28699	113892	2463	145054
Open	518	3870	0	4388
Single Family	702	6136	69	6907
Two Family	37	74	0	111
Multi- Family	5	412	0	417
Exurban Residential	2038	9467	16	11521
Institutional	38	985	0	1023
Commercial	50	1211	0	1261
Industrial	11	1293	0	1304
Right of Way	830	6430	70	7330
Landfill/Extraction	0	819	0	819
Airport	0	250	0	250
Vacated	0	28	0	28
Total	32928	144867	2618	180413

Land Use	Upper Rock	Kishwaukee	Turtle Creek	County Average
Agriculture	87.16%	78.62%	94.08%	86.62%
Open	1.57%	2.67%	0.00%	1.41%
Single Family	2.13%	4.24%	2.64%	3.00%
Two Family	0.11%	0.05%	0.00%	0.05%
Multi- Family	0.02%	0.28%	0.00%	0.10%
Exurban Residential	6.19%	6.53%	0.61%	4.45%
Institutional	0.12%	0.68%	0.00%	0.27%
Commercial	0.15%	0.84%	0.00%	0.33%
Industrial	0.03%	0.89%	0.00%	0.31%
Right of Way	2.52%	4.44%	2.67%	3.21%
Landfill/Extraction	0.00%	0.57%	0.00%	0.19%
Airport	0.00%	0.17%	0.00%	0.06%
Vacated	0.00%	0.02%	0.00%	0.01%
Total	100.00%	100.00%	100.00%	100.00%

The greatest urban density, both in terms of land use and population density is in the Kishwaukee watershed. This is no surprise since the largest urban center (Belvidere) and several smaller centers (Poplar Grove and Capron) are in the Kishwaukee watershed.

All of the watersheds have a substantial agricultural component. With only portions of the Kishwaukee watershed being considered as urban or developed. Overall, the county is 87% agricultural but the percentage varies from a low of 79% in the Kishwaukee River watershed to a high of 94% in the Turtle Creek watershed in the northeastern portion of the county.

The only significant body of open water within Boone County is located within the Kishwaukee River watershed. This is the result of the man made Candlewick Lake located in the northwestern portion of the watershed.

Wetlands within the county are shown in Figure 3-2. Wetlands are spread throughout the county with the portion of the county having the lowest percentages being the western portion of the Kishwaukee and the eastern and northern portions of the Kishwaukee having the highest percentage. Recently, Ducks Unlimited, in consultation with the U.S. Fish and Wildlife Service and state governments is working to update the National Wetlands Inventory (NWI) for the states in its Great Lakes/Atlantic Region. The work in Boone County has been completed and resulted in the data used to create Figure 3-2.

Floodplains of the county as found in the FEMA Flood Insurance Rate Maps (FIRM) are shown in Figure 3-3. It should be noted that the FIRM layer only includes mapped floodplain areas. Since only certain jurisdictional floodplains are mapped, there may be considerably greater floodprone areas than indicated by the FIRM maps. Also, the floodplains depicted by the FIRM maps may have expanded due to the increased level of urbanization in the county since the late 1970s to early 1980s when the flood insurance studies were performed. The maps for Boone County are currently in the process of being updated with the effective date being February 18, 2011. The discussion of current floodplain regulations in Section 4.2 discusses the status of floodplain mapping further.

**Reserved for
Figure 3.2
Mapped Wetlands of Boone County**

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**Reserved for
Figure 3.3
Mapped Floodplains of Boone County**

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Table 3-3: Boone County Land Use Area Within the Floodplain in Acres by Watershed

Land Use	Upper Rock	Kishwaukee	Total
Agriculture	263.81	11295.21	11559.02
Open	43.89	1520.54	1564.43
Single Family	0.91	105.58	106.49
Two Family	11.15	11.61	22.76
Multi- Family	0	38.19	38.19
Exurban Residential	87.31	647.38	734.69
Institutional	0	31.41	31.41
Commercial	0	215.16	215.16
Industrial	0	73.19	73.19
Right of Way	5.74	257.64	263.38
Landfill/Extraction	0	65.4	65.4
Airport	0	0	0
Vacated	0	0	0
Total	412.81	14261.31	14674.12

Table 3-4: Boone County Land Use Area Within the Floodplain as a Percentage of Total Land Use Area

Land Use	Upper Rock	Kishwaukee
Agriculture	0.18%	7.79%
Open	1.00%	34.66%
Single Family	0.01%	1.53%
Two Family	9.97%	10.38%
Multi- Family	0.00%	9.17%
Exurban Residential	0.76%	5.62%
Institutional	0.00%	3.07%
Commercial	0.00%	17.06%
Industrial	0.00%	5.62%
Right of Way	0.08%	3.51%
Landfill/Extraction	0.00%	7.98%
Airport	0.00%	0.00%
Vacated	0.00%	0.00%

Table 3-5: Boone County Land Use Area Within the Floodplain as a Percentage of Total Floodplain Area		
Land Use	Upper Rock	Kishwaukee
Agriculture	1.80%	76.97%
Open	0.30%	10.36%
Single Family	0.01%	0.72%
Two Family	0.08%	0.08%
Multi- Family	0.00%	0.26%
Exurban Residential	0.59%	4.41%
Institutional	0.00%	0.21%
Commercial	0.00%	1.47%
Industrial	0.00%	0.50%
Right of Way	0.04%	1.76%
Landfill/Extraction	0.00%	0.45%
Airport	0.00%	0.00%
Vacated	0.00%	0.00%
Total	2.81%	97.19%

Floodplain area is presented in Tables 3-3, 3-4 and 3-5. Table 3-3 shows the absolute area of each land use in the floodplain by watershed. Table 3-4 shows the area of each land use in the floodplain as a percentage of the total area of that land use in the watershed. Table 3-5 shows the area of each land use in the floodplain as a percentage of the total floodplain area in that watershed. Mapped FEMA floodplains within each watershed occupy anywhere from none being mapped floodplain (Turtle Creek) to a high of 10.6% of the total watershed area (Kishwaukee River). Mapped FEMA floodplain occupies 8.77% of Boone County as a whole. The tables show that most of the floodplain is located in areas of agricultural, open space, vacant, wetland and water land uses. Of these non-urban uses in the floodplain, most are in agricultural areas. In fact, agricultural land use accounts for nearly 80% of Boone County's mapped floodplain area. This is important considering that agricultural areas are often converted to urban land uses.

Areas of urban uses (residential, commercial, industrial and institutional) are also located in the floodplain. It should be noted that when an urban land use is found to be in the floodplain, it does not necessarily mean that structures are located in the floodplain. Most of the urban land use in the floodplain is residential.

3.2 FLOODING

Flooding occurs from a number of sources including overbank flooding along streams and rivers and local drainage related flooding due to ponding in isolated depressions, high water tables and inadequate stormwater infrastructure. Basement flooding can also occur where sanitary sewer systems accept excess stormwater runoff during major storm events. Flooding should be distinguished from flood damages. Floods result in flood damages only when they cause destruction, such as when they inundate developed areas. Floods damage buildings and infrastructure, threaten health and safety, destroy crops and disrupt business and traffic, making what had been a natural (and often benign) occurrence a hazard to people and modern development.

3.2.1 Findings

Overall, damage to structures from flooding does not appear to be a widespread problem in Boone County with only 960,175 dollars in fold insurance claims being issued since 1978. This probably reflects a number of factors including the relatively small portion of the county that is developed and the lower density of developed areas.

Local drainage problems are often the result of structures located in isolated depressions and former wetlands with no surface outlet. Other local drainage problems are associated with older developments that were constructed without effective stormwater drainage systems. A lack of regulations regarding gutters, downspouts and drainage ditches that move stormwater can cause significant flooding in urban areas. There is a clear correlation between the level of urbanization and the percentage of the floodplain that is impacted by urban land uses. Some local drainage problems are related to high water tables which may be the result of field tiles that no longer function properly. It has been reported that urban construction activities sometimes disrupt agricultural field tiles. Examples of areas negatively impacted by the disruption of agricultural field tiles include Central Park Subdivision in Loves Park, Newbury Place Subdivision in Timberlane, Bennett's Crossing Subdivision in Poplar Grove, Al-ger Subdivision in Boone County and Oakbrook Woods Subdivision in Belvidere. A study completed in 1994 by the IEPA found that 80% of flood damage reports in Northeastern Illinois came from homeowners with residences built on converted wetlands. (IEPA, 1994)

Hydric soils are widespread throughout Boone County. Hydric soils are by definition soils that are formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in their upper portions. Hydric soils are formed in wetlands and in their natural state are often too wet to farm under normal conditions. By modifying the hydrology and lowering the water table through the use of drain tile or other methods, some of the most productive agricultural soils in Boone County are hydric soils.

All of the hydric soils mapped as being present in Boone County on Figure 3-4 are rated as being subject to flooding and have a seasonal high water table of 0-2' below the ground surface. The high seasonal water table and flooding are hazards that are hard to overcome. Hydric soils have poor potential for building site development and as sites for sanitary facilities. The seasonal high water table limits the use of hydric soils as a site for dwellings with or without a basement.

Some development has taken place in the floodplains of the county's rivers and creeks. Much of this development occurred prior to floodplain mapping, but others have been developed after the fact. Examples of areas of concern include several of the area campgrounds such as Holiday Acres along the Kishwaukee River, Camp Epworth along the Kishwaukee River, and Outdoor World along Coon Creek. Homes built on Lawrenceville Road and U.S. Route 20 along the Kishwaukee River is in another area. Bel-mar Country Club is an example of an open space that is routinely affected by its location within the floodplain of the Kishwaukee River. A newer example of homes being placed within a floodplain area is the Oakbrook Woods Subdivision located along a smaller waterway.

Crop damage can also occur from flooding. Crop losses can be the result of excessively wet spring seasons preventing farmers from planting their entire fields and from extended duration floods later in the growing season that damage crops established but not yet harvested. On the other hand, drought can also cause substantial crop losses.

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Figure 3.4
Hydric Soils of Boone County**

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3.2.2 Conclusions

Although damage from flooding is not currently a widespread problem, experience in other parts of the region, other parts of the country and even comparisons of the rural and urban portions of the county suggests that as the level of urbanization increases, flood damages may also increase. Flood damages can increase for two primary reasons. The first is that as urbanization and associated runoff volumes increase, floodplains expand to include those areas that were previously outside the floodplain. The second reason is that as the level of development and value of land increases, the potential for structures to be constructed in inappropriate, flood prone locations increases. Both of these causes of increased flood damage can be minimized through proper planning and regulation.

3.3 STREAMBANK EROSION

While erosion and deposition within a stream is a natural process, this process is greatly accelerated as a watershed urbanizes causing an increase in the frequency and duration of bankfull flow. Excessive streambank erosion can be both a water quality concern as discussed in the next section and an infrastructure concern as discussed below. Particularly in urban areas, severe streambank erosion can result in loss of adjacent private property and can even threaten structures constructed too close to the stream. At the other end of the erosion process is deposition which can lead to reduced conveyance capacity within the stream and blockage of culverts. Only limited information was obtained from the surveys related to streambank erosion and the findings below are largely based on observations by SWCD staff as well as the authors of this plan.

3.3.1 Findings

Streambank erosion was identified as being a problem in many of the streams and rivers located in the county. Waterways identified by SWCD staff as having segments of relatively severe streambank erosion include Beaver Creek, Piscasaw Creek, Coon Creek, Geryune Creek, Kishwaukee River, Mosquito Creek and Kinnikinnick Creek. It was reported that the locations of severe erosion typically occur immediately downstream of channelized sections. Erosion also tends to be more severe in the urban reaches.

3.3.2 Conclusions

Channelization which reduces the length and increases the slope of the stream, tends to increase erosion as the stream attempts to recreate a natural meander pattern to reestablish an equilibrium bed slope. Also the problem can be greatly exacerbated by the urbanization which increases the rate of runoff in already fast moving streams. Finally, changes in the riparian vegetation during urbanization from native, deep rooted species to shallow rooted turf grass greatly reduces the ability of the stream to withstand high velocity flow.

**Reserved for
Figure 3.5
Channelized Stream Sections of Boone County**

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3.4 WATER QUALITY AND WATERBODY USE IMPAIRMENT

Water pollution problems are caused by many sources including agricultural runoff, construction site runoff, urban runoff, failing septic systems, and industrial and municipal wastewater discharges. In addition to potential human health concerns, degraded water quality leads to impaired aquatic ecosystems. In addition to water pollution, physical changes in a waterbody or watershed such as channelization, removal of riparian vegetation, excessive erosion, dredging, hydrologic destabilization and loss of wetlands can be sources of waterbody impairment.

Related to hydrologic destabilization, protection of groundwater resources is another concern. A shift from groundwater dominated hydrology to surface water dominated hydrology can significantly affect water temperatures, water chemistry and flow variability. This can have a profound effect on streams, lakes and wetlands in terms of their ability to support aquatic and recreational uses. The change in flow variability and water level fluctuation resulting from a shift from groundwater to surface water can also have a significant impact on stream, lake and wetland morphology. In addition, the recharge of clean water to underlying aquifers is essential to Boone County residents as their sole source of drinking water supply.

3.4.1 Findings

Boone County has some of the highest quality streams in northeastern Illinois. Lower Beaver Creek is rated as a Biologically Significant Stream.¹ (Figure 3-6) In addition, significant portions of Piskasaw Creek achieved an “A” rating for its biological integrity (Figure 3-7), with “B” ratings attained by other portions of Piskasaw Creek and Lower Beaver Creek. The diversity of aquatic life found in Boone County streams, Lower Beaver Creek and Piskasaw Creek again achieved the highest ratings. (Figure 3-8)

The Kishwaukee River is the highest rated stream in Northeastern Illinois (Grade A in the Biological Stream Characterization stream rating system) and is in the top 3 in the state of Illinois (IEPA, 1989).

¹ **Biologically Significant Streams (BSS):** Streams that have a high rating or score based on data from at least two taxonomic groups. This can be achieved by obtaining an "A" rating either for diversity or for integrity that is based on data from two or more taxonomic groups. A second way to achieve this status is for a stream segment to have class scores in the highest class for at least two different taxonomic groups when considering the combined data from the diversity and integrity ratings. Stream segments identified as biologically significant are unique resources in the state and the biological communities present must be protected at the stream reach, as well as upstream of the reach. Therefore BSS reaches were extrapolated from site-specific information to upstream stream segments to arrive at the segments identified as biologically significant. See *Integrating Multiple Taxa in a Biological Stream Rating System* at <http://www.dnr.state.il.us/ORC/BioStrmRatings/index.htm>

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**Reserved for
Figures 3.6 through 3.8
Biologically Significant Streams, Ratings
for Stream Integrity and Ratings for Stream Diversity**

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Streams assessed by the Illinois EPA are listed in the latest *Illinois Integrated Water Quality Report and Section 303(d) List* (IEPA, 2008). The Total Maximum Daily Load (TMDL) program is a watershed-based program the main goal of which is to return waters to a condition that supports their designated uses. Specifically, a TMDL is a determination of the greatest amount of a given pollutant that a water body can receive without violating water quality standards and designated uses. Designated uses include: aquatic life, fishing (for consumption), public and food processing water supplies, primary contact (e.g. swimming, water skiing), secondary contact (e.g. boating, recreational fishing), indigenous aquatic life and aesthetic quality.

Section 303(d) of the federal Clean Water Act requires States to identify waters that do not meet applicable water quality standards or do not fully support their designated uses. The Clean Water Act also requires that a TMDL be developed for each pollutant of an impaired water body. The TMDL process includes the following steps: identification of surface waters to be assessed; identification of the designed uses for each surface water; identification of the level to which each use is supported (full support, full/threatened support, partial support, nonsupport); identification of the potential pollutants causing the impairments; identification of the potential sources of the pollutants; identification of the TMDL for each pollutant that will remove the impairment and allow the surface water to fully support its designated uses; and development of an implementation plan to meet the TMDL limits.

While much of the surface waters in Boone County are generally of high quality, the TMDL process has identified some deficiencies.

Piscasaw Creek - one segment was rated as fully supporting aquatic life; the other segment was not assessed. The creek is listed as not supporting fish consumption with mercury from atmospheric deposition listed as the cause.

North Kinnikinnick Creek - is listed as fully supporting aquatic life but not primary contact due to fecal coliform contamination.

Kishwaukee River - two main segments in Boone County were assessed. The western segment is fully supportive of aquatic life but is not supportive for fish consumption and swimming. The eastern segment is also fully supportive of aquatic life and not supportive for fish consumption.

In January of 2006, KREP (Kishwaukee River Ecosystem Partnership) released a Strategic Plan for Habitat Conservation and Restoration for the Kishwaukee River

Watershed (http://krep.bios.niu.edu/KREP_PUBS/Strategic_Plan_KREP.pdf). The goal of the Strategic Plan was to increase the quality and quantity of habitat available for all native species in the Kishwaukee watershed to enhance biological diversity and establish a more sustainable human environment characterized by high water quality, reduced flood damages, and increased opportunities for outdoor recreation. The objectives outlined in the Plan were as follows:

1. Increase habitat for target wildlife species
2. Improve aquatic resources for fish and other species
3. Reduce nutrient and sediment loads flowing into rivers and streams
4. Reduce volume and velocity of surface water runoff
5. Improve public access to streams and remove navigation hazards
6. Increase amount of biological information available to decision makers

Beaver Creek - three segments were fully assessed. All three segments were rated as fully supporting aquatic life; the stream was not assessed for its ability to support swimming.

In September of 2008, CMAP (Chicago Metropolitan Agency for Planning) completed the Beaver Creek Watershed Action Plan Technical Report (<http://www.cmap.illinois.gov/beaver.aspx>). The goal of the report was to protect a healthy aquatic community as is currently found in the watershed and to ensure that the stream remains in full attainment of its aquatic life designated use as tracked by the fish Index of Biotic Integrity. Recommended steps to obtain the goals of the Report included two main areas of emphasis:

1. Agricultural Best Management Practices
2. Habitat and Ecosystem Restoration

Lakes are also assessed in the *2008 Illinois Integrated Water Quality Report*.

Candlewick Lake - is listed as impaired by total suspended solids, total phosphorus and aquatic algae.

The geology and soils of Boone County are such that most precipitation in undeveloped areas infiltrates and feeds streams and other bodies of water via groundwater discharge. Because of this, urban development has the potential to cause greater shifts from subsurface to surface runoff than in many other parts of the Northeastern Illinois region.

There are instances of poorly designed infiltration practices that have the potential to discharge polluted urban runoff directly to the groundwater.

Streambank erosion not only results in loss of property and riparian habitat where the erosion occurs but also results in sedimentation, high turbidity and burial of natural substrates in slower moving reaches and lakes downstream.

3.4.2 Conclusions

Without adequate urban stormwater management practices to minimize diversions from subsurface runoff to surface runoff, substantial changes in hydrology are likely to occur, significantly affecting the streams, lakes, and wetlands of the county. However, in an attempt to maintain existing infiltration, care must be taken not to contaminate groundwater resources with polluted urban runoff.

Although water quality and water body use problems are not yet severe, experience in other parts of the region, other parts of the country, and even comparisons of the rural and urban portions of the county suggests that as the level of urbanization increases so does the level of stream and lake use impairment. This is due to both increases in runoff rates as well as impairments of water quality associated with urban activities. Construction site erosion is a major potential source of water quality impairment. Although construction is only temporary at a particular location, it is ongoing constantly in urbanizing watersheds. The establishment of monitoring stations within the rivers and streams of Boone County would help to create a more detailed viewpoint of the issues the watersheds face.

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CHAPTER 4

ASSESSMENT OF STORMWATER MANAGEMENT IN BOONE COUNTY

The purpose of this chapter is to assess the current status of stormwater management in Boone County. The primary focus of this assessment is on urban stormwater. However, considering the large amount of agricultural land use in the county, agricultural runoff must also be addressed.

Each municipality was requested to fill out a level of service questionnaire that was sent out in June of 2009. After several follow-ups, a response to the questionnaire was received from only one municipality and Boone County (See Appendix A for a copy of the questionnaire along with a summary of the response). The following assessment is based on review of those responses as well as review of selected local water resource related ordinances, review of local water resource studies and input from Boone County, NRCS, SWCD staff and members of the technical subcommittee regarding local programs and conditions. The assessment is intended to reflect the adequacy of local programs with respect to achieving the goals and objectives adopted by the SMPC and in addressing the stormwater conditions and problems identified in Chapter 3.

4.1 ADMINISTRATION AND MANAGEMENT

The findings in this section are primarily based on the level of service questionnaire and input from the SMPC technical subcommittee.

4.1.1 Findings:

- Municipalities are responsible for stormwater management within incorporated areas and the county is the predominant player in unincorporated areas. Generally there is very limited intergovernmental coordination of programs to identify stormwater issues, prepare studies and perform maintenance.
- Prevention of flooding is the top stormwater-related priority in most communities.
- While not the top priority in most communities, water quality is recognized as being an important element of stormwater management.

- There are no municipal or county programs to educate the public on stormwater and related issues and as a result there is no real perception of stormwater as an issue except by the public that is directly affected.
- In many agricultural areas of the county, drainage districts are currently not active, resulting in little coordination of agricultural drainage activities.
- The State of Illinois has authorized county stormwater committees to develop and enforce countywide programs. In addition, some state and federal agencies do provide technical assistance and sponsor training opportunities.
- The Sustainable Watershed Action Team (SWAT) has been active in coordinating speakers and additional services to support proper watershed and stormwater planning in the northern Illinois region.
- The SMPC is attempting to coordinate stormwater management through development of a countywide stormwater program.

4.1.2 Conclusions:

The current administrative framework does not meet the SMPC goals and objectives in several respects. In particular, the goals and objectives state that stormwater management regulations should be consolidated into a countywide structure (Goal #1), public education and information programs should exist (Goal #3) and stormwater planning should be coordinated between municipalities (Goal #4).

4.2 REGULATION

This assessment is primarily based on review of ordinances in seven municipalities and the county. Also, the level of service questionnaire included questions related to stormwater regulations.

4.2.1 Findings:

The Boone County regulatory program is assessed in terms of four categorical areas; 1) floodplain management, 2) stormwater drainage and detention, 3) soil erosion and sediment control, and 4) stream and wetland protection.

1) Floodplain Regulations: Table 4-1 summarizes the review of seven municipal ordinances, the county ordinance.

- The majority of the local ordinances reviewed do allow development within the 100-year floodplain. As a result compensatory storage for fill in both the flood fringe and the floodway is not needed.
- Five of the local ordinances utilize a flood protection elevation one foot above the base (100-year) flood elevation.
- In general, the majority of the municipalities whose ordinances were reviewed have adopted a floodplain ordinance consistent with the minimum NFIP requirements as well as some additional flooding related provisions consistent with the SMPC goals and objectives.
- The majority of the seven municipal ordinances require that channel modifications be reviewed and permitted where practicable. If not avoided then several of the ordinances do not have channel modification requirements.
- Four of the seven municipal ordinances require avoidance of onstream impoundments and environmental mitigation for impoundments that are found to be in the public interest.
- The flood insurance studies and associated maps for Boone County were all prepared in 1982. Considering the growth in the county since 1982, many of the maps do not adequately reflect current land use conditions. Undoubtedly expansions of the floodplain have occurred as a result of the changes in land use. Updates for the studies and maps are currently underway and be effective February 18, 2011.
- The only municipality with no streams that have flood elevations or floodways associated with them within their jurisdiction is the Village of Caledonia.
- Since the growth in many municipalities is outside the corporate boundaries that existed at the time of the floodplain studies, the level of study and existence of flood elevations and floodways for the unincorporated areas may be more important than for the incorporated areas in terms of preventing additional flooding due to new development.
- Regulating floodplain development without elevations is difficult due to the inexact location of the floodplain boundary, the difficulty in determining safe minimum structure elevations and the inability to calculate floodplain storage.
- Floodplain boundaries are generally delineated only for stream reaches with drainage areas greater than one square mile in urban areas and 10 square miles in rural areas. Although streams and drainageways with less than one square mile drainage area may not be regulated, flooding can certainly occur along these stream reaches. Also, non-riverine depressional areas subject to flooding are generally not mapped as floodplain.

Table 4-1: Summary of Selected Local Floodplain Management Standards

Government Entity	Comp Storage Ratio Flood Fringe \ Floodway	Flood Protection Elevation	Floodway Appropriate Uses	Channel Modification Standards	Onstream Impoundment Standards
Belvidere	Not Allowed	1 Foot	State Permitted Uses	Not Allowed	Not Allowed
Poplar Grove	No Ordinance	No Ordinance	No Ordinance	No Ordinance	No Ordinance
Loves Park	No Ordinance	1 Foot	Floods Ordinance	No Ordinance	No Ordinance
Caledonia	No Ordinance	No Ordinance	Overlay Ordinance	Overlay Ordinance	No Ordinance
Cherry Valley	No Ordinance	1 Foot	Overlay Ordinance	Overlay Ordinance	No Ordinance
Capron	Not Allowed	No Ordinance	No Ordinance	No Ordinance	Not Allowed
Boone County	Not Allowed	1 Foot	Overlay District (Not Permitted)	Yes, but Discouraged	Not Allowed
Timberlane	Not Allowed	1Foot	Overlay District	Yes, but Discouraged	Not Allowed
NIPC Model	1.5 / 1.5	1 Foot	Yes	Yes	Yes

2) Stormwater Drainage and Detention Regulations: Table 4-2 summarizes the review of seven municipal ordinances, the county ordinance and the NIPC model ordinance with respect to stormwater drainage and detention.

- All but one of the reviewed municipalities and the county have stormwater drainage and detention requirements in various code locations with varying standards.
- Three of the seven municipalities and the county have adopted the same model for stormwater drainage and detention.
- Only one of the eight ordinances specifically requires control of the 2-year event. However, all but one of the others likely indirectly controls the 2-year event through a very low 100-year event release rate (0.15 to 0.20 cfs). All but one of the eight ordinances requires control of the 100-year event.
- Only one of the eight ordinances requires that site drainage and detention systems be designed to address water quality concerns or to minimize runoff volumes.
- One of the eight ordinances requires preservation of natural depressional storage.
- Four of the ordinances discourage or prohibit onstream detention and detention in the floodway or flood fringe.
- All but two of the ordinances discourage placing detention in natural wetlands.
- All of the ordinances require use of the Bulletin 70 rainfall amounts for stormwater system design.

Table 4-2: Summary of Selected Local Stormwater Drainage and Detention Standards

Government Entity	2-Year Release Rate	100-Year Release Rate	Water Quality Design Requirement	Runoff Minimization Requirement	Depressional Storage Protection	Onstream/Floodway Detention Discouraged	Flood Fringe Detention Discouraged	Detention in Wetlands Discouraged	Required Rainfall Data
Belvidere	0.04 cfs/acre	0.15 cfs/acre	Limited	Yes	Yes	Yes, Not Permitted	Yes, Not Permitted	Yes	Bulletin 70
Poplar Grove	None Provided	None Provided	No	No	No	No	No	Yes	Bulletin 70
Loves Park	0.2 cfs/acre	0.2 cfs/acre	No	Yes	No	No	No	No	Bulletin 70
Caledonia	0.15 cfs/acre	0.15 cfs/acre	No	Yes	No	No	No	Yes, Not Permitted	Bulletin 70
Cherry Valley	0.2 cfs/acre	0.2 cfs/acre	No	Yes	No	No	No	No	Bulletin 70
Capron	0.2 cfs/acre	0.2 cfs/acre	No	Yes	No	Yes, Not Permitted	Yes, Not Permitted	Yes, Not Permitted	Bulletin 70
Boone County	0.2 cfs/acre	0.2 cfs/acre	No	Yes	No	Yes, Not Permitted	Yes, Not Permitted	Yes, Not Permitted	Bulletin 70
Timberlane	0.2 cfs/acre	0.2 cfs/acre	No	Yes	No	Yes, Not Permitted	Yes, Not Permitted	Yes, Not Permitted	Bulletin 70
NIPC Model	0.04 cfs/acre	0.15 cfs/acre	Yes, Limited	Yes	Yes	Yes	Yes	Yes	Bulletin 70

3) Soil Erosion and Sediment Control Regulation: Table 4-3 summarizes the review of seven municipal ordinances and the county ordinance with respect to soil erosion and sediment control.

- State NPDES requirements for construction are consistent with the SMPC goals and objectives. Boone County SWCD has been responsible for inspection and enforcement of permit requirements on behalf of the IEPA at the state level.
- The NIPC model soil erosion and sediment control ordinance is generally consistent with the SMPC goals and objectives. Five of the eight entities have adopted at least some portions of the provisions in the NIPC model.
- Of the six ordinances reviewed (two entities do not have an ordinance in place) in detail, five had soil erosion and sediment control requirements. The majority of the ordinances were tied to the subdivision code, often only being applied on properties being subdivided.
- Five out of the eight ordinances reviewed include a list of principles included to establish the objectives of soil erosion and sediment control and convey a project design philosophy to minimize impacts.
- Only one entity that has an ordinance did not have a provision for inspection at critical stages. The ordinances were split between the municipality and the developer being responsible for inspections.
- All of the ordinances in place require that soil erosion and sediment control practices be maintained throughout the duration of construction.
- Five out of the six entities that have ordinances have some design standards. However, several did not have a comprehensive set of design standards that specifies appropriate practices.
- Based on discussion with NRCS and SWCD staff, design, installation and maintenance of soil erosion and sediment control plans can be problematic. In some cases, many of the measures identified in the soil erosion and sediment control plans are inappropriate for the situation; many measures identified on the plans are never installed and measures that are installed initially are often not maintained throughout the construction process. Needed adjustments in the field have improved at many sites due to meetings between SWCD, IEPA and the consultants who work in the area.

Table 4-3: Summary of Selected Local Soil Erosion and Sediment Control Standards

Government Entity	Applicability (Minimum Area)	List of Objectives	Inspection Provisions	Mandated Maintenance	Specification of Standards
Belvidere	All Construction	Yes	Yes, by SWCD	Yes	Yes
Poplar Grove	No Ordinance	No Ordinance	No Ordinance	No Ordinance	No Ordinance
Loves Park	All Construction	Yes	Yes, by City	Yes	Yes
Caledonia	All Construction	No	No	No	No
Cherry Valley	5,000 Square Feet, 500 Square Feet Near Water	Yes	Yes, by Village	Yes	Yes
Capron	No Ordinance	No Ordinance	No Ordinance	No Ordinance	No Ordinance
Boone County	5,000 Square Feet, 500 Square Feet Near Water	Yes	Yes, by Developer	Yes	Yes
Timberlane	5,000 Square Feet, 500 Square Feet Near Water	Yes	Yes, by Developer	Yes	Yes
NIPC Model	5,000 Square Feet, 500 Square Feet Near Water	Yes	Yes, by Permitting Authority	Yes	Yes

4) Stream and Wetland Regulation: Table 4-4 summarizes the review of seven municipal ordinances and the county ordinance with respect to stream and wetland protection.

- The Corps of Engineers Section 404 regulations do not meet the SMPC goals and objectives and the Corps' resources for enforcement are limited.
- The NIPC model stream and wetland protection ordinance is generally consistent with the SMPC goals and objectives, although it does not address the encouragement of infiltration and preservation/protection of groundwater recharge areas and aquifers called for by this Plan.
- Of the eight ordinances reviewed in detail, only one regulated wetlands locally or required wetland buffers and only three others required that a Corps permit be obtained before issuing a local development permit. All ordinances, except the Village of Capron, encouraged the avoidance of wetlands, but only the City of Belvidere had required buffers and setbacks. The Village of Poplar Grove has language encouraging buffers and setbacks.
- All eight of the ordinances reviewed had stream avoidance and stream mitigation requirements within their ordinances. However, only in the City of Belvidere did these protections extend to non-regulatory floodplains (generally floodplains with less than 1 square mile of drainage area are non-regulatory). Of the eight, only the Village of Capron required a buffer along streams.
- No ordinance contained language consistent with the SMPC goals and objectives to encourage infiltration and preserve/protect/restore groundwater recharge areas and aquifers.

<i>Table 4-4: Summary of Selected Local Stream and Wetland Protection Standards</i>							
Government Entity	Wetland Buffer \ Setback	Wetland Avoidance	Stream Buffer / Setback	Stream Avoidance	Stream Mitigation		
Belvidere	Yes, 25 feet	Yes	None/None	Yes, Zoning Code	Yes, Zoning Code		
Poplar Grove	None/None	Yes	None/None	Yes	None		
Loves Park	None/None	Yes	None/None	Yes	None		
Caledonia	None/None	Yes	None/None	Yes, Floodplain Development Ordinance	Yes, Floodplain Development Ordinance		
Cherry Valley	None/None	Yes	None/None	Yes	None		
Capron	None/None	No	Yes	Yes	None		
Boone County	None/None	Yes	None/None	Yes, Overlay District	Yes, Overlay District		
Timberlane	None/None	Yes	None/None	Yes, Overlay District	None		
NIPC Model	Yes, 75 feet	Yes	Yes, 75 feet	Yes	Yes		

General

- Contrary to the SMPC goals and objectives (in particular, Goal #4), municipal and county regulations do not appear to be tailored to address watershed-specific concerns and conditions.
- Overall, regulatory standards and enforcement are not directly coordinated between municipalities. However, some indirect consistency has occurred through adoption of the county ordinances by several other municipalities.
- Comments in the level of service questionnaires indicate a desire for strong, comprehensive regulations to prevent increases in flooding and to protect the quantity and quality of water resources of the county.
- Funding of local permit review and inspection functions is generally through permit fees.

4.2.2 Conclusions:

The current regulatory environment does not provide the level of comprehensiveness, stringency, consistency or the watershed specificity envisioned in the SMPC goals and objectives. Also, the existing state and federal programs do not meet the SMPC goals and objectives since the regulatory requirements are not consistent with the goals and objectives and the state and federal agencies may not have the resources to perform adequate field inspection to ensure compliance. On the other hand, at least a few of the municipal ordinances were nearly as comprehensive and stringent as the goals and objectives. An exception to this is soil erosion and sediment control regulation, which appears to be lacking in both regulatory requirements and field enforcement. The fact that some municipalities have already adopted ordinances with water quality components may ease creation and adoption of comprehensive and consistent countywide standards.

Given the recent growth in Boone County and the expected continued growth, the ongoing update of floodplain mapping is necessary but may not go far enough. However, with no funding identified for a true comprehensive update to floodplain mapping, an approach to make the best use of the existing mapping is needed to prevent construction in the actual floodplain and loss of floodplain storage.

4.3 PLANNING

4.3.1 Background:

In the middle 1970's, watershed plans were developed by the Northeastern Illinois Planning Commission as part of the Areawide Water Quality Management Plan (NIPC, 1979). The Kishwaukee River watershed study covered part of Boone County. Although the primary focus of these studies was on water quality, runoff rates and volumes were also modeled. These studies identified existing (1975) water quality conditions and predicted year 2000 water quality conditions based on several water quality management scenarios. Region wide, these studies were the basis of many of the Northeastern Illinois Planning Commission's policy plans and model ordinances. Locally, implementation of these plans has focused primarily on wastewater treatment as opposed to nonpoint sources of pollution.

In the late 1990's the IDNR under the Conservation 2000 program completed a series of inventories for watersheds within Illinois. In 1997 a report titled *The Kishwaukee River Basin: An Inventory of the Region's Resources* was completed. In 1998 a report titled *The Rock River Country: An Inventory of the Region's Resources* was also completed. It was hoped that the information provided within these reports would help lead the way towards the goals for the Conservation 2000 program.

In the early 2000's the Kishwaukee River Ecosystem Partnership developed a plan for the Kishwaukee River watershed. The *Strategic Plan for Habitat Conservation and Restoration in the Kishwaukee River Watershed* (<http://krep.bios.niu.edu>) is made up of subwatershed plans; subwatersheds present in Boone County include: Upper Beaver Creek, Little Beaver Creek, Piscasaw Creek, Geryune Creek, Mud Creek, Kishwaukee River, Spring Creek, Lower Coon Creek, Mosquito Creek (tributary to Lower Coon Creek), Kingsbury Creek, Trimble Run, Rossetter Creek, Upper Central Kishwaukee River, Lower Central Kishwaukee River, Lower Beaver Creek, and Meander Creek. The Kishwaukee River and Upper Central Kishwaukee River are identified as priority watersheds for plan recommendations.

In 2008, the Boone County SWCD and CMAP facilitated the development of the Beaver Creek Watershed Action Plan. The plan recommends best management practices (BMPs) that will proactively conserve land and water resources to prevent degradation.

Most other locally initiated stormwater studies have focused on local drainage problems. The more significant studies and plans, including those discussed here, are summarized in Table 4-5.

Table 4-5: Flood Control, Drainage, and Water Quality Studies and Plans

Title	Author, Year	Water Body, Location	Subject
Areawide Water Quality Management Plan	NIPC, 1979	Fox & Kishwaukee Rivers in McHenry, Lake, and Kane Counties	Regional Water Quality Enhancement and Protection
Strategic Plan for Habitat Conservation and Restoration in the Kishwaukee River Watershed (http://krep.bios.niu.edu)	KREP, 2003	Kishwaukee River in Boone, DeKalb, McHenry, Ogle, Kane, Walworth and Winnebago Counties	Habitat and Natural Resources Preservation and Restoration
Beaver Creek Watershed Action Plan	CMAP and Boone County SWCD, 2008	Beaver Creek in Boone County	Best Management Practices (BMPs) that will proactively conserve land and water resources to prevent degradation
The Kishwaukee River Basin: An Inventory of the Region's Resources	IDNR, 1997	Kishwaukee River	Assessment of Natural Resources within the Watershed
The Rock River Country: An Inventory of the Region's Resources	IDNR, 1998	Lower Rock River	Assessment of Natural Resources within the Watershed
The Rock River Ecosystem Restoration Study	US Army Corps of Engineers, 2001	Rock River	Ecosystem restoration needs within the basin.
The Picasaw Creek Subwatershed Plan	KREP, 2005	Picasaw Creek	Existing natural resources, conditions and concerns

Coon Creek Watershed Evaluation	US Army Corps of Engineers, Draft 2008	Kishwaukee River and Coon Creek	Water Flow Study using the LEAM Model
Coon Creek/ Mosquito Creek Outreach Project	Steve Weller, 2001	Coon Creek	Inventory natural communities, develop a management plan and database, and discuss easement options for the watershed
Kishwaukee River Basin Study	IDNR & IEPA, 2006	Kishwaukee River, Coon Creek and Beaver Creek	Water Quality and Fish Counts

4.3.2 Findings:

These findings are primarily based on review of the studies discussed above and the level of service questionnaires.

- Although the combined scope of the studies discussed above was relatively broad, no watershed studies have been performed that address all water resources concerns such as flooding, channel erosion, water quality and aquatic and riparian habitat in a comprehensive fashion.
- Locally generated plans have been successfully implemented, perhaps due to local involvement in development of the plans. Also, the local plans generally addressed immediate problems entirely within the jurisdiction of the entity that prepared the document. The local plans focused on remediating specific problems but lacked significant intergovernmental cooperation.
- Funding of capital improvements by municipalities is typically with general revenues. However, some municipalities use a wide variety of funds such as Belvidere's use of a utility tax and other resources including the motor fuel tax.
- The Illinois Department of Natural Resources, Office of Water Resources has a small projects fund for rural and smaller urban communities to help alleviate flooding issues.
- The Corps of Engineers also has several programs that provide funding for flood control projects of various sizes and types.

- FEMA provides funding for implementation of aspects of flood hazard mitigation plans including elevation and acquisition of floodprone structures. FEMA is also a source of disaster relief funds.
- The USEPA, through IEPA, has funding for nonpoint source pollution control projects. These funds have been used to retrofit detention basins to improve water quality benefits, to perform stream and shoreline restoration and maintenance activities, and other similar demonstration projects.
- The USGS has funding for hydrologic and water quality data collection and analysis. Some mapping efforts may also be fundable through USGS. USGS funds 50% of project labor and expenses.
- The Illinois Department of Natural Resources, Office of Natural Resource Management has open space acquisition and development funds which could be used to acquire (and potentially restore) sensitive natural stormwater storage areas such as floodplains and wetlands. The state reimburses up to 50% of the cost of approved open space acquisition and development projects.
- The USDA has a wide variety of potential funding sources that range from conservation methods, natural resource protection to flood control projects.

4.3.3 Conclusions:

Watershed planning is not being performed in a manner consistent with the SMPC goals and objectives which prescribe that planning should be comprehensive in its scope (flooding, streambank erosion, water quality, habitat, etc), identify preventative actions, and be performed on a watershed basis. Instead, stormwater is being managed on the basis of political boundaries which are generally too small to encompass major watersheds. One recent step in the right direction was the Beaver Creek Watershed Plan, which due to CMAP's overview did a better job on focusing on an entire watershed verses just the portion located within a particular jurisdiction. Planning and analysis is being done to remediate problems rather than to prevent problems.

4.4 MAINTENANCE

The following findings are based on the level of service questionnaires.

4.4.1 Findings:

- Maintenance of stormwater facilities is generally performed by municipalities on an as-needed basis as problems occur rather than as a scheduled preventative activity. However, there are some exceptions such as the City of Belvidere's annual maintenance program.
- Maintenance of agricultural drainage tiles often does not occur until there is complete failure and drainage ditches are generally not maintained until major blockages accumulate to the point that the tiles discharging to them can no longer function properly. The main issue relating to drainage tile is the uncertainty surrounding location, condition and responsibility; however in Boone County maintenance is up to the individual property owners.
- Property owners (i.e. homeowners associations) are generally responsible for maintenance of detention facilities in newer developments. However, some municipalities retain this responsibility. Special Service Areas (SSA) have been successfully utilized by the City of Belvidere for several developments. Homeowners associations often do not dedicate sufficient resources nor do they have the technical expertise to properly maintain these facilities.
- There do not appear to be any significant stream clean-up programs carried out by local government. However, some volunteer groups perform stream cleaning activities to remove accumulated debris.
- There is not a wetland maintenance program within any of the Boone County jurisdictions, at this time responsibility lies with the individual landowners.
- Funding of maintenance by municipalities is almost exclusively with general revenues, but other revenue streams are utilized in some situations.

4.4.2 Conclusions:

To be consistent with the goals and objectives (in particular Goal 5), maintenance needs to be more proactive to prevent problems from occurring. Steps such as yearly inspections should be implemented. Also stream and wetland preservation need to be addressed on a more systematic and consistent basis and in a manner which benefits all stream corridor and wetland functions.

4.5 SUMMARY

In general, few of the SMPC goals and objectives are being fully met. In terms of administration and management, the current organizational framework is fragmented with no agency or organization playing a central coordinating role. As a result, there

is little coordination between the municipalities and the county. However, there have been many recent steps towards a more comprehensive approach.

Some of the jurisdictions have reasonably comprehensive stormwater related regulations. However, these regulations are not consistent countywide or even within watersheds. This results in variable levels of protection which compromises the value of the comprehensive regulations, where they do exist.

Beneficial projects are occurring in and along the Kishwaukee River and other waterways. However, there is still no comprehensive watershed plan coordinating flood control with maintenance activities and regulatory controls.

Recently, watershed planning is beginning to occur in some areas (in particular, Beaver Creek). It appears that there may be a growing recognition of the need to look at problems at the watershed level and in a comprehensive manner. However, funding for these activities is very limited and there is no central entity coordinating these activities.

Stormwater infrastructure maintenance is occurring but in a reactive manner rather than in a preventative manner. Based on comments in the level of service questionnaire, it appears that there is increasing recognition at various levels that better coordination is needed to address stormwater regulatory, planning and maintenance needs and that both stormwater quality and quantity are issues of concern. More work still remains to be done and there needs to be greater participation from the smaller jurisdictions located within Boone County including Caledonia, Poplar Grove, Capron, Timberlane, Loves Park and Cherry Valley.

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CHAPTER 5

RECOMMENDATIONS FOR A COUNTYWIDE STORMWATER PROGRAM

This chapter presents the recommendations for the Boone County stormwater program. The recommendations are based on the goals and objectives of Chapter One and the findings in Chapters Three and Four. Section 5.1 presents the programmatic recommendations of the Stormwater Plan. The recommendations are organized into the four functional categories described in Chapter Two. Section 5.2 presents recommended regulatory standards for floodplain management, stormwater drainage and detention, soil erosion and sediment control, and stream and wetland protection. Section 5.3 presents recommended planning procedures for comprehensive watershed plans. Section 5.4 presents an implementation plan for the program.

5.1 STORMWATER PROGRAM RECOMMENDATIONS

The goals and objectives, as well as the original purpose for creating the Boone County Stormwater Management Planning Committee (SMPC) presented in Chapter One, specify a consolidated countywide stormwater management framework to provide a consistent level of service throughout the county. This is particularly important within watersheds since local actions have effects throughout the watershed. In addition, there are certain economies of scale associated with coordinated countywide efforts such as public education and technical training. Finally, the theme among many of the funding agencies is to emphasize watershed approaches. A countywide program will be in a better position to demonstrate that projects for which funding is being sought have been coordinated at the watershed level.

5.1.1 Administration and Management

Enhance the Role of SMPC and Acquire and Train Adequate Staff: The SMPC, composed of half county and half municipal representation, should take the lead role for stormwater management in Boone County. The primary purpose of the SMPC and its technical committee should be to provide countywide coordination of stormwater management in Boone County to ensure consistent levels of flood mitigation and water resource protection and enhancement throughout the county's

watersheds. This will provide for a consolidated countywide framework as specified in the Goals and Objectives.

The SMPC should obtain sufficient staff to manage a countywide stormwater program and implement the recommendations in this Stormwater Plan. The SMPC's activities should be categorized into the four functional category areas identified in Chapter 2: 1) administration and management; 2) regulation; 3) planning; and 4) maintenance.

In addition to providing staff support to the SMPC, the primary roles of the SMPC staff under administration and management will be development and management of the work program and budget, technical support, public education, professional education, and data keeping.

Form Technical Advisory Committee: As technical support to the SMPC, the Technical Advisory Committee (TAC) should be expanded. Exact membership of the TAC should remain flexible to suit the needs of the SMPC. However at a minimum, the TAC membership should include technical staff from the county's municipalities and county agencies such as the Soil and Water Conservation District, the Boone County Conservation District and the Boone County Highway Department. In addition, membership or participation by consultants serving both public and private clients and local interest groups (e.g. the Kishwaukee River Ecosystem Partnership (KREP), Northern Regional Groundwater Protection Planning Committee (NRGPPC)) should be considered. The members should be scientists, engineers, and others knowledgeable in stormwater, natural resource management and urban planning issues. Participation and input from regional, state and federal resource agencies should also be encouraged. The TAC should provide input to staff and recommendations to SMPC on technical matters such as ordinance development and watershed planning.

Provide Technical Support: One of the most important components of a successful stormwater program is to have knowledgeable staff well trained in all areas of stormwater management. Local officials, staff and citizens must also be part of the overall technical support program. Since the level of expertise in stormwater and natural resource matters varies among the municipalities, the SMPC staff can serve as a technical resource to the individual towns as well as to individual citizens. Technical assistance can be provided in such areas as ordinance review and implementation, stream and wetland maintenance and management, and addressing local drainage concerns.

Coordinate Professional Education: To be consistent with the goals and objectives of this plan as well as the recommended regulatory standards, training will be needed for site planners, design engineers and landscape architects in methods of BMP and site design to minimize the stormwater related impacts of development. Training should also be provided on such topics as maintenance, emergency management and flood mitigation. Training opportunities should be initiated by the SMPC using existing training resources. Several training resources exist in the region including professional organizations (e.g. the American Society of Civil Engineers), the Natural Resource Conservation Service, and the University of Wisconsin Extension.

Develop Public Education Program: The key to long term support for a countywide stormwater program is grass roots public support. A public information program should be established to enlighten local officials and the public regarding stormwater issues and the values of streams and wetlands. The public information program should be coordinated with other county agencies such as BCCD, schools and local interest groups (e.g. KREP, NRGPPC). Although it is important to reach all citizens to address urban runoff issues such as application of fertilizers, disposal of household hazardous waste and used motor oil, there are key citizens groups that should be targeted. These citizens groups include those that live adjacent to waterbodies and homeowners associations that may be responsible for management of waterbodies and components of the stormwater management system (e.g. detention basins).

Develop Funding Mechanism: Developing adequate funding of the stormwater management program should be assigned a high priority. While grants may be used to supplement the program, a consistent source of dedicated funding must be identified to provide for a consistent level of service and to allow for long term planning and implementation of the program. Three basic funding alternatives exist for Boone County: 1) the existing county corporate budget, 2) the stormwater taxing authority provided for in the stormwater authorizing legislation, and 3) the stormwater service charge recently considered by the state legislature. Each of these three has advantages and disadvantages.

The source of funding for SMPC activities during the current planning stage has been the time put in by the county planning staff and the in-kind time provided by the members of the SMPC and the technical committee

County corporate budget: This source will not sustain a long term stormwater program which meets the goals and objectives nor the recommendations of this plan. The primary concern with this revenue source would be the likely need to cut other

programs to fund the stormwater program and the annual uncertainty regarding funding availability.

Stormwater taxing authority: Prior to the 1991 tax cap legislation, this was a straightforward means of funding a countywide stormwater program. While the SMPC budget and tax rate would still be subject to county board approval, taxing authority would provide a dedicated source of funds that could not be diverted to other county uses. Due to the tax cap, a referendum would be required to utilize this funding mechanism, making it more difficult to implement than when the stormwater legislation was originally passed. The outcome of a referendum would depend on the amount of education provided prior to the vote and the size of the request for a typical homeowner.

A disadvantage to both of the above approaches is that they are ad valorem based systems in which property owners pay based on the value of their property. However, property value may not correlate well with the contribution of stormwater runoff and stormwater program support needs. Also, these approaches may not allow for variable taxing levels across the county to address variable funding needs among watersheds.

Stormwater service charge (user fee): Legislation has been considered by the Illinois legislature four times to allow a service charge system of funding for county stormwater programs. Although there has been increasing support with each attempt, the bill has not yet passed. The bill's sponsor reportedly intends to continue to pursue its passage.

Under a service charge system, individual properties would pay based on their stormwater contribution with impervious area generally being used as the indicator of stormwater contribution. This would be much like any utility such as sanitary sewer service or electric service with each property owner receiving a monthly or annual bill. (However, the bill would not vary on a monthly or annual basis like most utility bills.) Under this system the charge per impervious acre could be varied by watershed based on the funding needs of the watershed. Also, incentives for developments that utilize stormwater management measures beyond those required by the countywide ordinance could be built into the fee structure. (For example, residents within developments that utilize natural swale drainage rather than storm sewers would pay a lower rate.) The primary disadvantage to this system is the substantial initial investment required to set up and implement the system. Perhaps the most costly aspect of the program is implementing the billing system. First, the amount of impervious area for each parcel of land must be calculated. Then based on the

funding needs, as outlined in a financial plan, the charge per impervious acre must be determined. Finally, the system of sending bills and tracking payment must be established. While a user fee system has many advantages, the substantial up front investment may not be justified for a small program.

In Illinois, two examples of stormwater utility fees are in use in the cities of Rock Island and Bloomington. The City of Rock Island charges \$3.51 per month per Equivalent Residence Unit (ERU). On a national basis, single family resident fees are averaging about \$3.85 per month for an ERU of 2,800 SF of pavement. Revenue of \$1.3 million per year is generated in this city of 40,000 residents. This program was affirmed by the courts as an appropriate fee, not a tax, in response to a lawsuit brought against the City by 12 churches in 2004. Details on the case are available at <http://www.iml.org/dbs/imllegal/dyncat.cfm?catid=940>. The City of Bloomington fee is based upon a minimum of 2% impervious area within a given parcel, and then the fee is assessed at \$1.45 per 1,000 square feet of impervious area. (References: *Stormwater Utilities of Illinois* Mark Hoskins, Manhard Consulting, and IFAASM presentation found at http://www.floods.org/PDF/IAFSM_Stormwater_Utilities.pdf *Stormwater Utility brochure, City of Rock Island* found at www2.rigov.org/pdf/stormwater/stormwaterutilitybrochure.pdf)

Recommended Funding Approach: During the initial establishment period of the program, it may be most practical to operate within the current corporate budget. As the SMPC prepares for watershed planning and capital projects, a service charge system should be considered to more equitably fund activities whose expenditures will vary by watershed. At all stages of the program, grants should be sought to assist in supporting appropriate program activities.

5.1.2 Regulation

In a largely rural yet rapidly urbanizing county such as Boone, a primary emphasis of the stormwater management program should be to prevent exacerbation of any problems that currently exist and to prevent any new problems from being created. Two primary preventative tools are acquisition of critical water resource features such as groundwater recharge areas, floodplains and wetlands and a comprehensive and consistent regulatory program. Acquisition is discussed further under Planning (Section 5.1.3) and regulations are discussed here. This section focuses on the procedural elements of the regulatory program while Section 5.2 recommends regulatory standards.

There are two general types of regulatory controls: land use restrictions (e.g. zoning ordinances) and design standards (e.g. subdivision ordinances). Land use restrictions are generally used to protect sensitive landscape features such as floodplains, groundwater recharge areas, hydric soils and wetlands. Land use restrictions are intended to preserve the functions of these areas, such as stormwater storage, purification and wildlife habitat, as well as to prevent damages to property that would result if building were to occur in those areas. Design standards are primarily used to control the rate, volume and quality of stormwater runoff and are intended to minimize the impact of development on downstream areas. Most comprehensive regulatory programs make use of both types of controls.

Land use restrictions could also take the form of land cover based regulations which might restrict the total amount of impervious area allowed in a watershed to a pre-determined level based on the assimilation capacity of the receiving waterbody(s). There is some precedence for this practice in McHenry County where the City of Crystal Lake is attempting to limit imperviousness and drainage system type within the remaining undeveloped portions of the Crystal Lake watershed. This practice may also have applicability in the Kishwaukee River watershed which could be irreparably damaged by substantial urbanization. There are obvious political and legal questions to consider before this type of restriction is pursued. A determination regarding the appropriate mix of design standards and land cover restrictions is best made at the time of ordinance development with potential watershed specific modifications made based on recommendations in the watershed plans.

Prepare and Adopt Countywide Ordinance: To provide a consistent level of protection and to provide equity throughout the county, a program for consistent countywide regulation and enforcement should be developed with standards established at the countywide level and, where appropriate, modified at the watershed level to meet watershed specific needs. A countywide regulatory program would involve development of a countywide watershed development ordinance that applies to both incorporated and unincorporated areas. To be consistent with the SMPC goals and objectives, the watershed development ordinance should be comprehensive, specifying standards for stormwater drainage and detention, floodplain management, soil erosion and sediment control, as well as stream, wetland and groundwater recharge area protection in a single document.

An update of FEMA regulatory floodplain maps for Boone County is currently in process, and new maps should be in place in 2010. This will enable existing and future regulations to better protect these sensitive areas.

Prepare Technical Reference Manual: In support of the countywide watershed development ordinance, a technical reference manual should be developed to provide guidance in meeting the ordinance. The reference manual should include guidance on intent and interpretation of the ordinance as well as guidance on design methodologies and procedures. The manual should be updated from time to time as new information becomes available and as experience is gained in implementing the ordinance.

Institute Ordinance Implementation and Enforcement Structure: Once adopted, there are several approaches to implementing the ordinance. One end of the spectrum of possible methods would be to have all permitting and inspections carried out by the SMPC with very limited involvement by municipal staff. The other end of the spectrum would be to maintain the current system with all permitting and inspections carried out at the local level and no involvement by the SMPC except to craft the minimum ordinance to be adopted by all. The first approach would take too much control away from the municipalities and would remove inspection responsibility too far from those most familiar with the development sites. However, it would provide the greatest level of regional or watershed coordination to ensure that developments are reviewed considering the larger watershed implications. The second approach could be difficult to implement since it would be difficult to force a municipality to adequately enforce a countywide ordinance developed at a higher level. Also, many municipalities may not have sufficient staff and/or financial resources to adequately enforce a comprehensive ordinance. Finally, this second approach would provide little in the way of watershed coordination of development activities.

The recommended approach is one that is between the two ends of the spectrum described above. It is recommended that SMPC maintain responsibility for all permit and enforcement activities but have a mechanism for delegating that responsibility to interested municipalities. Municipalities that adopt requirements that are at least as stringent as the countywide ordinance, and have demonstrated qualifications would receive delegation and be responsible for permit review and enforcement within their jurisdiction. It is anticipated that small municipalities are likely to choose to rely on the SMPC. The SMPC would be responsible for permit review and enforcement in unincorporated areas of the county and in those municipalities not desiring or qualifying for delegation. (A variation of this approach, which is used in DuPage and Lake Counties, would be to treat the unincorporated areas as a municipality. Under this variation, the SMPC would be separate from the staff of the county who review permits for unincorporated areas.) This recommended approach utilizes the positive aspects of the two ends of the spectrum identified previously. It employs local

knowledge and access to development sites combined with SMPC oversight to ensure that watershed perspectives are considered, to provide technical assistance and to ensure consistent enforcement throughout the county.

Permit review for stream and wetland disturbances as well as for floodways requires specialized expertise in a number of disciplinary areas including biology, soils, hydrology, and hydraulics. In general, it will not be cost effective for each municipality to maintain in-house expertise in each of these areas. As a result, costs associated with regulating those activities can be minimized and consistency in interpretation and enforcement can best be achieved by retaining permit review and inspection for streams, wetlands and floodways at the SMPC level. However, if a municipality has the qualifications and a demonstrated enforcement record, delegation for these areas could be accomplished also.

Although most permits will be reviewed at the local level, there should be a provision for a pre-application meeting(s) involving both the municipal and SMPC staff, particularly for larger developments. This would provide a degree of watershed review and regional perspective as well as take advantage of the technical expertise of SMPC staff. SMPC should also maintain a central file of all permits issued within the county. This will provide for a central database which can easily be accessed by municipal and SMPC staff as a resource for the pre-application meetings and will streamline incorporation of development data into the watershed planning process.

Fund Regulatory Activities: Like funding to support the administrative and management activities of the SMPC, funding of ordinance and technical reference manual development should be through a countywide base (e.g. the county corporate tax, the stormwater taxing authority or (if available) countywide service charge). To supplement countywide funding, the SMPC should pursue funding which may be available through EPA under Section 319 of the Clean Water Act for development of the nonpoint source components of the countywide ordinance and technical reference manual. The application deadline for 319 projects is August 1 of each year. SMPC should also pursue funding to update floodplain mapping with particular attention given to those rapidly developing areas without floodplain elevations associated with them.

Once the countywide ordinance is adopted, permit review and inspections performed by SMPC and delegated municipalities should be funded through permit application fees. Fees should be established based on such factors as the type of permit (wetland vs. floodplain vs. stormwater) and area (number of acres) of development or disturbance. The fees should offset expected staff time to review permits, make

routine site inspections, and perform enforcement activities. Municipalities that have received delegation may use the SMPC fee schedule or develop their own. SMPC would receive fees only for those developments that it reviews. However, a small surcharge could be added to the municipal fees to offset SMPC staff time for pre-application meetings.

5.1.3 Planning

Planning should be carried out both at the countywide level and at the watershed level by the SMPC. SMPC is the logical entity to coordinate stormwater planning since it is less inhibited by political boundaries (much larger geographic area). In terms of countywide coordination and planning, the SMPC can represent the stormwater interests of the municipalities and the county as a unified voice. In terms of watershed planning, the SMPC can more readily perform watershed level planning than individual municipalities and can facilitate preventative and remedial projects that will consider and benefit both upstream and downstream interests.

Perform Countywide Planning and Coordination Activities: In support of watershed planning and the regulatory program, certain countywide stormwater planning efforts should be undertaken. These would include advanced identification of wetlands, coordination with other planning programs (i.e. open space, transportation, etc.) and coordination with other counties.

Advanced Wetland Identification: An Advanced Identification (ADID) wetland study should be evaluated for Boone County. The ADID study will evaluate wetland functions, identify exceptional quality wetlands and develop wetland protection and public education strategies.

The ADID evaluation is critical to an effective wetlands protection program. The information provided in the evaluation will be invaluable in making permit decisions both at the local level and at the federal (Corps of Engineers) level. The ADID evaluation will also be a valuable component of a critical areas acquisition program that should be coordinated between SMPC and the Boone County Conservation District.

It appears unlikely that the USEPA would be able to fund an ADID wetland study as the agency did for a number of Chicago-area counties (Lake, DuPage, McHenry, and Kane). Instead grant sources for the funding of such an effort should be explored.

Ducks Unlimited is currently performing an update of the National Wetland Inventory of the state of Illinois for the USFWS. That effort is due to be completed in 2010; the draft Boone County map has been obtained by the SMPC. An alternative to an ADID wetland study could be developed by the SMPC by combining this information with information available on the quality of aquatic resources in Boone County including Biologically Significant Stream integrity and diversity information, Biological Stream Classification, Illinois Natural Area Inventory, hydric soils, FQIs, and other information available from BCCD, SWCD and KREP.

Coordination with Other County Planning Activities: SMPC should coordinate with other county planning activities such as transportation planning, open space planning and planning for groundwater protection. Transportation systems can have a significant impact on the drainage system and natural resources of the county as well as provide opportunities such as creation of regional stormwater storage areas or wetland mitigation banks. The Boone County Conservation District has an active open space acquisition program. SMPC should coordinate with the district to identify opportunities to acquire areas of regional stormwater significance as part of the District's open space program. The Northern Regional Groundwater Protection Planning Committee is actively working to protect the quality of groundwater resources in the county. This committee was convened by the Illinois EPA as required by the Illinois Groundwater Protection Act which called for regional committees to be established in areas of the state dependent on groundwater as a drinking water source and where groundwater is highly vulnerable to contamination. The NRGPPC includes representatives from Boone, McHenry and Winnebago counties. McHenry County has developed a method for identifying sensitive aquifer recharge areas (SARA) that could be used in Boone County to develop a similar map. The Boone County Board's Water Protection & Planning Alliance is reviewing the county's existing regulations governing the protection of water quality. The Rockford Metropolitan Agency for Planning (RMAP) is coordinating planning efforts within the urbanized areas of Winnebago, Boone and Ogle counties. A natural resources inventory of Winnebago County has been performed; it is possible that funding will be available for a similar inventory in Boone County. In addition, the Regional Water Supply Planning Group released their report *Water 2050, Northeastern Illinois Regional Water Supply/Demand Plan* in January of 2010 with recommendations for water supply protection.

Hydrologic Data Collection: Another countywide planning effort that should be undertaken is hydrologic data collection that can later be used in support of watershed modeling efforts. At least several years of simultaneous rainfall and streamflow data are needed to adequately calibrate hydrologic and hydraulic computer models.

Additional years of data add confidence to the accuracy of the models on which floodplain delineations and problem solving decisions are based.

While there are several daily rainfall gauges, there are no reliable hourly gauges within Boone County supported by National Oceanic and Atmospheric Administration (NOAA). Reliable hourly rainfall gauges should be identified or installed in strategic locations in the county to provide distributions for the rainfall totals from the daily gauges. The area distribution of the daily gauges should also be reviewed to ensure adequate coverage of the county.

The USGS, in cooperation with the IDNR, operates a streamflow gauge on the Kishwaukee River in Belvidere. In addition, the USGS, in cooperation with the Fontana-Walworth Water Pollution Control Commission operates a streamflow gauge on Piscasaw Creek near Walworth, Wisconsin. Additional streamflow gauges should be installed to provide model calibration data in the other watersheds of the county.

Coordination With Other Counties: Although county boundaries are sufficiently large to facilitate watershed level planning, the Boone County watersheds extend beyond the county boundaries in both the upstream and downstream directions. SMPC should coordinate with downstream counties to identify their concerns that may be impacted by Boone County's plan. Upstream counties should be made aware of Boone County's plans and encouraged to manage stormwater in a manner consistent with Boone County. This plan as well as the recommended watershed development ordinance should be circulated among the surrounding counties for review and comment.

Assist Municipalities and the County in Obtaining Community Rating System

Credits: The National Flood Insurance Program's Community Rating System (CRS) was created to reduce flood damages to existing buildings, to manage development in areas not mapped by the NFIP, to protect new buildings beyond the minimum NFIP protection level, to help insurance agents obtain flood data or to help people obtain flood insurance. The CRS has three goals: to encourage, by the use of flood insurance premium adjustments, community and state activities beyond those required by the National Flood Insurance Program to:

1. Reduce flood losses
2. Facilitate accurate insurance ratings
3. Promote the awareness of flood insurance

Community involvement in the CRS program is voluntary. Any community in full compliance with the rules and regulations of NFIP may apply for CRS classification. The CRS program is based on credits given to communities for activities such as:

1. Public Information
2. Mapping and Regulations
3. Flood Damage Reduction
4. Flood Preparedness

Credit points are assigned to each participating community based upon how well an activity affects the three goals of the CRS. The CRS allows for reduced flood insurance premiums for policy holders within communities that perform activities beyond the minimum FEMA requirements. SMPC should assist the county and municipalities in individually applying for credits or propose to FEMA a system of countywide CRS credits.

Perform Watershed Planning and Coordination Activities: To provide coordination within watersheds and to prepare plans for each of the watersheds, activities specific to each watershed should be carried out.

Form Watershed Boards: To improve implementability of watershed plans, to assist in project prioritization, and to provide advice and direction to SMPC staff, formal Watershed Boards should be formed. The Watershed Boards could have between five and eleven voting members (depending on watershed population and size). The voting members should be composed of representatives from municipalities, townships, SMPC and citizen organizations within the watershed. The municipal and township representatives should be appointed by the municipalities and townships within the watershed. The citizen representatives should be appointed by the SMPC.

In addition to the voting members, staff from resource agencies should be invited to participate and could be part of an advisory subcommittee assembled during preparation of watershed plans (see section 5.3.1). Relevant county (e.g. Health Department, Boone County Conservation District, Highway Department and the SWCD), regional (NIPC and FWA), state (IDNR, IEPA) and federal (Corps of Engineers, NRCS, USEPA and USFWS) entities should be considered.

The functions of the watershed boards should be threefold. The first function should be to provide input to the SMPC regarding prioritization of the watersheds for preparation and implementation of watershed plans as well as stream maintenance activities (proposals for allocation of funds to the watershed). In this role, the

watershed board would also provide significant input regarding establishment of watershed specific service charge rates (if a stormwater service charge funding mechanism is established in Boone County).

The second function of the watershed boards should be to guide preparation of the watershed plans and to take an active role in implementing the plans.

The third function of the watershed boards should be to provide a forum for local governments to coordinate local projects (both urban development and public works related projects) that may have regional impacts.

In addition to watershed activities initiated and performed by the SMPC and its watershed boards, studies performed by state and federal entities (e.g. IDNR or Corps funded flood control projects, IDNR or FEMA funded floodplain mapping, etc.) should be coordinated through the watershed boards.

Prepare and Implement Watershed Plans: Because development of watershed plans for all of the watersheds in Boone County is a long term process, the watersheds should first be prioritized. The prioritization should consider potential problems that could develop in the absence of watershed plans (e.g. increased flood damages without updated floodplain maps), existing problems and watershed planning activities that are already underway. For example, a Beaver Creek watershed plan has recently been completed. This subwatershed was chosen, in part, by the Kishwaukee River Ecosystem Partnership as a pilot project because of the quality of the stream's biota and the heavy development pressure in the watershed.

Watershed planning procedures should be established to ensure consistency between watershed plans. At a minimum, the plan should address the nine minimum elements required by USEPA for a watershed to be eligible for future 319 funding. Watershed planning should consider development of improved floodplain maps, identification of regionally significant natural storage areas, identification of groundwater recharge areas, identification of potential wetland mitigation banks, identification and prioritization of remediation needs (i.e. flood control, stream stabilization and restoration, water quality and habitat enhancement, etc.) and include an implementation plan. Standards for evaluating remedial projects should also be developed. Section 5.3 presents a recommended watershed planning approach.

Watershed plans should be prepared by SMPC staff (or their consultant) along with the watershed boards to maximize consistency between watershed planning and evaluation procedures and to improve staff knowledge of watershed conditions.

Fund Watershed Planning and Implementation Activities: Although funding may be available from several agencies for watershed planning and implementation activities, the missions of the agencies vary. For example, funding is available from IDNR-OWR and the Corps of engineers to address flooding problems while funding may be available from EPA to address water quality problems. Section 2.1 discussed each of the state and federal agencies as well as funding available through those agencies.

Because the resource agencies have variable missions that are limited in scope, utilizing funds from the resource agencies to develop comprehensive watershed plans consistent with the SMPC goals, objectives and watershed planning procedures will require substantial coordination. Perhaps the most effective approach would be to first identify the most critical problems within a watershed through the knowledge of the watershed board. If there are critical flooding problems for which IDNR-OWR or Corps of Engineers funding is likely to be available, funding should be sought from those agencies. If problems are water quality related and/or the primary concern is problem prevention, FEMA and EPA may be the best sources since these agencies fund local efforts rather than performing the studies in-house.

Because of the limited amount of funding available from the resource agencies for planning activities, these agencies should not be relied upon when preparing work program budgets for watershed planning. SMPC should be prepared to fund watershed planning with in-house funds and then pursue outside sources to supplement SMPC funds.

Utilizing funding from the resource agencies for implementation of the recommendations of the watershed plans is more readily accomplished since the appropriate agency can be approached based on the type of project.

5.1.4 Maintenance

Manmade stormwater facilities should be maintained to ensure that they function as designed. Natural systems should be maintained to prevent excess debris accumulation or erosion to ensure that they provide their full range of natural functions.

Develop Maintenance Standards: Appropriate maintenance and inspection standards and schedules should be developed at the SMPC level to ensure a consistent level of service throughout watersheds and throughout the county. This is particularly important for stream maintenance where inappropriate maintenance activities can lead

to water quality and/or habitat degradation, exacerbation of downstream problems, and greater need for follow up maintenance.

Develop Mechanism to Maintain Natural Drainage System: While in an entirely natural environment natural systems are self maintaining, in the human altered environment management and maintenance is needed to counteract the effects of human influences such as modified hydrology and fire suppression. This task would address the mechanism for implementing maintenance activities according to the standards developed above. Because of its inter-jurisdictional nature, stream maintenance should be coordinated by the SMPC through the watershed boards. Stream maintenance activities should be cost shared between the municipalities, SMPC and possibly drainage districts. The streams in Boone County should be prioritized in terms of maintenance needs to guide this long term activity.

Develop Mechanism to Maintain Stormwater Infrastructure: Because of the importance of functioning stormwater infrastructure, particularly detention and water quality management practices, the SMPC should develop a mechanism to insure that stormwater infrastructure is maintained. In general the municipalities should be responsible for ensuring that infrastructure is maintained. However, there are a variety of methods the municipalities may employ to carry out maintenance activities. For example, a municipality may wish to delegate maintenance to homeowners associations. However, the municipality should continue to inspect the facilities and have a mechanism whereby the municipality can perform unaddressed maintenance needs and charge the homeowners association. All infrastructure installed as part of new development should consider maintenance as part of the design. For example, urban stormwater drainage systems should not be tied into agricultural tile systems which are difficult to maintain and were not intended to convey surface runoff. Further, new stormwater detention facilities should not be approved without identification of parties responsible for maintenance.

5.1.5 Summary

This section described the recommendations for the Boone County Stormwater Program. Presented is the general framework with each of the four functional areas represented. Section 5.4 presents a plan for implementing the recommendations presented here.

5.2 REGULATORY STANDARDS RECOMMENDATIONS

The regulatory program recommendations (Section 5.1.2) call for a countywide watershed development ordinance that applies to both incorporated and unincorporated areas. The section also specifies that the ordinance should be comprehensive, specifying standards for stormwater drainage and detention, floodplain management, soil erosion and sediment control, as well as, stream, wetland and ground water recharge area protection in a single document. While preparation and adoption of ordinance language will be performed during implementation of this plan, recommended ordinance standards for new development and substantial redevelopment are presented here. These standards are intended to be the principles upon which explicit and detailed ordinance criteria and specifications will be based. These standards are presented in a manner consistent with the traditional design standard approach to regulation. These standards do not preclude the use of land cover based restrictions (limits on impervious area) in selected areas or other regulatory approaches to minimize the impacts of development and can serve as a checklist of concerns if these alternative approaches are pursued.

5.2.1 Comprehensive Purpose Statement

The ordinance should include a comprehensive purpose statement addressing the following concerns and objectives.

- Control erosion and sedimentation in and from drainage, developments and construction sites of all sizes.
- Encourage new development to meet the natural topography of the site in order to preserve existing stormwater drainage and to encourage infiltration
- Require the preservation of unique natural features such as wetlands, forested areas and steep slopes.
- Preserve, protect and restore water resources of Boone County including waterways, floodplains, wetlands, ponds, lakes, groundwater recharge areas and aquifers.
- Incorporate water quality and habitat protection measures in all stormwater management activities.
- Elimination, to the extent practical, of non-point source pollution.
- Promote an awareness and understanding of stormwater management issues by Boone County residents through a public information and education program
- Identify, prioritize and remedy existing areas of concern

- Coordinate the short and long term maintenance of natural waterways, manmade drainage ways and stormwater management facilities located within the county.

5.2.2 Floodplain Management

The ordinance should address the following standards related to floodplain management.

Ordinance Applicability: The applicability of the ordinance should be extended to include significant drainageways and depressional storage areas with drainage areas less than one square mile. Building in these areas could lead to significant flood damages to new buildings constructed within these low lying areas and to a loss of floodplain storage, resulting in increases in flood flows downstream.

Restrict Floodway Development to Reasonable Appropriate Uses: Floodway appropriate uses should be restricted to public flood control projects, public recreation and open spaces, water dependent activities and roadway crossings. Additional appropriate uses allowed such as expansions to treatment plants, accessory structures such as garages and parallel roadways, may result in additional flood damages and will interfere with floodway functions such as water quality mitigation and habitat protection and potentially subject the waterway to hazardous substances such as raw wastewater, gasoline and household fertilizers and pesticides.

Mitigate Permitted Floodway Construction Activities: Mitigation for activities in the floodway should include compensatory storage at a conservative ratio greater than 1:1, maintenance of the original floodway surface area and environmental impact avoidance and mitigation should include the following:

- Demonstrate that there is no practical alternative to the channel and floodway modification and that onstream impoundments are in the public interest
- Maintain or improve natural channel conditions such as stream length, sinuosity, pool and riffle pattern, and channel substrates.
- Impoundments must not prevent migration of indigenous fish species, or cause degraded water quality conditions
- A non-point source pollution control plan must be implemented throughout the watershed for proposed onstream impoundments

These requirements are intended to prevent increases in flood flows and stages and to protect the natural hydrologic, water quality and aquatic habitat functions of streams.

Compensate for Lost Storage in the Flood Fringe and Depressional Storage Areas: To prevent increases in flood flows and stages, hydraulically equivalent compensatory storage should be required for all fill activities in the flood fringe and depressional storage areas. As a safety factor, compensatory storage should be provided at a conservative ratio greater than 1:1.

Require a Flood Protection Elevation: To provide a factor of safety and minimize flood damages of those properties within or adjacent to the floodplain, a flood protection elevation above the base flood elevation should be required for all permitted structures to be constructed within the 500-year floodplain.

Require that a Letter of Map Revision (LOMR) be Obtained for all Floodplain Modifications: During the development process, permitted site grading or flow control may result in removal of land from the floodplain. Without a LOMR, those properties within the former floodplain will be required to obtain unnecessary flood insurance. Also, a LOMR provides an official record, filed with FEMA, of floodplain modifications.

5.2.3 Stormwater Drainage and Detention

The ordinance should address the following standards related to stormwater drainage and detention.

Ordinance Applicability: The stormwater drainage and detention standards (with the possible exception of detention requirements) should be required of all development, regardless of size. However, as a practical matter, the requirement that a permit be obtained may be limited to developments over a specified size.

Control the 2-year Release Rate: The 2-year discharge rate from development sites should be sufficiently low to prevent increases in instream flow rates. A 2-year release rate is specified to prevent increases in streambank erosion which is largely the result of increases in the magnitude of 2-year and smaller runoff events. In the absence of a watershed plan, a 2-year release rate equal to the lower of 0.04 cfs/acre or the pre-development onsite rate should be used. Due to the increases in runoff volume associated with urbanization, it has been found that the required onsite release rate has to be less than the pre-development onsite release rate to prevent increases in instream flow rates. As watershed plans are developed, the onsite release rate required to prevent increases in instream flow rates can be computed and the ordinance refined as necessary. Controlling the 2-year release rate will also improve pollutant removal within detention basins.

Control the 100-year Release Rate: The 100-year discharge rate from development sites should be sufficiently low to prevent increases in instream flood flow rates and enlargement of floodplains as the watershed develops. In the absence of a watershed plan, a 100-year release rate equal to the lower of 0.15 cfs/acre or the pre-development rate could be used. The rationale for 0.15 cfs/acre for the 100-year event is similar to the rationale for the 0.04 cfs/acre for the 2-year event. As watershed plans are developed, the onsite release rate required to prevent increases in instream flow rates can be computed and the ordinance refined as necessary.

Minimize Increases in Runoff Volumes: Increases in runoff volumes should be minimized through use of a runoff volume reduction hierarchy which specifies minimization of impervious surfaces, maximization of infiltration opportunities, and use of natural drainage practices, in addition to using detention. Reducing runoff volumes not only reduces the increase in runoff volumes leaving the site and entering the receiving waterbody but also minimizes the generation of stormwater related pollutants.

It should be recognized that detention is used to prevent increases in runoff rates but does not prevent increases in runoff volumes. This standard is intended to address this issue. In watersheds that are found to be particularly sensitive to runoff volumes and/or to shifts from subsurface to surface runoff, this standard may be particularly important. Further, numerical runoff volume targets may be warranted rather than the hierarchy described here.

Standards for infiltration practices should be considered to minimize the potential for contamination of groundwater resources in the quest to minimize changes in hydrology.

Preserve Onsite Depressional Storage: Existing onsite depressional storage should be preserved independently of required detention volumes. Even with no change in land cover, significant increases in flood volumes and rates would be experienced if watershed depressional storage were eliminated. This standard will also be particularly important in hydrology sensitive watersheds.

Minimize the Discharge of Pollutants: Runoff from urban developments is contaminated with a number of pollutants including heavy metals, oil and grease, bacteria and nutrients. Water quality BMPs such as constructed wet or wetland detention, drainage swales, and filter strips should be incorporated into stormwater

management systems to retain and transform stormwater pollutants onsite. Pollutants should be retained onsite to protect downstream lakes, streams and wetlands.

In some parts of the country performance standards for pollutant concentrations (e.g. concentration limits similar to those for wastewater plants) have been used with limited success. The monitoring required to verify that standards are being met can be very expensive. For this reason, design standards which specify a variety of techniques that have been shown to provide desired levels of performance (e.g. percent removal of a particular pollutant) are recommended. If a watershed has been found to be particularly sensitive to certain pollutants, target numerical performance levels could be specified. These targets could be expressed in terms of percent removal or in terms of allowable annual loads for the pollutants of concern.

Prohibit Onstream Detention: Onstream detention should be prohibited unless it provides regional flood control benefits, is in the public interest and the environmental mitigation discussed under the floodway construction activities section of the floodplain management standards is provided.

Prohibit Detention in the Floodway: Detention in the floodway is difficult to design to function properly under all flood stage conditions. In addition, the detention basin may block flood flows, reducing the conveyance capacity of the floodway. Finally, pollutants captured by the detention basin may be flushed into the stream when the basin is inundated by large instream flood events.

Prohibit Detention in the Flood Fringe: Detention in the floodplain is also difficult to design to function properly under all flood stage conditions. In addition, detention within the flood fringe may block flood flows, reducing the effectiveness of the area while potentially acting as a pollutant access point.

Prohibit Direct Discharge of Stormwater Runoff to Wetlands: Stormwater runoff should be treated and detained prior to discharge to significant natural and mitigation wetlands. Excessive pollutant loads and significant changes in the magnitude and frequency of water level fluctuations within wetlands can severely stress wetland plant and wildlife communities. While wetlands are able to provide significant pollutant filtering benefits, excessive pollutant loads can exceed their assimilation capacity.

Detention Should be Designed Using Appropriate Hydrologic Methods: Detention basins should be designed using hydrographic routing based techniques

and using rainfall data from the Illinois State Water Survey Bulletin 70 publication (Huff, 1989).

Require Formal Maintenance Agreements for all New Stormwater Facilities:

For stormwater infrastructure to function properly it must be maintained in its design condition. Maintenance agreements should identify responsible parties, maintenance requirements and schedules, and should identify adequate funding arrangements for long term maintenance.

Prohibit Connection of Stormwater Drainage Systems to Agricultural Tile Systems:

Agricultural tile systems were designed to drain groundwater under free flow conditions and were not constructed for maintenance access. Also many of the tiles were installed up to 80 years ago and were constructed of lower strength materials than modern storm sewers. Surcharging of drain tiles as a result of discharge of surface stormwater runoff can rupture these tiles that are difficult to maintain and repair and do not have easements associated with them to allow maintenance access.

5.2.4 Soil Erosion and Sediment Control

The ordinance should address the following standards related to soil erosion and sediment control.

Ordinance Applicability: Soil erosion and sediment control measures should be required for land disturbances of all sizes. However, as a practical matter, the requirement that a permit be obtained generally may be limited to those activities disturbing more than one acre unless adjacent to a waterbody or wetland.

Minimize the Area of Disturbance: The area disturbed at any particular time should be minimized through staging of construction activities and through site design which minimizes the area to be regraded.

Require Soil Erosion and Sediment Control Measures Consistent with Established Guidance:

The ordinance should include explicit design and operation standards for soil stabilization, sediment control measures, conveyance channels, and other important priorities. The recommendations in the latest amendment of the "Illinois Urban Manual - A Technical Manual Designed for Urban Ecosystem Protection and Enhancement" prepared by the NRCS for the Illinois Environmental Protection Agency and in the latest amendment of "Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control" (the Greenbook) (Northeastern

Illinois Soil Erosion and Sedimentation Control Steering Committee, 1988) may also be adopted by reference.

Require Installation of Sediment Control Measures Prior to Land Disturbance: Sediment control measures such as sedimentation basins and silt fences should be installed prior to significant land disturbance activities to ensure that sediment generated during construction is captured.

Require Early Implementation of Erosion Control Measures: Soil erosion control measures such as temporary seeding, mulching, and erosion control blankets should be implemented soon after the end of active disturbance of the land and prior to final grading if final grading will not be completed for a significant period of time. This includes stabilization of soil stockpiles.

Require Routine Inspection and Maintenance of All Soil Erosion and Sediment Control Measures: For soil erosion and sediment control measures to be effective they must be routinely inspected and maintained. Although construction activities are only temporary, it is not uncommon for soil erosion and sediment control measures such as erosion blankets, silt fences, and sediment traps to require maintenance or replacement several times during the construction process.

Provide Effective Enforcement Tools: Without the threat of enforcement, it is often difficult to ensure that measures are adequately maintained. Effective enforcement tools include stop work orders and fines that specify each day as a separate violation.

5.2.5 Stream and Wetland Protection

The ordinance should address the following standards related to stream and wetland protection.

Require Protection of All Wetland Functions: Require protection or mitigation of wetland functions for all wetlands including those less than one acre in size which are inadequately addressed by the federal regulatory program. Individually, small isolated wetlands may not have high functional values, cumulatively, the functions of those small wetlands can have a significant impact on the watershed. Wetland protection criteria should adequately address functions such as stormwater storage, pollutant filtering, and protection of habitat for threatened or endangered species which may be overlooked in the current permit process.

Require Mitigation for All Significant Wetland Disturbances: All wetland disturbances, including those not directly regulated by the Corps of Engineers, should be addressed. Damaging wetland disturbances such as vegetation removal and impoundment are only regulated by the Corps if they are associated with a dredge or fill activity. Mitigation should be provided for all disturbances and maintenance and monitoring of all mitigation measures should be required for a period of at least five years.

Require Buffers Along All Waterbodies and Wetlands: A buffer of appropriate width comprised of native vegetation should be maintained or established along the shoreline of all streams, lakes, and wetlands. Exceptions to the native vegetation requirement may be allowed to facilitate water dependent activities, maintenance, or recreational access such as for beaches and boat launches, where appropriate.

Require Setbacks Along All Waterbodies and Wetlands: Beyond the buffer described above, a setback should be established along the shoreline of all streams, lakes, and wetlands. Only limited types of development should be allowed within the setback. The development types should be limited to the following:

- Minor improvements such as pedestrian or bicycle trails and educational signs.
- Maintenance access for utilities
- Parks and recreational areas
- Private and public lawns

5.3 WATERSHED PLANNING METHODOLOGY AND ISSUES

The purpose of watershed planning is to identify the unique resources and problem areas of a watershed and to develop a plan to prevent potential future problems and remediate existing problems. This section outlines a recommended planning methodology and the issues that should be addressed in a comprehensive watershed plan. Additional information on the CMAP guidance as well as the USEPA criteria for watershed planning is provided in Appendix B.

Although some watershed plan implementation activities may be performed by the SMPC, many will be the responsibility of the watershed boards composed of the local governments within the watershed. Thus it is important that the watershed plan be viewed as a product of and for the watershed board, and the communities it represents.

An interdisciplinary team should be assembled to guide the watershed planning process and prepare the watershed plans. The team should be composed of the following disciplines: water resources and environmental engineering, environmental planning, biology and mapping/GIS. This team will likely be composed of SMPC staff and their consultants. However, it may also be possible to utilize local, regional, state and federal resource agencies when assembling the team. Use of SMPC staff to prepare the watershed plans will ensure consistency in methodology between watersheds.

5.3.1 Watershed Planning Methodology

The watershed planning methodology described below should be used in preparing watershed plans. The methodology described briefly below is based upon the Illinois Model of Watershed Planning as outlined by CMAP and should not be viewed as rigid procedural requirements but as a guide to preparation of watershed plans.

1) Identify Stakeholders: The Watershed Board and SMPC staff should assemble a watershed advisory committee. The advisory committee may be composed of municipal and county agency staff, local consultants, resource agencies, significant land owners, local homeowners associations and environmental groups. Staff of local government and local citizens groups will have the greatest knowledge of watershed conditions and be most affected by those conditions. Consultants and resource agencies can provide additional technical expertise and experiences from other watersheds within the region. Also, the resource agencies may have funding and can provide input regarding fundable alternatives.

The purpose of the advisory committee is to assist the Watershed Board in establishing goals and objectives for the watershed plan and providing input on plan alternatives and the implementation plan for the watershed recommendations.

2) Develop Goals and Objectives: The goals and objectives of the watershed plan should be related to the unique conditions, problems and opportunities of the watershed. However, the goals and objectives of the watershed should begin with and be consistent with the goals and objectives of the countywide stormwater plan. The objectives identified early in the planning process should be used to guide the direction of the process. However, they may evolve over time as information on watershed conditions is collected. After the unique watershed goals are identified they should be further discussed and prioritized.

3) Inventory Watershed Resources and Conditions: Previous reports and studies and background data on the watershed should be assembled and an inventory of the stream corridor conducted. Data assembled should include floodplain, wetland, land use/land cover, soils and vegetation maps as well as hydrologic information such as rainfall and streamflow data. This will provide information on watershed wide conditions and resources that affect the stream hydrology and condition. In addition to collecting this data, a stream corridor inventory should be conducted to assess the condition of the stream corridor itself and identify problem areas such as severe streambank erosion, suspicious discharges and poor habitat conditions. Stream cross-section, rainfall and streamflow data will be needed if detailed flood analysis and floodplain mapping are to be performed. A list of potential resources to aid in the locating of necessary data is provided within the CMAP guidance found in Appendix B.

4) Assess Waterbody/Watershed Problems: Based on the information collected and assembled above, watershed problems can be identified and the sources, causes and magnitude of the problems analyzed. After identifying and quantifying the problem it is necessary to identify what causes and sources need to be controlled to meet the goals and objectives of the plan. Priorities and targets for each of the problems will need to be selected for further investigation.

5) Recommend Management Practices: Alternatives for remediation and prevention of problems should be developed and should consider both watershed and site specific measures as well as structural and non-structural techniques. Alternatives should also consider their impact on other watershed resources. Costs and potential funding sources should be developed for each of the alternatives. Considering the watershed goals and objectives, financial resources and the estimated costs for projects, alternatives should be selected and recommended projects prioritized.

6) Develop an Action Plan: An action plan should be prepared which identifies funding sources, the responsibilities of the various parties that will implement the plan, and a schedule for implementation. This is an extremely important step since without specific tasks assigned to specific parties, it is unlikely that the plan will be implemented.

7) Monitoring your Success: A monitoring system including measurable milestones for identifying successful implementation of the watershed plan is an excellent tool to showcase the success and importance of watershed planning. In addition, a review process to determine the overall effectiveness of the watershed plan is necessary to determine the need to reevaluate or modify the plan.

5.3.2 Comprehensive Watershed Planning Issues

At a minimum, a watershed plan should identify and address in a comprehensive fashion the problems, needs and opportunities in the watershed including those discussed below.

Flood Damage and Mitigation Needs: While flooding related damages may occur in specific locations, flooding is the result of runoff from the entire upstream watershed. Thus, flood damages, particularly overbank flooding, must be analyzed on a watershed basis. Since watersheds rarely follow political boundaries, analysis of flooding problems must necessarily be addressed on an intergovernmental basis; hence creation of the SMPC. In addition to addressing existing flooding problems, potential future problems should also be identified and watershed specific regulatory standards considered to avoid potential problems.

Floodplain Mapping Status and Needs: The floodplain maps throughout most of Boone County were prepared in the early 1980's. Generally in the more urban areas of the county, the mapping was prepared based on hydrologic and hydraulic modeling. In the more rural areas, the mapping was done by more approximate means such as regression equations and using the historic flood of record as the regulatory flood. Due to land use changes, better rainfall information, and greater sophistication in watershed modeling techniques, the accuracy of many of the existing maps is questionable. However, FEMA and the State of Illinois are in the process of updating the maps for Boone County. It is anticipated that this process will be completed sometime in 2010. This new mapping will be a key component to future watershed planning in the region.

Identification of Regionally Significant Storage Areas: Throughout Boone County there exist depressional storage areas that store significant runoff volumes. If these depressional storage areas are lost, substantial increases in downstream flow rates and flood damages may result. [Note: an example of retaining depressional storage can be identified on Figure 3-4 in the area of U.S. Route 20 and Morreim Drive as part of Townhall Industrial Park] In a study of Butterfield Creek in southern Cook County, Illinois, it was found that 100-year discharges would increase from 35% to 100%, depending on watershed location, if watershed depressional storage was lost (USDA, 1987). The 35% to 100% increase was independent of any land use changes in the watershed. Many depressional storage areas may also be groundwater recharge zones important for stabilizing streamflows and lake levels within the watershed.

Watershed planning should identify significant depressional areas and develop alternatives for their preservation.

In addition to identifying existing watershed storage areas, opportunities for creation of additional regional storage areas should be identified. For example, regional storage areas could be created behind existing or future roadway embankments to serve as regional detention for portions of the watershed.

Channel and Shoreline Erosion: Although erosion is a natural process, excessive channel and shoreline erosion often occurs in urban and agricultural watersheds. Streambank and shoreline erosion occurs as a result of both hydrologic destabilization due to urbanization and local instream factors. Hydrologic destabilization is the result of increases in volumes and rates of runoff due to urban development. Increases in runoff rates and volumes result in increased stream velocities as well as stream and lake water level fluctuations. Local instream factors include channelization and loss of deep rooted, stabilizing streambank and shoreline vegetation.

Alternatives to remediate excessive channel and shoreline erosion should consider both watershed measures to address hydrologic destabilization and instream measures. Watershed measures to address hydrologic destabilization could include retrofitting of existing detention basins to improve rate control during 2-year and smaller runoff events and creation and/or utilization of regional storage areas described previously. Potential instream measures include re-establishment of native deep rooted vegetation and bio-technical erosion control measures which use a combination of structural and vegetative measures to control streambank and shoreline erosion.

Alternatives to prevent excessive stream and shoreline erosion should also consider both watershed and instream (and riparian) measures. Watershed measures should include adequate stormwater controls to prevent hydrologic destabilization as the watershed develops. Instream measures should include stream corridor management to prevent and address invasion of non-native and undesirable vegetation, prevent disturbance of natural streams that are currently stable, and restore channelized streams that may be unstable. Finally, buffers should be established along streams and shorelines so that normal erosion does not later threaten structures and property that is developed along the stream or shoreline.

Sedimentation: Like erosion, sedimentation is also a natural process. However, excessive sedimentation can reduce the conveyance capacity of stream channels and culverts, increasing flood heights and damages. Sedimentation can also lead to loss or degradation of aquatic habitat as described below. Sedimentation is the result of

erosion of upland land surface (agricultural and construction sites), wash off of pollutants from urban land surfaces (impervious areas), and streambank erosion in upstream reaches. Watershed planning should identify the primary existing or potential causes of excessive sedimentation and identify alternatives to reduce the source of sediment.

Water Quality Remediation and Protection: Water quality problems are typically related to high concentrations of suspended sediment, nutrients, pesticides, oil and grease, organic matter, bacterial and heavy metals. Sources of these pollutants include agricultural and urban runoff, upstream streambank erosion, failing septic systems and point sources. Water quality problems can also be the result of conditions within the waterbody itself (particularly for lakes) such as resident carp populations and certain recreational activities which stir up bottom sediments and lead to high turbidity levels. Watershed planning should identify potential sources and causes of the problems as well as alternatives to remediate the problems. During evaluation of alternatives to improve water quality, other factors such as lack of physical aquatic and riparian habitat, should be considered since addressing water quality alone may not be sufficient to meet certain watershed goals and objectives such as improving recreational fisheries.

Waterbodies that may be particularly sensitive to low water quality or that may be subject to excessive pollutant loads due to anticipated upstream land uses should be identified and alternatives to prevent excessive loading developed. Adequate stormwater best management practices should be sufficient to protect most waterbodies. However, for particularly sensitive waterbodies, land use restrictions or numerical loading limits in the tributary watershed may also be necessary to provide adequate protection. Considering that water temperature and flow rate fluctuations can also have a significant impact on water quality and waterbody conditions, the quantity and source of runoff (surface vs. subsurface) may also need to be addressed.

Particularly important or sensitive groundwater recharge areas should also be identified and protected to prevent contamination of groundwater resources.

Aquatic and Riparian Habitat Restoration and Protection: Impairment of stream, lake and wetland habitats can be the result of sedimentation, streambank erosion, and intentional direct modifications such as channelization and wetland destruction. High sediment loads can bury natural substrates important for feeding and spawning as well as fill in lakes and wetlands. Streambank erosion results in direct loss of riparian habitat where the erosion is occurring and also leads to sedimentation. Streambank erosion also results in widening of the stream, reducing

water depths which may further impair habitat. Direct modifications destroy habitat diversity, often remove natural substrates, and can lead to streambank erosion. Restoration of aquatic and riparian habitat should consider that other factors, such as water quality and quantity, may also be limiting factors. Restoration activities should also consider the sources and causes of habitat impairment since without watershed controls, restoration may be only temporary. As watershed planning is being undertaken, regional restoration opportunities for stream corridors, lakes and wetlands should be evaluated. There may be opportunities, for example, to accomplish restoration objectives as part of flood control projects or enhancement of regional storage areas.

As discussed under water quality, particularly sensitive habitats or habitats likely to be significantly affected by projected upstream urbanization should be identified and alternatives to prevent habitat degradation developed. Adequate stormwater best management practices and restrictions on stream and wetland modifications should be sufficient to protect most habitats. However, for particularly sensitive habitats, land cover (impervious area) restrictions in the tributary watershed may also be necessary to adequate protection, particularly to minimize changes in hydrology which is often the root cause of habitat degradation.

Recreational Use Impairment: The rivers, corridors, and lakes of Boone County are used for a number of recreational uses such as swimming, boating, fishing and hiking. These uses can be impaired due to bacterial contamination, water quality, aesthetic and physical conditions. Poor water quality and reduced aesthetics (algae blooms, high turbidity, etc.) can severely impair swimming uses and may cause health concerns. Aesthetics and physical conditions (debris blockages, overly shallow water, etc.) can reduce boating potential (such as canoeing). Water quality and physical conditions can reduce fish populations, impairing recreational fisheries. Watershed planning should address water quality, aesthetics, access and physical conditions particularly in evaluating regional projects. Whenever possible, multi-functional, watershed based solutions should be identified (e.g. incorporating a trail system into a stream restoration project. When considering recreational use enhancement, it should be recognized that certain recreational uses (particularly power boating) can affect other uses such as habitat and water quality.

Identify Coordination Opportunities with Other Programs: There are often opportunities to achieve watershed based stormwater objectives through coordination with other programs such as open space and transportation planning. Watershed planning can be coordinated with open space acquisition programs to acquire particularly important and/or sensitive natural areas such as wetlands, regional storage

sites, critical floodplains and high quality stream corridors. As discussed previously, roadways can be designed to create stormwater storage areas or regional wetland banks to benefit downstream areas.

5.3.3 Summary

In summary, the key principles of this watershed planning methodology are to base recommended actions on identified flooding problems and waterbody impairments and to approach the solution of watershed problems in a holistic, comprehensive fashion.

5.4 PLAN IMPLEMENTATION

5.4.1 Adoption of Stormwater Plan

The first step toward implementation of this Boone County Stormwater Plan is adoption of the plan by the SMPC and approval by the County Board. The steps leading to adoption of the plan are listed below.

1) SMPC approval of the draft plan: The plan as drafted by the staff and policy advisory committee is presented to the SMPC. After incorporating comments from the SMPC members, the Stormwater Plan is approved for public review. It may be beneficial to solicit comments from the municipalities and other local governmental entities prior to releasing the document for general public review.

2) Public review period: The SMPC puts the approved draft plan out for public review during which time the plan is sent to the IDNR, RMAP, neighboring counties, and other interested agencies for review and comment. A public hearing is held during this period. Relevant comments received during the review period and hearing are then addressed in the final stormwater plan at the discretion of the SMPC.

3) Approval by the County Board: The County Board approves the final Boone County Stormwater Management Plan.

5.4.2 Prioritization of Recommendations

In general, prioritization of stormwater plan recommendations is dependent on a number of factors including the extent of existing problems, the rate of urbanization, and available funding. Review of existing data and questionnaires distributed to the municipalities indicates that there are not wide spread issues with a lot of flooding and water quality problems in Boone County. There is however, an indication of existing

localized water issues in Boone County. In the more urbanized areas of the county, problems are beginning to be felt, particularly in terms of impairment of streams and lakes.

These factors suggest that the first priority should be a regulatory program to minimize new problems related to new development and avoid exacerbation of existing problems. However, certain administrative and management recommendations will be necessary to support the regulatory program. While the regulatory program is being implemented, the SMPC should also begin to focus on maintenance and planning needs. Table 5-1 lists each of the recommendations from Section 5.1 along with a priority ranking from one to three with one having the highest priority.

Table 5-1: Prioritization of Plan Recommendations

Plan Recommendation	Priority Ranking	Section Referenced
Administration and Management Recommendations		
Acquire and Train Staff	1	5.1.1
Form Technical Advisory Committee	1	5.1.1
Provide Technical Support	2	5.1.1
Develop Public Awareness Program	1	5.1.1
Coordinate Professional Education	2	5.1.1
Develop Funding Mechanism	1	5.1.1
Regulatory Recommendations		
Prepare and Adopt Countywide Ordinance	1	5.1.2
Implement Existing & Future Water Shed Plans	1	5.1.2
Prepare Technical Reference Manual	2	5.1.2
Institute Ordinance Enforcement Structure	2	5.1.2

Planning Recommendations			
Perform Countywide Planning Coordination Activities	1	5.1.3	
Form Watershed Boards	2	5.1.3	
Hydrologic Data Collection	2	5.1.3	
Prepare Plans for Remaining Watersheds	3	5.1.3	
Maintenance Recommendations			
Develop Maintenance Standards	2	5.1.4	
Develop Mechanism to Maintain Natural Drainage System	3	5.1.4	
Develop Mechanism to Maintain Stormwater Infrastructure	2	5.1.4	

5.4.3 Discussion of Prioritization

Priority 1: The priority one recommendations are primarily related to preparation of a countywide stormwater ordinance and activities required to support preparation of the ordinance.

Acquire and Develop Adequate Staff: Staffing plans must be considered and developed by the appropriate officials to carry out the plan and enforcement of any future ordinance. Although acquisition of staff is listed under priority one, it will be an on-going process with staff needs changing as the program proceeds through implementation of the countywide and watershed plan recommendations.

Develop Public Awareness Program: A public education program should begin as soon as practical to develop grass roots support for adequate regulatory standards and increased funding levels that will be required.

Develop Funding Mechanism: To proceed with implementation of this plan a consistent, dedicated source of funding is needed. The SMPC and the County Board

should proceed immediately with developing a mechanism to ensure that funding is available to implement the subsequent stages of the plan.

Form Technical Advisory Committee: Other than staff, the TAC will be the primary technical resource to the SMPC. The TAC will be needed to provide input to staff during preparation of the countywide ordinance.

Prepare and Adopt Countywide Ordinance: Staff, with consultants and TAC assistance, should prepare a countywide ordinance as soon as practical to minimize adverse effects from new development. The SMPC should apply for any available grants to help fund preparation of the ordinance. One such possible source would be the Section 319 grants from the IEPA.

Perform Countywide Planning Coordination Activities: SMPC staff should perform ongoing coordination activities. SMPC should also consider establishing a hydrologic data collection network early in the program to obtain streamflow and precipitation data that will be needed for future watershed planning.

Implement Existing & Future Water Shed Plans : Plans such as the Beaver Creek Watershed Plan should not just sit on the shelf, an implementation strategy tied to the plan and future ordinances should be developed.

Staffing Needs: During implementation of the priority one recommendations, staff positions and a consultant (to assist in preparation of countywide ordinance language) may be needed.

Priority 2: The Priority 2 activities are primarily related to interpretation and enforcement of the countywide ordinance.

Provide Technical Support: SMPC staff will be the central technical resource for the county in terms of interpretation and enforcement of the ordinance. As such, technically qualified staff will be needed to perform that function.

Coordinate Professional Education: With the county ordinance in place, there will be training needs for both design and permit review professionals. Coordination should be provided so that these opportunities are available as ordinance implementation begins.

Prepare Technical Reference Manual: Preparation of the technical reference manual should begin as the ordinance is being adopted such that the reference manual is available on or before the effective date of the ordinance.

Institute Ordinance Enforcement Structure: This includes obtaining SMPC staff for ordinance review and proceeding with the process of delegating ordinance enforcement to the municipalities. The SMPC enforcement structure should be in place before the effective date of the ordinance.

Form Watershed Boards: The watershed boards may be formed prior to watershed planning to facilitate coordination of activities between municipalities and to provide input to the SMPC during watershed prioritization.

Develop Maintenance Standards: Having consistent standards for maintenance is important to minimize avoidable flood hazards and to discourage misguided maintenance activities that may actually exacerbate problems. Standards and acceptable procedures could be included in the technical reference manual. Dissemination of the materials prepared on appropriate standards and procedures should target township maintenance departments, municipalities and major land owners.

Develop Mechanism to Maintain Stormwater Infrastructure: It will be important that a mechanism to maintain the stormwater infrastructure installed as part of new development be developed and implemented to ensure the long term functioning of the infrastructure. Specification of maintenance responsibilities for stormwater infrastructure should be included in the ordinance.

Staffing Needs: Depending on permit load and the extent to which permit authority is delegated to the municipalities, additional staff positions may be needed to participate in pre-application conferences, review permits and to perform inspections as well as to perform the other activities identified under this priority level.

Priority 3: Priority three is maintenance of the natural drainage system and watershed planning and implementation. While watershed planning and a countywide maintenance program are very important, they are also very expensive and given the lowest priority due to financial constraints. However, availability of grants and other watershed planning and implementation assistance may skew the priority given to watershed planning.

Prepare Plans for Remaining Watersheds: Watershed plans should be prepared based on the procedures in Section 5.3. Funding opportunities should be sought to assist in development of the plans.

Develop Mechanism to Maintain Natural Drainage System: Although standards for maintenance procedures were developed under priority 2, a mechanism is needed to actually perform the maintenance activities. Grant opportunities should be pursued for certain maintenance activities, particularly stream maintenance to address erosion problems.

Staffing Needs: Staff will be required to coordinate maintenance activities, hire and manage maintenance contractors and complete maintenance work.

The number of staff needed for watershed planning will depend on whether watershed plans are prepared in house or by consultant. The advantages of preparing the plan in house, include increased staff familiarity of the watersheds by being closer to the process, lower level of dependence on consultants during plan update and implementation phases and the potential ability to attract a greater level of staff technical expertise to the SMPC will be gained by offering staff the opportunity to actually perform the work rather than simply managing consultant contracts. The advantage to hiring consultants is the potential ability to acquire a greater level of technical expertise than could be afforded otherwise, and the ability to complete watershed plans at an increased rate.

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Appendix A – Municipal Survey and Received Responses

STORMWATER MANAGEMENT LEVEL OF SERVICE SURVEY

Entity Responding: City of Belvidere and Boone County

1. There is currently a formal program to educate the public about the problem causes, needs and costs of stormwater management in your community. **T F**

Belvidere – False Boone County – False

If true, please describe your program.

2. The general public recognizes stormwater as a serious problem in terms of water quantity and quality. **T F**

Belvidere – True Boone County – True

If true, please describe important local concerns.

Belvidere – Residents in the flood prone areas of the City are very aware of the problem: Sheffield Green, Fremont Street – High School, 4th Street

Boone County - Concerns received are mostly due to growth. Example – I never had this much water before the subdivision was built. Another concern is point release of runoff from detention ponds where it was sheet runoff before and caused no erosion. Another is occasional flooding along rivers. Residents feel it is the local agency’s responsibility to prevent this.

3. Stormwater management efforts are coordinated with neighboring jurisdictions. **T F**

Belvidere – True Boone County – False

If true, please describe coordination efforts.

Belvidere – City of Belvidere and Boone County have uniform development standards.

4. Inquiries and complaints regarding stormwater issues are handled by municipal staff.

T F

Belvidere – True Boone County – False

If true, please describe inquiry/complaint follow-up system. If false, please list agencies to whom complaints or inquiries are referred.

Belvidere – Inquiries and/or complaints are received by the Public Works Department office staff. A work order is produced and sent to the appropriate department for action. Once the work order is completed, it is sent back to the office staff for final recording.

5. Comprehensive watershed drainage plans and storm sewer drainage system plans have been prepared for your community. **T F**

Belvidere – True Boone County – False

If true, please briefly describe drainage plans or include copy if possible.

Belvidere – A portion of the watersheds within the city limits have completed plans, the remaining watersheds will have plans completed as budgeting allows.

6. Plans for new residential, commercial or industrial sites are reviewed to include analysis of stormwater impacts on adjacent governments and are not based upon the regulations and plans of the approving authority only. **T F**

Belvidere – True Boone County – False

If true, please describe the procedure used to assess impacts.

Belvidere – The development standards for the city and adjacent governments (county) are the same.

7. An effort to coordinate the development of stormwater management regulations and design criteria between municipalities has been made. **T F**

Belvidere – True Boone County – False

If true, please describe coordination efforts.

**Belvidere – Through the establishment of the Boone County Stormwater Committee.
Boone County – Working on it.**

8. The water quality of storm runoff has been specifically addressed in municipal ordinances. **T F**

Belvidere – True Boone County – N/A

If true, please describe the manner in which water quality considerations are addressed in the ordinance.

Belvidere – Objective: Section 151.42 (d) (1) (f)

Standards: Section 151.42 (d) (6)

Section 151.42 (d) (7) (o), (q), (v), (w), (bb), (cc), (hh)

Section 151.42 (e) (4)

9. There has been an adequate effort made to coordinate soil erosion and sedimentation control requirements on a regional basis. **T F**

Belvidere – True Boone County – True

If true, please describe coordination efforts.

Belvidere – The erosion and sediment control ordinance is the same for the City and County and is administered by the same agency, the Boone County Soil and Water Conservation District.

Boone County – Not sure if adequate, but the NPDES II is in place for any disturbance of land one acre or greater. Construction plans all contain erosion control measures. Boone County Soil and Water Conservation District oversees all new subdivisions for erosion and sedimentation plans

10. Stormwater management facility inspections and inventories are carried out on a consistent basis. **T F**

Belvidere – True Boone County – True & False

If true, please describe inspection program and schedule.

Belvidere - All outfalls to the river are inspected on an annual basis. All detention facilities are inspected on an annual basis.

Boone County - True – It is done during initial construction. False – Once complete inspections stop unless there is a complaint from someone.

11. Maintenance of stormwater facilities is performed through a scheduled preventative maintenance program rather than in response to complaints. **T F**

Belvidere – True Boone County – False

If true, please describe maintenance program and schedule.

Belvidere – Mowing of drainage facilities is done on a regular basis. Cleaning of low flow channels, inlets and outlets in storm detention basins is done annually.

Boone County – In the County it is up to the landowner to maintain with no inspection.

12. Permitting decisions include regional interests and are not based upon the regulations of the approving authority only. **T F**

Belvidere – False Boone County – False

If true, please describe other factors considered.

13. Enforcement of development specifications is carried out by municipal staff on a consistent basis. **T F**

Belvidere – True

Boone County – False

If true, please describe enforcement mechanisms for non-compliant activities.

Belvidere – Regular inspections of new developments and buildings are scheduled. If deficiencies are noted, the developer/builder is notified of the corrective action needed. Failure to make the corrections in the specified time period will cause a stop work order to be issued until such time that the deficiencies are correct.

Boone County – Enforcement is carried out by Soil & Water for most developments. On construction projects (roads and bridges) it is done by the County Engineer.

14. Nearby Drainage Districts have made an adequate effort to coordinate erosion and flow control requirements with your community. **T F**

Belvidere – False

Boone County – False

If true, please describe coordination efforts.

15. Stream or channel maintenance is performed in your community. **T F**

Belvidere – True

Boone County - False

If true, please explain the nature of these activities (staff, volunteer groups, etc.).

Belvidere – Clean ups along the river banks are scheduled annually. Detention/retention areas are cleaned on a regular basis.

Boone County – The only maintenance the County and Townships do is occasional ditch cleaning.

16. List, in order of importance, the most critical elements of stormwater management as it pertains to your community.

- a. Water Quality (WQ)
- b. Flood Control (FC) – Wetland and/or Floodplain Preservation
- c. Erosion\Sedimentation Control (SESC)
- d. Groundwater Recharge
- e. Other (please explain)

Belvidere – B, C, A, D

Boone County – B, C, A, D

17. Please describe the source of funding for the following elements of your stormwater management program. (General revenue, permit fees, Homeowners Associations, etc.)

a. Capital Improvements (sewer rehab, local flood projects, etc.)

Belvidere – General revenue, grants and fees

Boone County – Property taxes, motor fuel taxes

b. Maintenance and Operations (culvert maintenance, street sweeping, etc)

Belvidere – General revenue, special service areas, homeowner’s association

Boone County – Property taxes

c. Regulatory (plan review, construction site inspection, etc.)

Belvidere – General revenue, developer fees, permit fees

Boone County – Property taxes, motor fuel taxes

18. Any Additional Comments?

Belvidere – None

Boone County – None

DRAFT

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Appendix B – USEPA & CMAP Watershed Planning Guidance

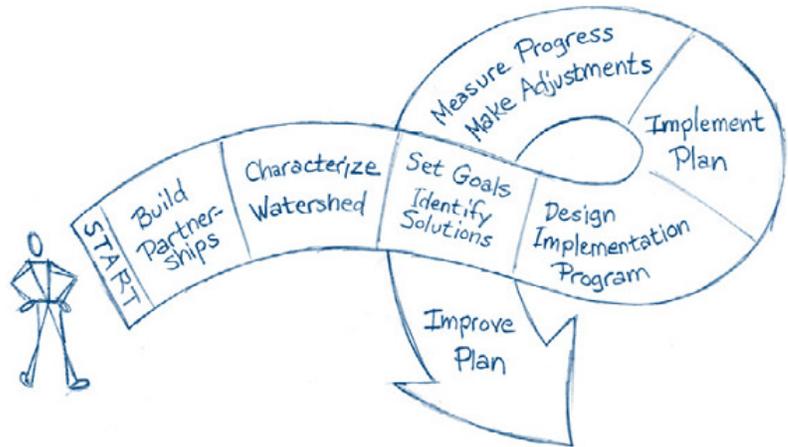
EXCERPT FROM USEPA WATERSHED PLANNING HANDBOOK MARCH 2008

2.3 Steps in the Watershed Planning and Implementation Process

The parts of the watershed planning process can be illustrated in a number of ways, such as steps, phases, or portions of a circle. In general, all watershed planning efforts follow a similar path from identifying the problems to, ultimately implementing actions to achieve the established goals. Many groups find that informal scoping and information collection prior to plan development provides valuable input during the early phase of planning. Scoping activities include pre-planning data review and discussions with stakeholders that can help to define the planning area, identify other stakeholders, and help to solicit opinions and advice on how to proceed before launching into the plan development process.

This handbook organizes the watershed planning process into the following major steps:

1. Build partnerships.
2. Characterize the watershed to identify problems.
3. Set goals and identify solutions.
4. Design an implementation program.
5. Implement the watershed plan.
6. Measure progress and make adjustments.



Within each step, several activities are conducted before moving on to the next step. Many of these activities are repeated in different steps. For example, information/education (I/E) activities occur in the first step when building partnerships but also occur throughout the process, especially when implementing the plan.

It can be daunting to begin the planning process and consider the scope of work needed to implement watershed restoration and/or protection measures. Many groups have found that tackling smaller projects and tasks early in the planning process can help to engage stakeholders and demonstrate progress, creating a sense of momentum that leads to long-term success.

Figure 2-1 shows some of the activities and tools used in each step of the watershed plan development and implementation process.

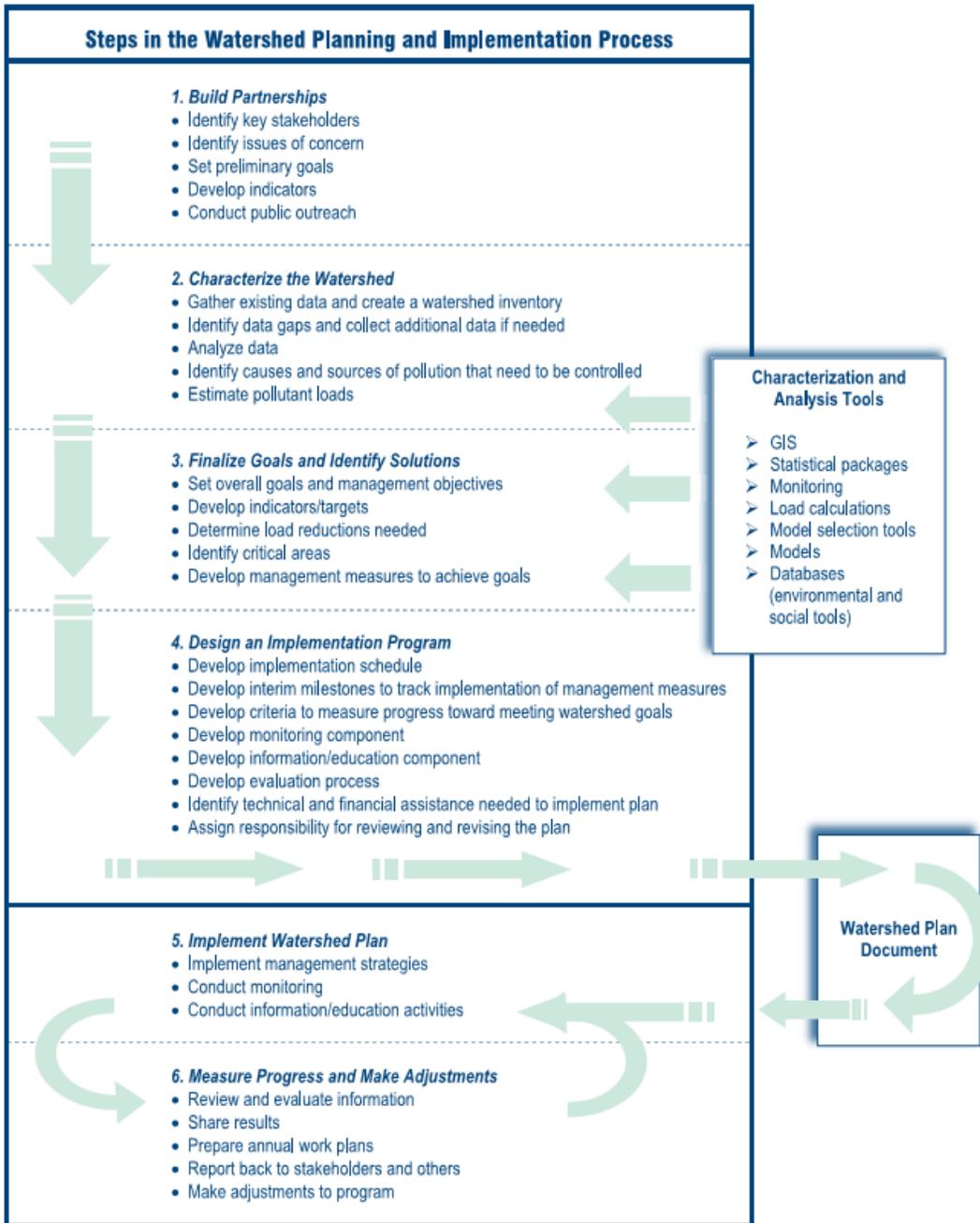


Figure 2-1. Steps in the Watershed Planning Process

The figure provides a road map for the watershed planning process, as well as a road map for this document. You might want to refer back to it from time to time to find out where you are in the process and where you need to go. Note that steps 1 through 4 feed into the development of the plan, but the watershed planning process continues with plan implementation. Once the plan is implemented, annual work plans are prepared, monitoring activities are conducted to quantitatively measure progress toward meeting water quality goals, and plan adjustments based on evaluation information received (and other inputs, such as changes in resources or watershed conditions) are continually made.

**EXCERPT FROM CMAP GUIDANCE FOR DEVELOPING WATERSHED
ACTION PLANS IN ILLINOIS
MAY 2007**

Illinoisans, much like other Americans, face many challenging social problems that typically have environmental consequences. Today's problems are often subtle, chronic, and inter-related. This is particularly evident in the area of water resources. Nonpoint-source pollution, for example, is the most vexing water-quality problem that faces America today. In Illinois, as elsewhere, agricultural and urban land uses are the largest nonpoint-source contributors to water resource impairment.

While a more regulatory or "top-down" approach has worked well in dealing with point-source pollution, a more flexible and collaborative or "bottom-up" approach is necessary for addressing the ongoing nonpoint-source threat. A watershed approach features those attributes and offers a coordinating framework for practicing collaborative governance and sustainable management of water resources. Other 21st century issues of growing importance including availability of safe drinking water, ground water overdraft and depletion, and maintenance of abundant water supplies, demand a more comprehensive approach to environmental protection, as well as an approach grounded in sound science, innovative solutions, and broad public involvement. These attributes describe the watershed approach too.

Embracing these ideas, this manual presents an approach to watershed-based planning designed to ensure that local stakeholders play a central role in the development of comprehensive, multi-issue watershed plans. A watershed approach to planning for and managing land and water resources is not a new idea. Explorer and civil-war veteran, John Wesley Powell, called for a water and watershed approach to organizing settlements in the arid West during the latter part of the 19th century. Only now has the wisdom of Powell's vision become fully appreciated. More recently, the United States Environmental Protection Agency (USEPA) reaffirmed their commitment to supporting a watershed approach to environmental-resource protection (i.e., Memo from G. Tracy Mehan, 2002). The USEPA argues that groups working within the watershed-based approach can identify and implement successful strategies to maintain and restore the chemical, physical and biological integrity of our nation's waters.

Closer to home, the Illinois Environmental Protection Agency is committed to a similar watershed approach to protecting, enhancing, and restoring state water resources. By focusing on multi-stakeholder efforts within hydrologically defined

boundaries to protect and restore our aquatic resources, watershed planning offers a promising approach to manage today's challenges.

Watershed planning efforts have evolved considerably over the last couple decades. Previously, such efforts were often top-down processes that focused primarily on single issues. More recently, local groups variously described as “place-based” or “community-led” planning initiatives have assumed a larger role in watershed planning and management. At the same time, the importance of comprehensive planning, rather than a single-issue focus, has also been recognized. This manual embraces this evolution in watershed planning and seeks to provide an up-to-date approach to guide locally-driven, comprehensive watershed planning efforts in Illinois.

The USEPA has incorporated the watershed-based approach into many of its major programs—most importantly, for our purposes, are regulations regarding eligibility for certain types of Clean Water Act, Section 319 funding. The Section 319 program represents the USEPA's primary nonpoint-source water-pollution-control program. The USEPA requires nine components of a watershed-based plan. This manual addresses each component and explains how you can ensure that your planning efforts meet these requirements. Meeting these requirements will help ensure that when work towards plan implementation begins, funding support can be found under the Section 319 program.

This Guidance for Developing Watershed Action Plans in Illinois (referred to as The Illinois Guide hereafter) aims to help the reader create and develop an effective watershed-planning initiative that will produce a locally driven watershed action plan. The Illinois Guide features seven chapters. Each chapter represents a step in the strategy for conducting a watershed planning process. It is meant to be a companion to other useful reports that provide water-quality data and cover a variety of related concepts that collectively represent important information for those wishing to become more knowledgeable about our water resources.

The reader is encouraged to review the entire document in order to get an overview of the entire process. However, groups that are seeking to update previously existing plans to meet the new requirements may find it more expedient to seek out the specific chapters and passages that apply to their needs. As the following table illustrates, each of the nine Section 319 components has been addressed by a planning stage. Note that some chapters do not address any of the nine components. This manual, while seeking to address these components, also strives to present a general

approach to comprehensive watershed planning, whether you elect to work within the guidelines of the Section 319 program or not.

Illinois Model Watershed Planning Stages	Section 319 Components
1. Identify Stakeholders	
2. Develop Goals and Objectives	
3. Inventory Watershed Resources and Conditions	
4. Assess Waterbody/Watershed Problems	a. Identification of causes and sources that will need to be controlled to achieve load reductions estimated within the plan
5. Recommend Management Practices	b. Estimate of the load reductions expected for the management measures described in component
	c. Description of the nonpoint-source management measures that need to be implemented in order to achieve the load reductions estimated in component b; and identification of critical areas
	d. Estimate of the amounts of technical and financial assistance needed; costs; and the sources and authorities (e.g., ordinances) that will be relied upon to implement the plan
6. Develop Action Plan	e. Information and public education component; and early and continued encouragement of public involvement in the design and implementation of the plan
	f. Implementation schedule
7. Monitor Your Success	g. Description of interim, measurable milestones for determining whether NPS measures or other actions are being implemented
	h. Criteria to measure success and reevaluate the plan
	i. Monitoring component to evaluate effectiveness of implementation efforts over time.