

**WOODSTOCK**  
**GREEN INFRASTRUCTURE PLAN**  
**A Natural Resources and**  
**Greenway Buffer Strategy**



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# **ACKNOWLEDGEMENTS**

## **Woodstock Green Infrastructure Plan – A Natural Resources and Greenway Buffer Strategy**

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#### **Woodstock Environmental Commission**

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# **INTRODUCTION**

The City of Woodstock has long been proactive regarding the need to preserve and protect natural resources in and around the community. Activities conducted and supported by the City in this regard have included:

- The preservation and upkeep of the Westwood Conservation Area and Ryders Woods site.
- The designation and preservation of the Silver Creek Conservation Area.
- Partnering with The Land Conservancy of McHenry County (TLC) concerning the maintenance of a number of City-owned properties, including the Hennen site on Dean Street and the Prairie Ridge Nature Area northeast of Dean Street and US Route 14.
- Implementing conservation design and tree protection ordinances and standards.
- The enactment of the first mandatory residential recycling program in McHenry County.
- The identification of environmentally sensitive areas on its comprehensive planning documents and a restriction on the extent that these areas can be developed.
- Working with the McHenry County Conservation District (MCCD) to acquire and preserve various environmentally valuable sites in and around the City, including the Dufield Pond and Kishwaukee Headwaters sites.
- Initiation of a rain garden demonstration program at the North Seminary Avenue Water Treatment Plant.
- Use of permeable brick pavers at the Woodstock Public Library's alternate parking lot.
- The creation of an environmental commission to prepare an environmental plan and to

address environmental concerns and issues identified by the City Council.

- Encouraging the use of native plant species in City-owned parks and as part of required landscape projects associated with new development and redevelopment.

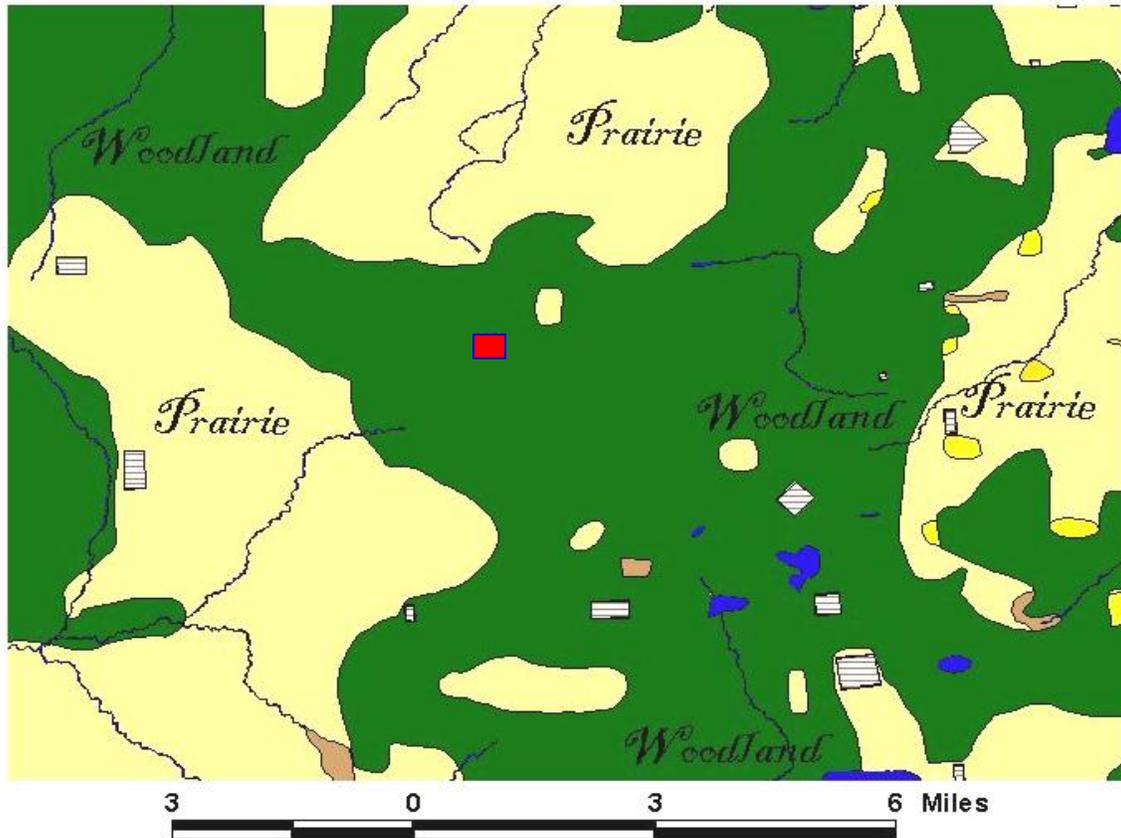
These activities and others are indicative of Woodstock's commitment to the physical environment and the protection of natural resources.

This Plan provides a further demonstration of the City's ongoing commitment in this area. Its purpose is to inventory and map natural resources in and around Woodstock and to show how they can be connected. It is intended to "start the conversation" and provide direction for natural resource protection and buffer creation efforts. It can also be used to identify the location of sites that should be protected and managed as open space, and to show how our natural features relate to future land use and development within Woodstock and its planning jurisdiction.

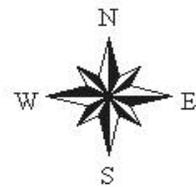
It will allow residents and property owners to become informed of the existence of green infrastructure in the vicinity of their property and how their land can be managed so as to protect and enhance adjoining green areas. This information can also be used to create guidelines and recommendations for the preservation, protection, and linking of natural features which comprise green infrastructure.

<b>ABBREVIATIONS</b>	
<b>BMP</b>	<b>Best Management Practices</b>
<b>GINM</b>	<b>Green Infrastructure Network Map</b>
<b>GITM</b>	<b>Green Infrastructure Trails Map</b>
<b>GIBM</b>	<b>Green Infrastructure Buffer Map</b>
<b>IDNR</b>	<b>The Illinois Department of Natural Resources</b>
<b>MCCD</b>	<b>The McHenry County Conservation District</b>
<b>SWCD</b>	<b>The McHenry-Lake County Soil and Water Conservation District</b>
<b>TLC</b>	<b>The Land Conservancy of McHenry County</b>

# Presettlement Landscape Map of the Woodstock Area, circa 1837



- Woodlands (forests and savannas)
- Wetlands (marsh and wet prairies)
- Prairies (grasslands)
- Swamps (brushy wetlands)
- Water
- Early Agricultural Homesteads
- Woodstock Square



Presettlement (1837) landcover map of the City of Woodstock and vicinity. The dominant community types mapped were prairie and timber (woodland). Other community types mapped were wet-prairies (yellow), water (blue), and sloughs or swamps (light brown). Several of the features shown in this map exist today as natural resource amenities. Source: Woodstock Environmental Plan 2010.

# **DEFINING GREEN INFRASTRUCTURE**

## **What is Green Infrastructure?**

The term “green infrastructure” has a variety of meanings. Woodstock’s Environmental Plan 2010 describes it as *“the life support functions provided by a network of natural ecosystems, including clean water, healthy soils, recreation, shade and shelter.”* The Environmental Plan also refers to the U.S. Environmental Protection Agency’s use of the term as *“the interconnected network of open spaces and natural areas, such as greenways, wetlands, parks, forest preserves and native plant vegetation, that naturally manages stormwater, reduces flooding risk and improves water quality.”*

Perhaps the most common way of using the term “green infrastructure” is based on physical characteristics and landscape features. In this context, it is described as an interconnected system or network of natural areas, landscapes, and open spaces. The foundation of a green infrastructure network is its natural elements, such as woodlands, savannas, wetlands, waterways, groundwater recharge areas, and grasslands that function together to sustain ecological values and functions. Green infrastructure can also include adjacent lands and features that connect natural communities, serve as buffers, and provide opportunities for restoration. This interconnected network of environmental resources supports biodiversity and provides habitat for diverse communities of native plant and animal life.

One element of the green infrastructure network is shown on the McHenry County Sensitive Aquifer Recharge Areas (City of Woodstock) Map on the next page. This map depicts major recharge areas in and around the City which are most sensitive to infiltration and potential contamination (see Appendix B for further information).

The above definitions include both existing green infrastructure, such as conservation district holdings, public parks, and designated natural areas, as well as adjoining areas that may be used for expansion and restoration. It may also include trails, cultural and historic sites, and recreational features. Green infrastructure serves to maintain ecosystem values and functions, and also provides associated benefits to human populations. It helps to preserve ecological processes, support native plant and animal communities, and contribute to the community’s health and quality of life.

Green infrastructure networks can be enhanced by nature-based alternatives to conventional “gray infrastructure”. In this smaller context, practices consisting of engineered natural systems are used to complement and support green infrastructure.

These practices are intended to improve overall environmental quality and provide essential utility services. The U.S. Environmental Protection Agency identifies several green infrastructure techniques, including green roofs, porous pavement, rain gardens, and vegetated swales, which use soils and vegetation to assist in the infiltration and/or recycling of stormwater runoff. In addition to effectively retaining and allowing the infiltration of rainfall, these technologies can also filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon.

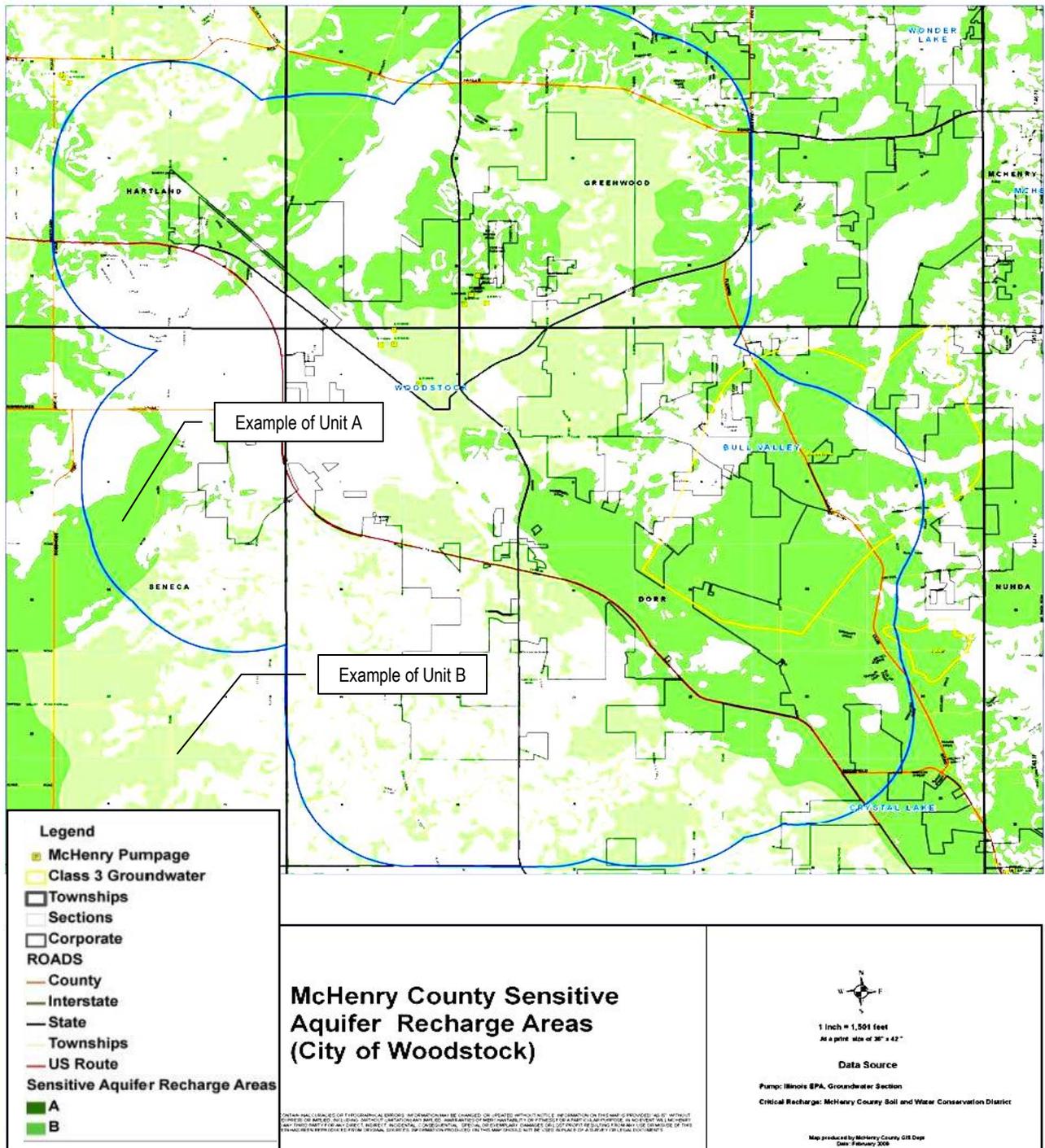
The benefits of viewing green infrastructure from both larger integrated land use and open space perspectives, as well as in terms of site specific green technology that results in better protection of natural systems, are examined further in this document.

## **Green Infrastructure Planning**

Green infrastructure planning is the opportunity to approach traditional land use planning in a different way. By inventorying and evaluating environmental functions and values before development activity begins, we obtain a detailed catalog of natural resources throughout the Woodstock planning area. This can be used to designate land for protection and/or restoration in order to promote and provide stormwater management, wildlife habitat, recreation, energy savings, aesthetic values, enhanced community health, and sustainable economies.

Land planning that starts within the context of local environmental and ecological systems can ensure that development is directed towards appropriate locations, thus protecting environmental resources and functions, and also saving money and energy. In existing developed areas, green resources can be reconnected and natural systems and habitats restored.

In summary, green infrastructure planning involves the inventorying of natural resources, identifying strategies for their protection, restoration, and enhancement, the development of a coordinated strategy to channel development efforts and redevelopment endeavors to the most appropriate and suitable locations, and the identification of retrofit opportunities for existing gray infrastructure.



McHenry County Sensitive Aquifer Recharge Areas Map  
(City of Woodstock), Source: McHenry County Dept. of Planning &nd Development

# **THE IMPORTANCE OF GREEN INFRASTRUCTURE**

Green infrastructure helps protect existing ecological systems and provides a basis for managing their growth and expansion. Maintaining and improving green infrastructure can enhance a variety of ecological, social, and economic functions, such as the generation of increased biodiversity, enriched plant and animal habitats, greater clean air and water quality, increased property values, and the possibility of more efficient stormwater management and treatment.

Preserving green infrastructure and managing it properly can provide numerous benefits, such as:

- Improved water quality.
- Better groundwater recharge.
- Reduced flood damage.
- Superior aquatic and terrestrial habitat and biodiversity.
- Connected trails, greenways, and open space amenities.
- Enhanced recreational activities.
- Additional ecotourism opportunities.
- Reduced costs for installing and servicing conventional infrastructure.

- Improved community health and enhanced climatic change mitigation.

Green infrastructure also benefits the community by:

- Contributing to the City's identity and sense of place.
- Integrating natural resource values into local management decision-making processes.
- Revealing opportunities for the restoration and enforcement of natural systems which already exist in or close to developed areas.
- Identifying relevant and important ecological areas and networks before development is proposed or occurs within and outside of the City.
- Allowing preservation efforts and development activity to be planned together and not in conflict with each other.
- Helping to create a vision of the future that can be used to help determine Woodstock's long-term planning goals and objectives.
- Providing a means of evaluating economic and environmental factors when making land use decisions.
- Ensuring that development and open space activity are encouraged and established in appropriate and compatible locations.

# **CURRENT PLANNING** **POLICIES & GREEN** **INFRASTRUCTURE**

Woodstock has traditionally supported the protection and preservation of natural resources. This is demonstrated throughout its planning documents and land use regulations, including those dealing with conservation design, tree protection, and the use of native landscaping and plant species. Planning policies and language relevant to green infrastructure and contained in Woodstock's planning documents are summarized below:

## **Woodstock 2020 Vision Statement**

The Woodstock 2020 Vision Statement states that "*Woodstock is ... A Connected Green Community*" and envisions the city as an "*innovative, progressive community that cares deeply about its rich green environment*" where "*all natural resources are valued as essential assets of the community and new developments are critically analyzed to evaluate environmental impact.*"

This Statement also sets forth the following aspirations:

- Maintain a strong commitment to the protection of natural resources through responsible stewardship characterized by strong city planning and sensible annexation.
- Have walking and bicycle paths running throughout the City and connecting to regional systems that extend miles in multiple directions.
- Have a large, inviting park system providing community "green space", as well as a variety of active and passive recreational opportunities.
- Have distinctive greenscape entryways and cobblestone detail that introduce the magic of Woodstock.

## **Woodstock Comprehensive Plan 2008**

The Woodstock Comprehensive Plan 2008 contains several goals and objectives which acknowledge the importance of environmental resources and the need to protect them. The Plan states that:

... the preservation of natural areas and open landscapes also sets Woodstock apart from other municipalities. An overall impression of extensive open landscapes and reduced development density are created by City owned sites, such as Ryders Woods, Westwood Park, and the Silver Creek Conservation Area, property owned and managed by the MCCD, as well as by privately owned parcels containing wetlands and woodlands ... Design standards for new development, together with an emphasis on conservation design and preserving natural resources on new development sites, help to maintain this impression. One of the benefits of having significant natural areas, open landscapes, and vistas is that the hectic lifestyle characteristic of highly developed areas is minimized. Furthermore, these areas perform important ecological functions and contribute to the biodiversity of Woodstock's planning area.

It also says that we should:

- (1) Protect natural resources and physical features; ensure an adequate and clean supply of groundwater; provide for clean air and surface water; protect wildlife habitat and mature trees; and encourage ecological diversity, health, and productivity;
- (2) Permit growth and change which is positive and sustainable, recognizes the value and positive benefits of natural features, and seeks to maintain and enhance them;
- (3) Maintain a strong commitment to the protection of natural resources through responsible stewardship characterized by strong and sensible planning and annexation practices.

Specific natural resource objectives listed in the Plan include:

- Encourage the preservation, restoration and protection of environmental amenities and natural resources especially where building and development activity is anticipated.
- Preserve, restore and protect the functions of flood hazard areas and drainage ways in and around Woodstock.
- Retain, restore and improve existing beneficial wetland areas and their functions, including

habitat, stormwater management, flood control, recreation, water quality maintenance, and aesthetics.

- Provide adequate long-term sources of quality potable water for existing and future community needs and conserve and replenish groundwater resources.
- Preserve and regenerate stands of oak and hickory trees and similar woodland resources.

Regarding open landscapes, the Plan seeks to encourage the designation of a variety of open areas in order to preserve natural resources, to provide for passive and active outdoor recreation, and to contribute to Woodstock's positive character. In relation to this, the following open landscape objectives were set forth:

- Maintain open landscapes and similar resources which complement and enhance the function of natural and environmentally sensitive areas.
- Ensure the provision and preservation of significant open landscapes where new development occurs.
- Preserve and protect existing open space and agricultural areas and uses, including those depicted on the City's Land Use Map.

The Woodstock Comprehensive Plan 2008 also strongly encourages the establishment of permanent buffers between the City and neighboring municipalities. These areas can serve as transitional zones between developed parts of the City and development occurring in other communities and in unincorporated portions of McHenry County. The Plan states that:

Buffer zones can consist of a variety of land use types and may include natural features such as wetlands, floodplain, prairie lands, woodlands, animal habitats, public/private conservation areas, and nature preserves. Deed-restricted open space which comprises part of a development site ... can also be used as part of or to augment a buffer zone ... Land used for crop production, pasture, orchards, as well as public right-of-way dedicated for limited highway and arterial road use, may also be considered as part of a buffer zone. Where such areas exist, consideration should be given to

connecting them and forming a linear buffer and open space system... The establishment of buffer zones should be strongly encouraged at strategic locations around the City. Examples of such areas include, but are not limited to:

- The general area extending south from US Route 14 to South Street, between the Westwood Park conservation area and Rose Farm Road (Seneca Township: east ½ of Section 11 and west ½ of Section 12). This area includes the Yonder Prairie and Westwood Conservation Area sites and surrounding area.
- The general area paralleling Nippersink Creek and perpendicular to Raycraft Road and IL Route 47 (Greenwood Township: south ½ of Sections 8 and 9, Section 10, and 18). This area includes the Bystricky Prairie Nature Preserve site along with surrounding area parcels.
- The general area located east of Fleming Road, south of IL Route 120, and in the vicinity of Cold Springs Road (Greenwood Township: southeast ¼ of Section 25 and Sections 35 and 36). This area includes the Boone Creek Fen area.
- The general area situated along IL Route 176, west of Dean Street, and extending north between Sunnyside Road and Dean Street (Dorr Township: west ½ and south ½ of Section 30, and Seneca Township: north ½ of Section 36). This location contains Lake Eddy and surrounding woodlands.

The above areas are generally depicted on the Natural Resources Map provided on the following page, and included on the green infrastructure inventory which was prepared for this Plan. The focus on natural resources in the Comprehensive Plan 2008 is further emphasized in its Natural Resources Map and Land Use Map which both depict environmental resources and amenities in and around the City.

There are a number of land use categories depicted in the Comprehensive Plan, including:



- **Resource Conservation:** This category refers to areas used and intended exclusively for the preservation and protection of wildlife habitat, wetlands, floodplains, open water, groundwater recharge, farmland, woodlands, and similar natural features and resources, which may be held in private or public ownership.
- **Resource Conservation Buffer:** These are areas adjoining Resource Conservation lands which serve as a buffer or transition between Resource Conservation areas and other land uses, or serve as a connecting corridor between isolated conservation areas. Development within this land use is generally not encouraged unless conservation design techniques are applied to protect the adjoining Resource Conservation lands. This overlay designation is not a specific land use.

These two land use categories include physical features that are very similar to the areas depicted on the green infrastructure inventory prepared for Woodstock. However, the green infrastructure inventory is more recent and up-to-date, has greater detail, and includes a greater variety of environmental features.

#### **Woodstock Environmental Plan 2010**

The Woodstock Environmental Plan, prepared in 2010, discusses green infrastructure and states that:

Green infrastructure brings together a network of open spaces, waterways and natural areas to provide wildlife habitat, support diversity of plant and animal species and provide recreational opportunities. It is important for Woodstock to identify these networks in its community vision, comprehensive plan and intergovernmental agreements with

neighboring jurisdictions. Green infrastructure stretches across municipal boundaries and in its ideal form creates a regional framework that links key natural areas and forms a web of natural connections.

Greenways are a subset of green infrastructure. Greenways are linear open spaces or corridors including land and water trail networks that can serve a number of different roles. Streams and hiking and biking trails preserve and expand habitat for flora and fauna, store, cleanse and absorb stormwater, and provide recreational opportunities for all age groups and levels of physical ability.

Woodstock, in its comprehensive plan, has identified resource conservation areas which follow stream corridors and link the currently protected natural areas. Protected land surrounding the community by MCCD, as well as city parks and natural areas, should be connected to form a cohesive web of habitat connectivity and recreational opportunities. Streams that run through the community are not navigable but should have buffers to protect their water quality and stream flow.

Among its recommendations, the Environmental Plan suggests that environmental features within Woodstock's green infrastructure be identified, protected, and enhanced; that green infrastructure be defined and identified in Woodstock's comprehensive plan and zoning documents; that a green infrastructure map which identifies the important elements and creates buffers around them be prepared; and that a greenways plan be created.

# **BASIC GUIDELINES FOR GREEN INFRASTRUCTURE PRACTICES**

There are a number of basic guidelines which are acknowledged during green infrastructure initiatives and practices. These can be used to provide a framework for achieving the sustainable use of land and creating interconnected systems of green space that will enhance local communities. When applied on a consistent basis, they provide general planning, acquisition, and preservation guidance and direction during the evaluation of development proposals and land disturbing activities.

- **Green infrastructure should serve as the framework for conservation and preservation decisions and activities.**

By using green infrastructure as a basis for the conservation and preservation of environmental resources, as well as for Woodstock's conservation design efforts, an interconnected green space framework can be created. Where isolated natural features already exist, an inventory of green infrastructure can help determine where connections between such features are most appropriate.

Identifying green infrastructure linkages before development plans are finalized, enables the City to inform developers of specific environmental resources and sites that the City believes are essential to the community and which must be protected. This is especially relevant during the preparation of development activity intended to move through Woodstock's conservation design process.

- **Green infrastructure connections should be established prior to the beginning of land disturbing development activity.**

The restoration of natural resources and environmental systems is generally more difficult and costly than trying to protect and preserve them prior to their disturbance or degradation. Since

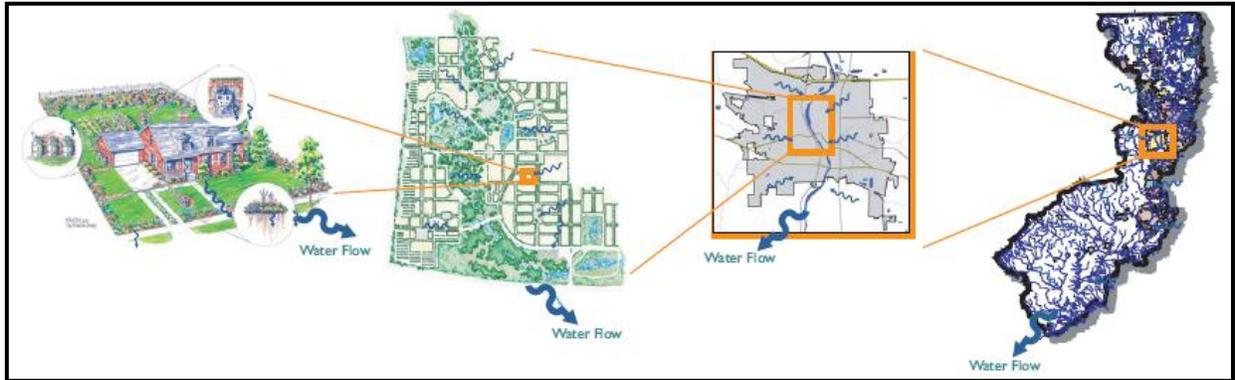
green infrastructure provides the ecological framework for the sustainable use of land, it is critical to identify and protect environmental resources and connections before construction of buildings, road networks, and utility systems begins. Whenever possible, the protection of green resources should occur before development. The adoption of a green infrastructure strategy by Woodstock will give the City an opportunity to reconnect valuable natural resources.

- **Connections and linkages are essential in order to create and maintain green infrastructure networks and systems.**

One of the goals which communities hope to achieve by protecting and preserving green infrastructure is the creation of open space networks that allow natural resources to be unified as an ecological system instead of as separate "stand alone" assets. Connecting the various components and features which comprise a community's green infrastructure is critical to the maintenance of vital ecological processes and to maintaining the health and diversity of plant and animal populations. In addition to using natural features to establish connections, artificially created amenities, such as bicycle and pedestrian trails, can also be utilized.

- **Green infrastructure systems occur at different scales and can overlap multiple jurisdictions.**

Like road and utility networks, green infrastructure systems often extend beyond government boundaries and contain features that function at different scales. When planning or designing green infrastructure linkages, it should be recognized that they can connect across urban and rural landscapes and incorporate green space functions at regional, community, and parcel levels. In many instances, it can be beneficial to work with neighboring municipalities, regional agencies and organizations, and private property owners to ensure that green infrastructure is protected beyond the City's boundaries. The schematic on the following page illustrates this concept of differing scales.



- **Green infrastructure involves public and private partnerships.**

The stakeholders of green infrastructure have varying backgrounds and needs, and successful initiatives involving the preservation of natural resources and the establishment of green infrastructure systems can create alliances among various organizations. Examples include such entities as McHenry County, the MCCD, TLC, the City of Woodstock, and the Environmental Defenders of McHenry County. In this context, it is important to acknowledge that green infrastructure systems do not require public ownership of the land, but may be preserved via easement, deed restrictions, or other legally agreed upon means.

- **Green infrastructure should be recognized as a public investment and priority.**

The value of green infrastructure is available to all residents and property owners in the community. Establishing green infrastructure systems will benefit the City by providing land for resource protection and restoration, recreation, and other public values. It may also lessen the need for “gray infrastructure” and thereby reduce the amount of public funds needed for conventional infrastructure improvements and maintenance. Green infrastructure systems can also reduce a community’s risk of getting damaged by flooding and other natural events. Realizing the public benefits of green infrastructure is a major step in demonstrating its importance and advising land owners that it is a high priority of the City.



Savanna Grove Subdivision Natural Area. Source: City of Woodstock.

# **GREEN INFRASTRUCTURE MAPPING**

## **Natural Resources and Open Spaces Data**

The McHenry County Department of Planning and Development has engaged in extensive mapping and compiled relevant data pertaining to the county's natural resource features. This information was gathered in the County's geographic information system and includes the following.

- Watershed boundaries
- Streams and lakes
- Floodplains
- Wetlands
- Illinois Natural Area Inventory (INAI) sites
- Existing public open space
- Woodland and grassland cover

These data sources were supplemented and enhanced with additional and more current local information, where appropriate. For example, wetlands data from the McHenry County ADID study replaced regional wetland data and oak woodlands mapping from the MCCD replaced the state woodland cover data.

After initial data was assembled, the County asked for input from regional and local conservation organizations. These included:

- Illinois Nature Preserves Commission
- Illinois Department of Natural Resources
- McHenry County Conservation District
- United States Natural Resources Conservation Service
- McHenry-Lake County Soil and Water Conservation District
- The Land Conservancy of McHenry County
- Environmental Defenders of McHenry County
- Openlands
- Several watershed planning groups

Based on the response from these groups, the most important resource layers were identified as core green infrastructure for mapping purposes and for the delineation of interconnected networks and the clustering of ecologically important areas. These areas include already protected and/or regulated locations, as well as unprotected resources. The information gathered for the entire County and evaluated during this effort was used as the basis for the City's green infrastructure inventory. This inventory is depicted on the

McHenry County Green Infrastructure Network Map. A copy of this map is provided in Appendix B.

## **The Green Infrastructure Inventory**

An overriding principle or assumption when mapping the green infrastructure inventory is that the size of resource areas and how they connect are extremely important. Elements of this approach include:

- Preserving large core areas.
- Protecting complexes of adjacent resource areas, such as wetlands, woodlands, and prairies.
- Connecting core areas with corridor, trail, or landscape linkages.
- Buffering critical areas from conflicting or harmful activities and land uses.

When green infrastructure inventory mapping is done at a large scale, such as for an entire county, small or isolated resource areas may not always be included. While such areas can be important for long-term protection, their exclusion from the map lessens map "clutter" and creates an opportunity to examine resources as part of a large-scale network. Never the less, the mapping prepared for Woodstock includes all publicly owned parks and existing natural areas regardless of size.

In order to acknowledge the elements listed above, the following specific core natural resource features were identified in the mapping effort.

- Waterways (lakes, ponds, rivers, creeks).
- Wetlands (NRCS and ADID surveys).
- McHenry County Natural Areas Inventory Sites (MCNAI).
- Illinois Natural Inventory Sites.
- IDNR Nature Preserves.
- IDNR Land and Water Reserves.
- Remnant oak woodlands from 2005 MCCD inventory.
- MCCD and IDNR sites and trails.
- FEMA 100-year flood hazard areas.
- TLC holdings and conservation easements.
- Threatened and endangered species locations.
- Class III groundwater protection areas.
- Open space mapping (McHenry County 2030 Comprehensive Plan).
- Hydrologic Atlas floods of record mapping.
- Resource conservation and conservation corridors (Woodstock Comprehensive Plan 2008).

A buffer of 200 feet was placed on the edge of the most critical natural resource areas, i.e., along waterways and on MCCD and IDNR sites/trails, but not on FEMA floodplain features. The buffers signify the importance of protecting critical resources and the need to be sensitive to activities and land uses which adjoin them. They are also used to provide mapping “connectivity” for adjacent natural resource areas that may appear separate on a map but actually function as an interconnected complex. The buffers serve as a means of using natural resource areas to maintain Woodstock’s identity and avoiding the blending of the City with other neighboring communities and developed areas.

The use of a 200 foot buffer is intended for general planning purposes and not necessarily as a regulatory device. For comparison, the McHenry County Stormwater Management Ordinance, which was adopted by and is enforced by the City, contains stream and wetland buffer requirements ranging from 30 to 100 feet, depending on resource quality and size. Recommended habitat buffers, however, may often exceed 300 feet for wetland habitats or sites containing endangered or threatened species.

Besides core natural resource features, additional mapping of supporting green infrastructure was conducted and used with the core natural resource features to finalize the core green infrastructure mapping. The following supporting natural resource information was collected:

- Hydric soils.
- Organic soils (includes peat and muck areas that may be suitable for wetland restoration).
- Highly erodible soils.
- Sensitive aquifer recharge areas.
- Watersheds and sub-watershed boundaries.
- Chicago Wilderness Green Infrastructure Vision Resource Protection Areas

### **Green Infrastructure Maps**

As part of this Plan, three maps have been prepared specifically for Woodstock and the surrounding area. These maps consist of:

- Green Infrastructure Network Map (GINM) - This map serves as the foundation for the other maps and for several of the recommendations set forth in this Plan.
- Green Infrastructure Trail Map (GITM) - This map depicts high priority natural resource sites and potential trail connections based on

existing and potential regional trails, the McHenry County Trail Map, and the 2009 Woodstock Master Bicycle Plan. It is designed to be used in conjunction with the GINM and GIBM.

- Green Infrastructure Buffer Map (GIBM) - The major feature depicted on this map are buffer zones located for the most part outside of the City. The buffer zone areas, which are depicted in blue, contain designated environmental resources, as well as existing and proposed future connections between these areas. The buffer is intended to help preserve natural resources and to also serve as a means of distinguishing Woodstock from other communities in the immediate area. It is general in nature and the area encompassed by it may vary when additional and more detailed analysis is done of individual land parcels or as land uses change.

Each of these maps is discussed in greater detail below.

### **The Green Infrastructure Network Map**

Using the mapping data and standards discussed above, the Green Infrastructure Network Map, or GINM, was created for Woodstock and its surrounding one and one-half mile planning jurisdiction. In some locations this area was extended to depict existing natural features which extend beyond Woodstock’s planning jurisdiction. A reduced copy of the GINM is on the next page.

The map was coded with the referenced core natural resource layers and used to depict interconnected green infrastructure systems. As part of this task, several questions were considered to establish content for the green infrastructure network map. These questions included:

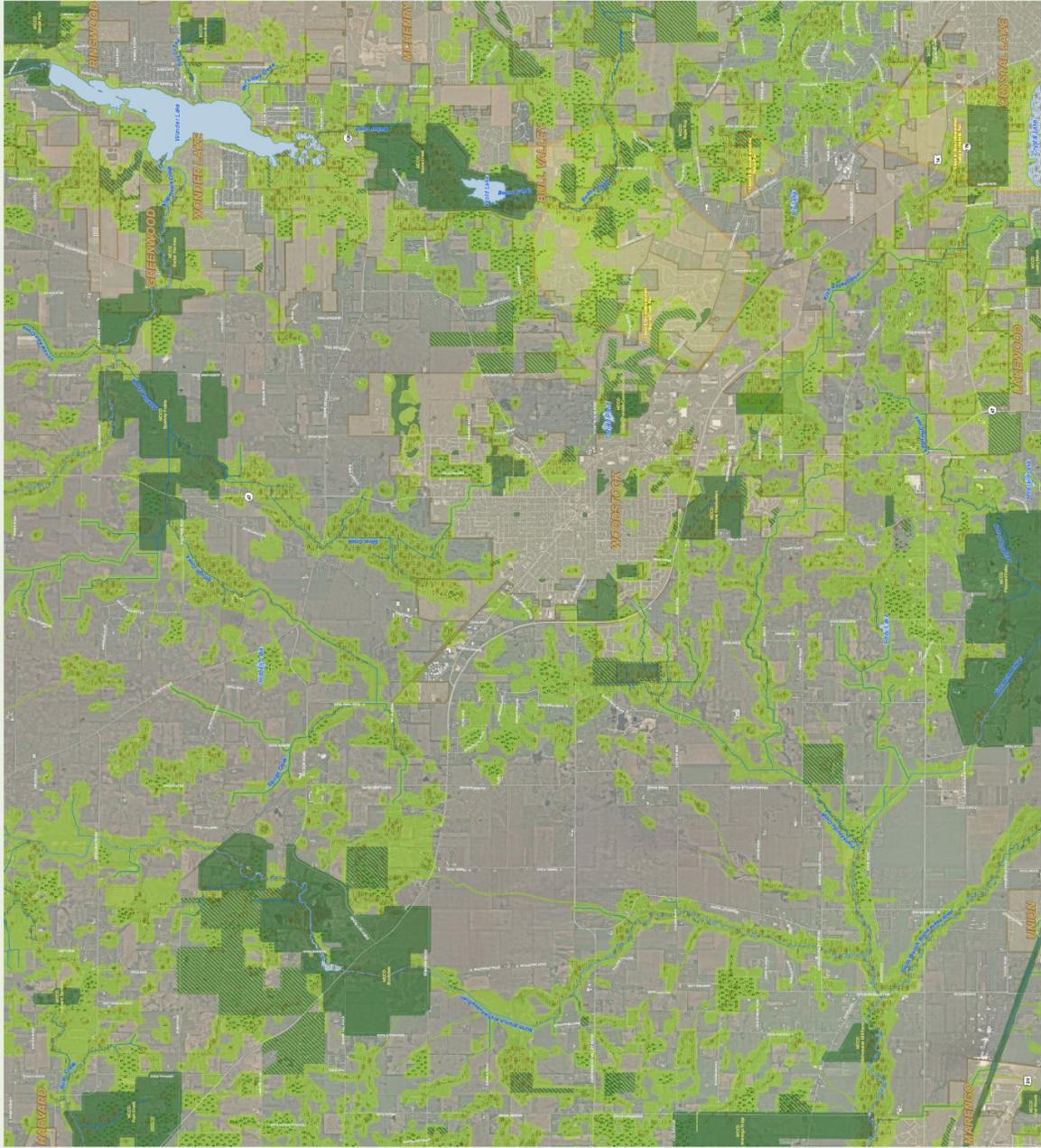
- Which natural resource features should be included in the proposed green infrastructure network?
- Which features should be excluded?
- What is the minimum size for designating natural resource areas as ecologically significant?
- When should connections between natural resource areas be made, thereby pulling certain isolated areas into the green infrastructure network?

A summary of these parameters follows.

# Green Infrastructure Network Map for Woodstock, Illinois

- 
**Parks and Preserves**  
 This layer consists of parks, used for public recreation, such as municipal and private parks, MCHD holdings, and state parks. These areas are typically located in the center of the city, along major roads, and along the edge of MCHD holdings and state parks.
- 
**Private Open Space**  
 This layer consists of land that is generally owned but either parcelized from the owner or held in trust for the owner. This layer includes private open space, such as golf courses, and corporate or institutional land. This layer includes land owned by the City of Woodstock, the McHenry County Board of Supervisors, the McHenry County Board of Health, the McHenry County Board of Education, and the McHenry County Board of Public Safety. This layer also includes land owned by the City of Woodstock, the McHenry County Board of Supervisors, the McHenry County Board of Health, the McHenry County Board of Education, and the McHenry County Board of Public Safety.
- 
**Environmental Resource Area**  
 This layer consists of various parks, creeks, wetlands, McHenry County (MCHC) sites, and wetlands. This layer includes flood hazard areas, such as the McHenry County Flood Hazard Areas, and flood hazard areas, such as the McHenry County Flood Hazard Areas. This layer also includes flood hazard areas, such as the McHenry County Flood Hazard Areas, and flood hazard areas, such as the McHenry County Flood Hazard Areas.
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**ADID Wetland**
- 
**Oak Grove**
- 
**Class III Groundwater Protection Area**

Prepared by the McHenry County Department of Planning and Development for the City of Woodstock, Illinois, June 28, 2012.



Green Infrastructure Network Map for Woodstock, IL. Prepared by the McHenry County Dept. of Planning & Development

# Green Infrastructure Network Map Legend



## Parks and Preserves

This layer consists of lands owned by public agencies such as municipal and district parks, MCCD holdings, and state parks. These areas are typically open to the public. Included in this category is a 200-foot buffer around the outside edge of MCCD holdings and state parks.



## Private Open Space

This layer consists of land that is privately owned but either precluded from development or is unlikely to be developed based on its current use. Private open space includes subdivision common areas, golf courses, and camps as well as privately owned properties that are permanently preserved such as IDNR Nature Preserves, IDNR Land and Water Reserves, and conservation easements. These areas typically are not open to the general public. Included in this category is a 200-foot buffer around the outside edge of the sites designated as Illinois Nature Preserves and Land and Water Reserves.



## Environmental Resource Area

This layer consists of lakes, ponds, rivers, creeks, wetlands, McHenry County Natural Areas Inventory (MCNAI) sites, Illinois Natural Areas Inventory (INAI) sites, oak woodlands, FEMA 100-year flood hazard areas, and Hydrologic Atlas floods of record. These areas were chosen to be included here because they provide, or have the potential to provide, valuable natural functions such as storm water management, aquifer recharge, water filtration, and flora and fauna habitat. Included in this category is a 200-foot buffer around the outside edge of the resource areas with the exception of flood hazard areas and floods of record.



## ADID Wetland



## Oak Grove



## Class III Groundwater Protection Area

- If adjacent resource areas are within 200 feet of each other, consider showing a connection or linkage between them. In special cases, such as the connection of MCCD macro sites, the connection distance may be extended.
- If a municipal park without any significant natural features (e.g., a playing field or athletic complex) is isolated with no connectivity to other natural resource areas, consider whether or not it should be included as part of the GINM.
- Isolated resource complexes of 10 or more acres, including adjoining protective buffer areas, should be retained on the map.
- Where necessary, refine the boundaries of select MCNAI sites that are mapped as large planning areas, rather than as specific habitat complexes.
- Do not include Class III groundwater protection boundaries as standard core features. Instead, their identification as overlays on final maps should be evaluated.
- Selectively add “organic soils” areas where they enable connections between neighboring wetland features or provide opportunities for large-scale wetland restoration.

The GINM was amended to include locations with both core and supporting green infrastructure data and, where appropriate, to designate connections between green infrastructure sites. The opportunity to review the map was given to a number of local environmental organizations, including the MCCD, TLC, SWCD, and the Environmental Defenders of McHenry County, for their review and input. Based on the input received, additional changes were made. The GINM was then presented to members of the Woodstock Plan Commission and Environmental Commission for additional comment.

### **The Green Infrastructure Trail Map**

The Green Infrastructure Trail Map, or GITM, is based in part on the inventory information on the GINM. Additional material used in preparing this map was obtained from a variety of other sources, including the McHenry County Green Infrastructure Trail Map and the Woodstock Master Bicycle Plan.

The importance of trails is due to the role they play in the development of green infrastructure networks. They can link natural resource areas and facilitate the movement of animal species between habitat areas. They can also help form connections between people and nature. Multi-purpose trails in the Woodstock area can make the natural environment more accessible and, in doing so,

allow more people to experience its beauty and value. The more that people connect with the land, the greater the support for natural area preservation. Thus, in addition to providing recreational and transportation benefits, trails can also serve nature.

McHenry County, after acknowledging the benefit of trails in green infrastructure planning, prepared an extensive survey and map of existing and planned trails for the county. The survey included regional trail maps, county trail maps, municipal bike maps, comprehensive plans, and park district maps.

The green infrastructure trail mapping process conducted by the County originated with a review of regional greenways and trail maps. The Northeastern Illinois Planning Commission and Openlands developed a large-scale regional plan and map in 1997 based, in part, on input from local governments. Subsequently, the Chicago Metropolitan Agency for Planning developed an updated Northeastern Illinois Regional Greenways and Trails Plan. In addition, Openlands and the Illinois Department of Natural Resources worked with various collaborators to develop a plan for the Grand Illinois Trail. These resources served as a starting point for the County’s efforts. To identify and obtain more local trails information, local municipalities, townships, and park districts were invited by the County to help identify existing and potential trail connections at sub-regional and local levels. The focus was on opportunities to provide non-motorized movement such as hiking and bicycling at both a county and community-scale, for purposes of recreation, commuting, and shopping. As part of the mapping, MCCD and the McHenry County Division of Transportation were consulted to identify additional trail opportunities. The intent of this mapping process was to identify existing and potential trail connections that:

- Linked municipalities
- Joined local trails to MCCD regional trails
- Connected local trails and communities to open space sites
- Served as open space connectors

The County’s mapping activity made it possible to better identify potential trail links between significant natural areas and buffer zones in and around Woodstock. This information, along with the GINM, was used in the development of the GITM for Woodstock.

The GITM depicts networks of dedicated green infrastructure, as well connecting trails which link natural resource areas, protect significant open

space amenities and create a means of visually distinguishing Woodstock from other municipalities and unincorporated developments. A reduced copy of the GITM map is provided at the end of this section.

### **The Green Infrastructure Buffer Map**

During the Woodstock City Council's discussion of the Woodstock Environmental Plan in 2009 discussion occurred regarding the establishment of buffer zones around the City. There was a consensus among Council members that the creation of buffers around portions of the City could result in benefits to the community and that it was a topic that needed further exploration. It was also apparent to the Council that a buffer program would be one way of maintaining Woodstock's distinctiveness and physical separation from neighboring communities and protecting important natural areas and resources.

In February 2010 the Environmental Commission discussed the establishment of buffer zones and agreed that a buffer zone strategy should be

prepared and presented to the City Council for its approval. Suggestions made by members of the Commission during this meeting have been incorporated into this Plan and into the recommendations set forth herein.

Buffer zones will differ in size and can consist of different land use types and may contain features such as wetlands, floodplain, prairie lands, woodlands, animal habitats, public/private conservation areas, and nature preserves. They may also include or coincide with open spaces established and dedicated as a condition of development approval such as public/private parks, recreational areas, golf courses, and trail systems. Deed-restricted open space comprising part of a development project, as well as large-lot estate developments characterized by significant open space and low housing/population density, can also be used as part of or to augment buffer zones. Land used for crop production, pasture, or orchards may also be considered as part of a buffer area.



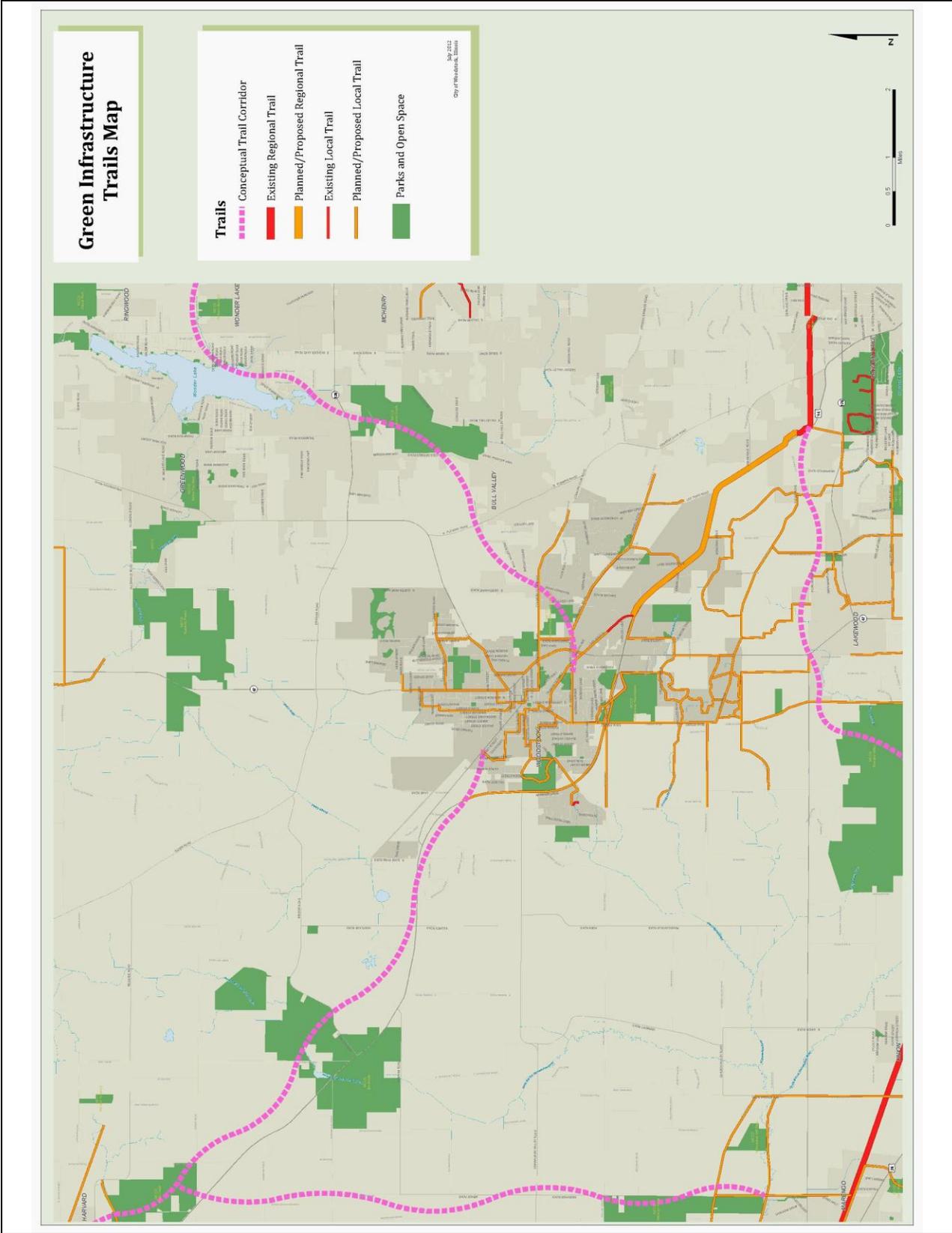
Example of riparian buffer zone. Source: USDA Natural Resources Conservation Service

The designation of buffer zones around Woodstock is a priority. By determining the location of such areas prior to future development activity or expansion of the City, advance notice is made available to property owners and potential developers. This allows them to make more informed decisions and provides direction regarding what to expect from the City if development activity is proposed. It also provides direction to the Plan Commission and City Council when development is proposed within or close to an intended buffer and serves as a reminder of Woodstock's land use goals and priorities

Based on goals and objectives in the Woodstock Comprehensive Plan 2008 and the Environmental Plan 2010, as well as direction from the City Council, a green infrastructure buffer map or GIBM was prepared for the Woodstock area. A reduced copy of this map is provided at the end of this section.

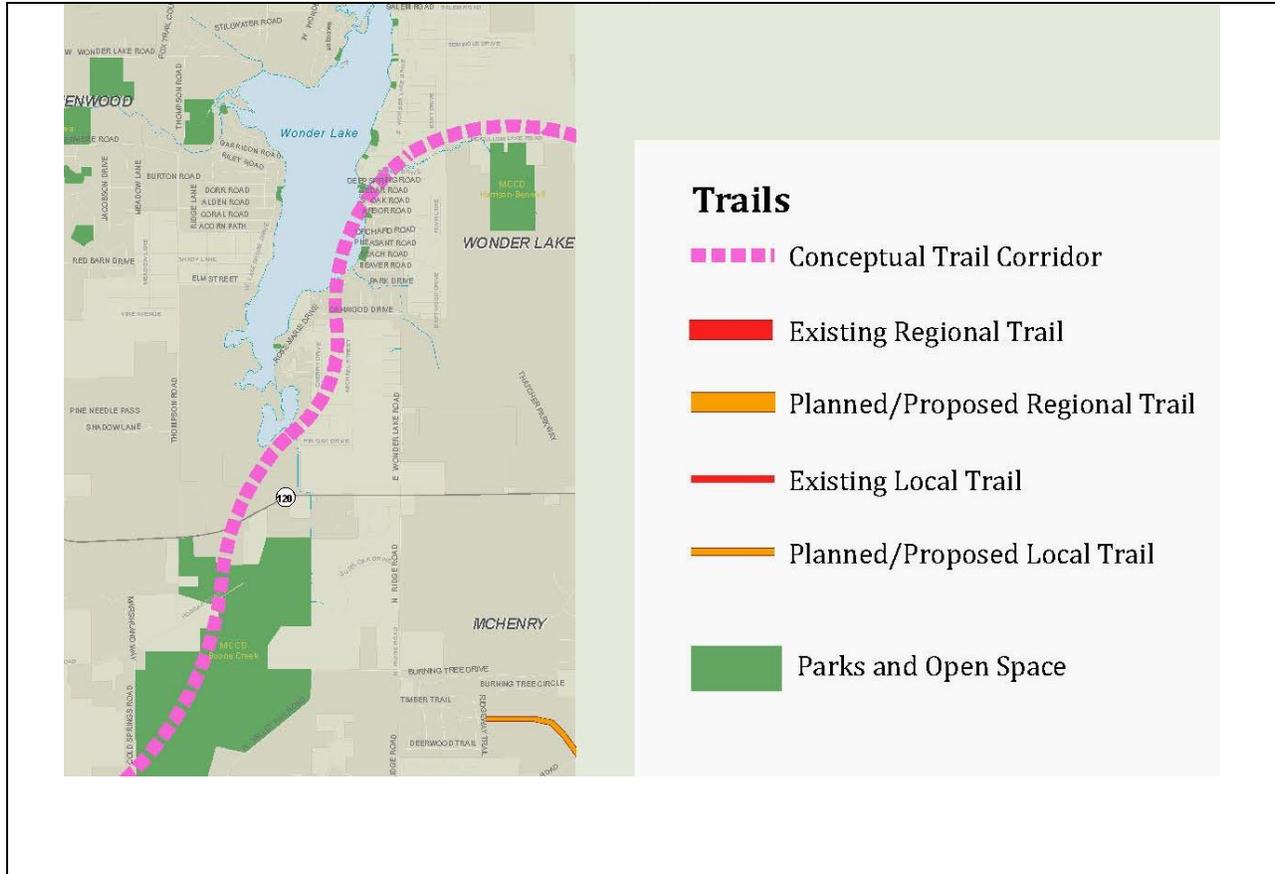
The buffer zone shown on the GIBM is a broad and general depiction of where the preservation and setting aside of protected natural features and open spaces are appropriate. It is emphasized that the buffer zone is a general category and serves as a starting point for the setting aside and preservation of natural areas and open space, as well as those areas which serve to connect these features.

The buffer zone designation does not prohibit the development of land within it, but provides advance notice to private land owners, developers, and the City that the physical characteristics of the land are likely to necessitate the use of special design and development techniques. It also indicates that as part of the development process, there may be requirements regarding the preservation of specific physical amenities and the need to make connections to neighboring land parcels.



Green Infrastructure Trails Map for Woodstock, IL. Prepared by the McHenry County Dept. of Planning & Development

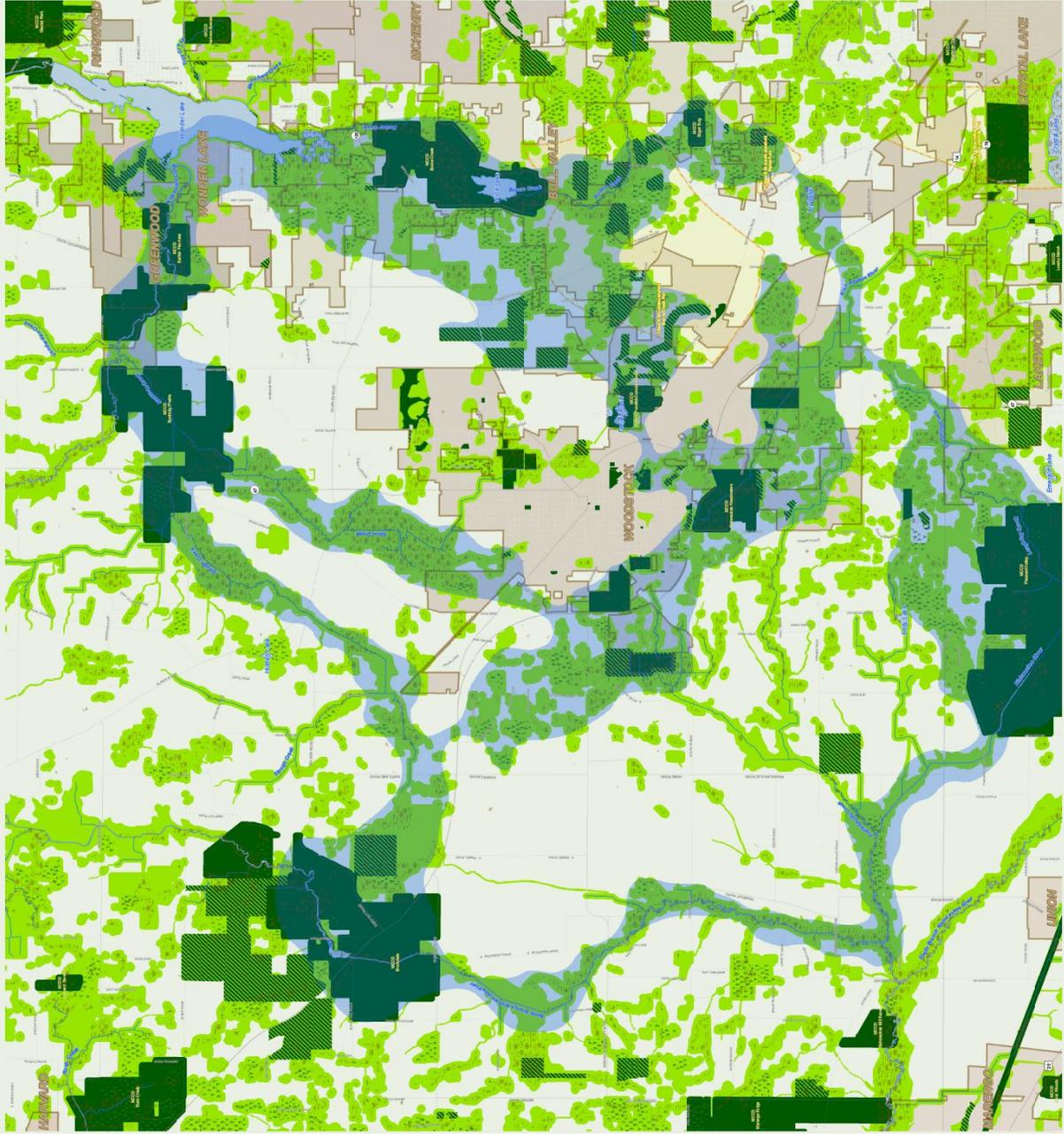
# Green Infrastructure Trails Map Legend



# Green Infrastructure Buffer Map for Woodstock, Illinois

- Buffer Zone**  
The buffer zones contain designs of environmental resources as well as the surrounding areas that are adjacent to the resources. The buffer zones are designed to help preserve natural resources and to also serve as a transition of developing land from other communities in the immediate area.
- Parks and Preserves**  
The parks and preserves are owned by public sector such as municipal and district parks, MCHD holdings, and state parks. These areas are typically managed by the public sector and are typically managed as parks or preserves.
- Private Open Space**  
This layer consists of land that is privately owned but either provided from development or is publicly owned. These areas are typically privately owned but are managed as parks or preserves. These areas typically are not open to the general public, but are managed as parks or preserves.
- Environmental Resource Area**  
This layer consists of areas such as wetlands, water bodies, McHenry County Natural Areas Inventory (NAI) areas, Illinois Natural Areas Inventory (INAI) areas, and other areas. These areas are typically managed as parks or preserves and are typically managed as parks or preserves.
- ADID Wetland**
- Oak Grove**
- Class III Groundwater Protection Area**

Prepared by the McHenry County Department of Planning and Development for the City of Woodstock, IL  
July 2012



Green Infrastructure Buffer Map for Woodstock, IL. Prepared by the McHenry County Dept. of Planning & Development

# Green Infrastructure Buffer Map Legend



## Buffer Zone

The buffer zone area contains designated environmental resources, as well as existing and proposed future connections between these areas. The buffer is intended to help preserve natural resources and to also serve as a means of distinguishing Woodstock from other communities in the immediate area.



## Parks and Preserves

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## Environmental Resource Area

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## ADID Wetland



## Oak Grove



## Class III Groundwater Protection Area

# **GREEN INFRASTRUCTURE AT THE LOCAL SCALE**

Green infrastructure can exist at various spatial scales, such as regional, neighborhood, and local. Examples of regional scale approaches include the creation of green infrastructure network maps and the buffer zone mapping. The data for such maps, which have been prepared for the Woodstock area, were evaluated in relation to Woodstock's overall one and one-half mile planning jurisdiction.

Activities occurring at the neighborhood scale can include using a "conservation design" approach for the development of land or designing large stormwater management systems for new subdivisions. Local and more site-specific efforts may include the use of rain barrels, natural landscaping, or rain gardens.

An essential green infrastructure consideration is the opportunity to work with residents, landowners, and local businesses at the neighborhood or site specific scale, and to incorporate green infrastructure practices in yards, subdivisions, business sites, and school grounds. Such practices lead to better water quality, reduced flooding, groundwater recharge, increased benefits for local habitat, aesthetic amenities, and, in many instances, less expensive alternatives to traditional gray infrastructure. Green infrastructure techniques can also be applied by developers at a neighborhood scale, when land is subdivided and a conservation design approach is used.

Local green infrastructure best management practices, or BMPs, and techniques include:



Woodstock Public Library auxiliary parking lot with permeable pavers. Source: City of Woodstock

**Permeable Paving** - Permeable paver systems, as well as porous concrete or asphalt, are paving systems that are installed in lieu of conventional asphalt or concrete. These systems have spaces that allow water to move through the driving surface rather than running off. Runoff is temporarily stored in the underlying stone base for gradual infiltration into the soil and underlying water table and/or slow release to the storm drain system. Common applications for permeable paving include parking lots, driveways, and pedestrian walkways. Permeable pavers may also be used for the rebuilding and resurfacing of streets and public roadways. The schematic on the following page shows a permeable paver system with a bio-swale stormwater management feature.

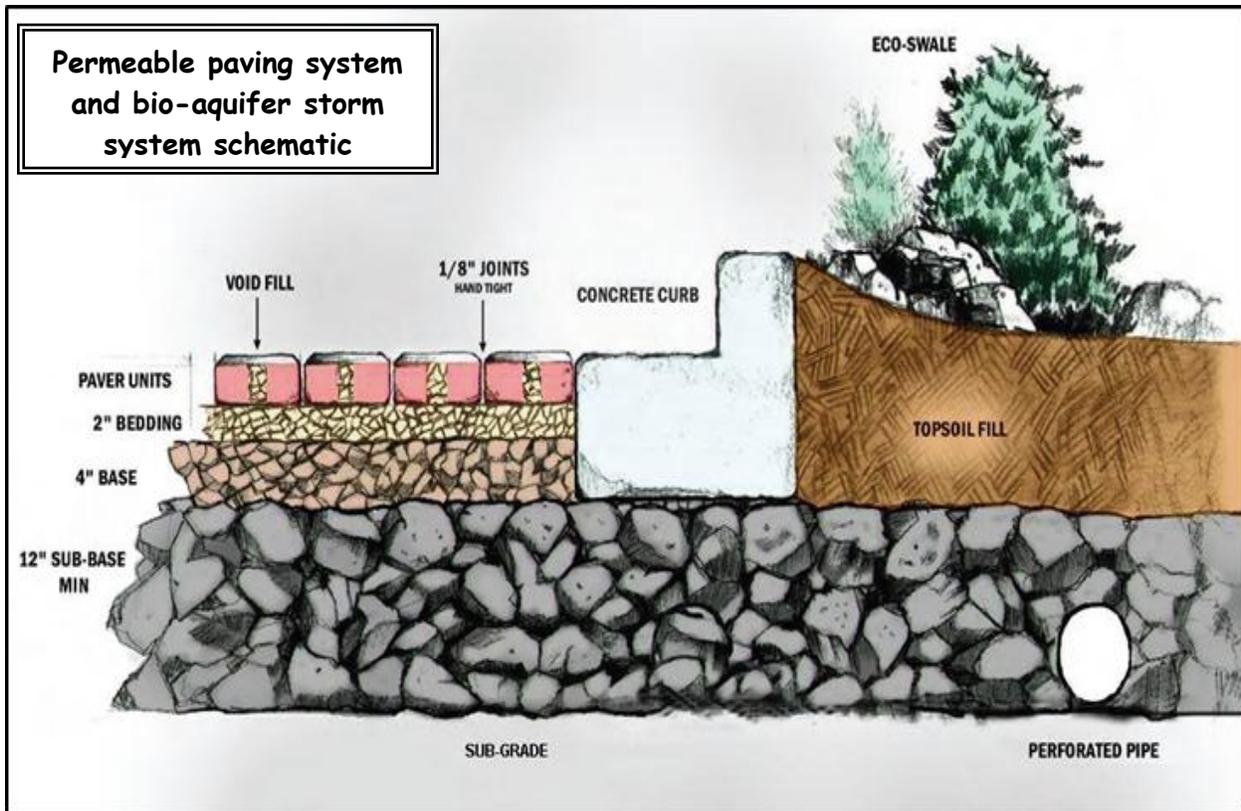
**Bioswales and rain gardens** - Bioswales and rain gardens are vegetated swale systems with an infiltration trench designed to collect, store, and absorb stormwater from a roof or paved area. They provide a less expensive alternative to costly conventional storm sewers and drainage systems. Bioswales and rain gardens are typically planted with native grasses and wildflowers that enhance the filtration, cooling, and cleansing of water.



Seminary Avenue Water Treatment Plant rain garden. Source: City of Woodstock

**Green roofs** - Green roofs are vegetated systems designed to retain and slow rainwater runoff from the tops of buildings. Green roofs are commonly planted with drought and wind tolerant vegetation and rainwater is slowly released at a restricted rate and given a better opportunity to be absorbed into the ground. Green roofs can also provide aesthetic amenities and serve as heat and cold insulation.

**Rain barrels** - A rain barrel is a rainwater collection and storage system that collects rainwater from a roof. In the absence of such a system, the rainwater would otherwise be lost to runoff and diverted to storm drains and streams.



Typically, a rain barrel is composed of a 55 gallon drum that is situated conveniently under a residential gutter down spout. Like cisterns, water stored in rain barrels can be used to provide gradual irrigation for lawns, gardens, landscaping, and potted plants.



Native landscape plantings on Tryon Street.  
Source: City of Woodstock

**Native landscaping** - This refers to the use of native prairie and wetland grasses, flowers, and shrubs instead of conventional turf grass. Typical

applications range from large corporate, residential, or institutional open space areas to small residential gardening projects. Native landscaping is more drought tolerant and uses less water, and is often a component of other best management practices, such as detention basins, filter strips, bioswales, and rain gardens.

**Naturalized detention basins** - Naturalized detention basins utilize native wetland and prairie plantings in basin bottoms, shorelines, and side slopes. They improve water quality, discourage nuisances such as Canada goose populations, provide natural habitat amenities, and can also provide aesthetic benefits. Utilizing a naturalized detention basin can also be done as a retrofit to improve water quality functions, reduce shoreline erosion, and lower maintenance costs of existing basins.

Many local governments, through ordinances and informational programs, promote the infiltration of clean runoff in newly developed areas utilizing the techniques described above. Municipalities have often amended their zoning, subdivision, and landscaping ordinances to allow or encourage green infrastructure practices for new development and redevelopment. Many communities have also developed and enacted comprehensive groundwater protection regulations, which may include

zoning and subdivision provisions, for recharge area and wellhead protection.

Woodstock, in its Unified Development Ordinance stipulates the use of “native landscaping to provide water quality benefits and infiltration” in retention and detention ponds and supports the use of “pervious brick or paver materials” for driveways and walkways. It also requires that new development which is proposed on land containing significant natural resources, comply with the City’s conservation design standards and specifications.



Naturalized detention basin at southwest corner of Country Club and Zimmerman Roads. Source: City of Woodstock

## **IMPLEMENTATION ACTIONS**

Recommendations, policies, strategies, and actions which should be considered in order to achieve the green infrastructure purposes and benefits discussed herein are identified in this section. Where applicable, specific implementation tools and local examples are also referenced.

It is important to realize that the various items listed below are not regulatory in nature and do not carry the full force of law. Many of them will require additional and specific action by the City Council. Furthermore, while these recommendations are directed toward the City, it must be emphasized that their implementation is not necessarily the sole responsibility of Woodstock and that the cost of implementing them should not be borne solely by the City.

In order to protect core green infrastructure resources and maintain green infrastructure networks and systems, the actions below should be considered.

### **Acquisition of Green Infrastructure by Public Agencies**

Open space and natural area acquisition is one of the most effective methods for the protection of areas depicted on the green infrastructure network map. It is a method that has been used successfully by the City, as well as by the MCCD and other agencies, to protect open space. The City and the District cooperated in the acquisition of the Dufield Pond Conservation Area on Country Club Road and the Kishwaukee Headwaters' site situated southeast of the intersection of Dean Street and US Route 14. Both of these areas are now owned by the MCCD.

Although such sites can be purchased by the City, it is preferred from a fiscal perspective that other less expensive methods of acquisition occur and that the costs of acquisition be paid through means other than local tax dollars. These methods can include acquisition through annexation negotiations or development approval, and funding assistance through IDNR's Open Space Lands Acquisition and Development (OSLAD) Program and the federally funded Land & Water Conservation Fund program (LAWCON).



**Local Examples** - The 8.86-acre Prairie Ridge Nature Area owned by the City and situated northeast of the intersection of Dean Street and Wagner Lane/US Route 14 is an example of acquiring title to green infrastructure resource sites through the development review and approval process. This location features native prairie grasses and vegetation, and significant wetland features. As part of the approval process for the Prairie Ridge Subdivision, Woodstock was conveyed title to this property by the developer. The City then entered into an agreement with TLC for management assistance with initial management funding provided by the developer. Source: City of Woodstock

### **Recommendations**

- The City of Woodstock should develop a land acquisition policy and identify green infrastructure priorities within the City's planning jurisdiction. Opportunities for protecting local natural areas that are part of the green infrastructure network should be identified, and efforts to educate residents and property owners about the value of these natural resources and the networks they comprise should be made.
- The City, as well as other government agencies, should continue to acquire natural open space with priority on those areas delineated in the GIBM.
- Where appropriate, the City and neighboring municipalities should work for the adoption of intergovernmental partnerships and leverage their resources to create and preserve natural communities. This should especially be done for the protection of plants and animals that need large tracts of land to survive. This is especially relevant where large assemblages of wetlands, stream corridors, prairies, savannas, and woodlands exist and provide habitat for a variety of plant and animal species.

- Woodstock, McHenry County, the City of Crystal Lake, the Village of Bull Valley, and MCCD should cooperate and coordinate their efforts to preserve and protect those green infrastructure resources located within their overlapping jurisdictions.
- Application should be made by the City, with assistance and support from other governmental bodies and local conservation groups, for state and federal grants to promote acquisition, restoration, recreation, and management activities.
- The City should coordinate with US Fish and Wildlife Service and MCCD efforts in the implementation of the Hackmatack National

Wildlife Refuge along Woodstock's northern planning boundary (see Appendix F).

- Woodstock, either by itself or with other municipalities interested in preserving natural areas as public open space, should consider utilizing the resources of the Illinois Department of Natural Resources (IDNR). IDNR has a long history of working with communities and park districts through its Open Space Lands Acquisition and Development (OSLAD) Program and the federally funded Land & Water Conservation Fund program (LAWCON). Additional information about these programs about these programs about these programs is available at <http://dnr.state.il.us/ocd/newoslad1.htm>.

#### HELPFUL REOURCES

The Land Conservancy of McHenry County provides guidance to landowners who may be interested in land protection options. Its website (<http://www.conservemc.org/what-we-do/preserve-land.html>) addresses conservation easements, land donations, other land protection options, and financial benefits and funding options.

There are several financial benefits for landowners who choose to permanently preserve their land with a conservation easement or a State Nature Preserve dedication.

- **Income tax benefit:** Landowners qualify for an income tax deduction equal to the difference between the value of their property with and without an easement. This is treated by the IRS like other non-cash donations to charity, and the landowner can deduct up to 30% of Adjusted Gross Income in non-cash donations and they can carry any unused portion of the deduction forward for 5 years.
- **Property tax benefit:** Land dedicated as an Illinois Nature Preserve or Nature Preserve Buffer is taxed at a rate of \$1 per acre per year. Land dedicated as an Illinois Land & Water Reserve, or that has a conservation easement that qualifies for a Certificate of Public Benefit from the state, can apply to have the assessed valuation on the land (not the buildings) reduced by about 75%.
- **Estate tax benefit:** Land that is protected with a conservation easement when valued as part of an estate will be reduced in value by 40% (up to \$500,000) for purposes of determining any estate taxes owed.

Illinois Nature Preserves Commission staff is available to meet with McHenry County landowners to describe the land protection programs in greater detail, help landowners assess the ecological value of their land and whether their land qualifies for these programs, and help the landowner implement a land-protection program. More information about the mission of the INPC, its authority to protect land under State statute, management of land, and the land protection programs are available at (<http://www.dnr.state.il.us/INPC/index.htm>).

#### Conservation Easements

Privately owned natural areas and open spaces can be voluntarily dedicated for long-term protection through the granting of a conservation easement. Under this provision, such areas remain in private ownership, but the rights to change use are given to a controlling agency, such as the City or an entity whose mission includes open space protection. An example of such an entity is TLC, which has worked with the City on several open space and preservation activities.

Conservation easements provide an effective way to preserve open space for the future. In addition to being voluntarily set aside by the owner, land can also be dedicated for preservation as part of the development approval process. This has occurred in a number of subdivisions in Woodstock, including the Savanna Grove, Spring Ridge, and Winslow Acres subdivisions, all of which have open space and natural areas under the jurisdiction of a property owners association.

## **Recommendations**

- The City should continue working with private land owners, TLC, and similar organizations to protect critical natural areas, buffers, and connections within the City and its planning jurisdiction.
- Encouragement and support for the establishment of voluntary preservation easements should be given to land owners
- The City and other municipalities, with support from the TLC and other environmental organizations, should promote the joining together of areas subject to conservation easements and in close proximity to each other, in order to establish or enhance the green infrastructure network. One way of doing this is to have such areas joined together with a connecting easement

## **Dedication of Nature Preserves**

Another option for private landowners is the protection of land as an Illinois Nature Preserve. Legislation was enacted in 1963 establishing a nature preserves system to permanently maintain and protect ecologically significant lands in Illinois. Land enrolled in the Illinois Nature Preserves System is designated as either an Illinois Nature Preserve or registered as an Illinois Land and Water Reserve. Such a designation confers the highest level of protection for land in Illinois. The two land-protection programs available through the Illinois Natures Preserves Commission provide flexibility in working with local landowners who wish to voluntarily protect their land.



**Local Examples** - When the Winslow Acres Subdivision property was originally proposed for development, there were concerns on the part of the City regarding the preservation of approximately 10 acres of high quality wetlands on the site. As part of the platting process, the wetland features, including a protective buffer zone, were subjected to a dedicated easement which restricted the use and future development of this feature. The wetland area extends further to the north and ultimately connects to Gerry Street Park which is owned by the City of Woodstock. Although maintained by a homeowners' association, the City can engage in maintenance and upkeep activities if the need arises. Source: City of Woodstock

The landowner retains title to the property and neither program provides or requires public access to the land. The Illinois Natures Preserves Commission partners with landowners to protect land that has been recognized for its high ecological value or otherwise serves to buffer or protect such land. Land with high ecological value can include prairies, woodlands, or wetlands that have largely survived undisturbed or that support populations of 1 or more of the State's list of endangered and threatened species.



**Local Examples** - The TLC and City of Woodstock, with assistance from the Illinois Nature Preserves Commission, worked together to establish the Yonder Prairie Nature Preserve on the western boundary of Woodstock. The original 40.3-acre Yonder Prairie site is owned by TLC and is an Illinois Nature Preserve. The adjoining 63.6-acre Westwood Park site is owned by the City of Woodstock and in 2010 was dedicated by the City and approved by the Illinois Nature Preserves Commission and IDNR as an addition and buffer to the Yonder Prairie Nature Preserve site. This site was characterized by the MCCD in its “McHenry County Natural Areas Inventory” as part of a larger 263-acre resource within the Kishwaukee River watershed and was described as one of the “highlights” of biodiversity both for its animal and floral features and characteristics. Source: City of Woodstock

**Recommendations**

- The City should support and encourage local property owners seeking nature preserve status for their land.
- The City and local conservation organizations should continue their efforts to educate private landowners and land developers about opportunities to set aside land for natural resource conservation and protection purposes.
- The City should continue to work with TLC, the Illinois Nature Preserves Commission, and similar related organizations to identify private land opportunities for obtaining Illinois Nature

Preserves status for properties with significant natural resources.

**Planning and Zoning Initiatives**

Upon review of the City’s current regulations, it is clear that Woodstock has been aggressive in developing regulatory methods to protect community character, open space, and natural resources. Nevertheless, there are still additional measures that can be taken to ensure that future development and land disturbing activities occur in a sustainable manner and conform to the goals of the Comprehensive Plan 2008 and Environmental Plan 2010. Several of the major goals and objectives of these two documents emphasize the intelligent use of land and the making of development decisions that contribute to the

protection of green infrastructure. These goals focus on the protection of natural resources and the environment, preserving environmentally sensitive areas, providing aesthetically pleasing places, and preserving and enhancing existing local water resources.

Key features of green infrastructure identified and discussed in Woodstock's planning documents, as well as in this Plan, include:

- Woodlands and forested areas
- Parks and recreation sites
- Existing open space and trail amenities
- Designated natural areas
- Sensitive aquifer recharge areas
- Artificial and natural stormwater management systems
- Wetlands and hydric soils
- Floodplain areas, including lakes and streams

The physical environment and natural features of the Woodstock area form one of the major keystones of the Comprehensive Plan 2008 Land Use Map. An objective of this map regarding natural resources and land use is to assist and help:

Protect natural resources and physical features; ensure an adequate and clean supply of groundwater; provide for clean air and surface water; protect wildlife habitat and mature trees; and encourage ecological diversity, health, and productivity. Permit growth and change which is positive and sustainable, recognizes the value and positive benefits of natural features, and seeks to maintain and enhance them. Maintain a strong commitment to the protection of natural resources through responsible stewardship characterized by strong and sensible planning and annexation practices.

This can be realized in part by promoting compact and contiguous development near existing infrastructure to maximize use and efficiency of existing facilities. It can also be achieved by avoiding or restricting the encroachment of land disturbing activities into sensitive natural area. One of the most effective ways to implement land use policy is through zoning and other land use regulatory ordinances. In that respect, the Comprehensive Plan 2008 recommends the City review and revise the zoning, subdivision, and other development related ordinances to be consistent with the visions, goals, and policies of the 2008 Plan. The Plan also recommends working

with other municipalities and local organizations to achieve a consistent approach to resource protection.

### **Recommendations**

- The City should cooperate with and support neighboring municipalities, townships, and other governments in the development of green infrastructure plans that are consistent with Woodstock's planning principles. Local green infrastructure maps should be used to facilitate opportunities for resource protection and greenway connectivity, and should complement Woodstock's Green Infrastructure Plan.
- The Cities of Woodstock and Crystal Lake should work cooperatively on resource protection and greenway connectivity in the southeast part of Woodstock and northwest Crystal Lake where green infrastructure features extend across municipal boundaries.
- The City should refer to the Green Infrastructure Plan when advising private land owners and developers on natural resource issues and development plans and proposals.
- The City should request that Natural Resource Information (NRI) reports prepared by the SWCD for annexation, zoning, and land use petitions, reference the Green Infrastructure Plan.
- Green infrastructure elements and information should continue to be incorporated into the City's land use plans and zoning maps, with a priority on protecting critical natural resources, open space, and linked greenways.
- Woodstock should link development priorities to natural resource amenities, particularly streams, lakes, wetlands, and their respective watersheds and recharge areas. Development should be avoided or restricted in the most sensitive of these areas.
- Regulatory tools and techniques, such as overlay protection districts and the general review procedures set out in the Unified Development Ordinance, should be reviewed and revised by the City to clearly require the identification of sensitive areas where development intensity should be limited. Overlay districts can be structured to provide advance knowledge of site constraints to land owners and developers, as well as to identify

creative design techniques that will provide natural resource protection.

### **Conservation Design**

Conservation design utilizes a variety of creative land planning techniques and innovative storm water management practices to protect natural resources and open spaces, preserve natural areas and habitat, and protect water resources. The City of Woodstock was the first community in McHenry County to adopt conservation design standards and specifications as part of its Unified Development Ordinance. Conservation design is required for all subdivision sites characterized by sensitive natural resources and is allowed by right for all other properties.

For many of the environmentally sensitive lands on the GINM and within Woodstock's planning jurisdiction, conservation design offers a valuable tool to protect them. It also creates an opportunity to establish greenway and trail connections, and provide for the long-term enhancement and stewardship of ecologically important lands.

Conservation design development entails a thorough review of a development site to evaluate green infrastructure elements, including wetlands, streams, woodlands, soils, and topography. Unlike traditional land development processes, where developers have sought ways to build over these natural areas and thereby reduce the quality and amount of natural resources, conservation design searches for creative approaches to preserve and enhance them. It also lessens the fragmentation of natural areas, reduces land grading and associated infrastructure construction, and results in more functional open space. Preserved open spaces can be enhanced with trail systems which connect adjacent developments, existing trails, and other open spaces. Effective conservation design also incorporates legal, financial, and ecological management provisions for the long-term protection and stewardship of natural areas within a conservation development.

Another critical aspect of conservation design is to incorporate elements that minimize increases in stormwater runoff and degradation of runoff water quality. Low impact development designs feature narrower streets, permeable paving, and storm-water best management practices such as bio-swales and rain gardens. Their goal is to maintain natural recharge of rainfall and runoff, thereby protecting groundwater aquifers and



**Local Examples** - The Sanctuary at Bull Valley is a 300-acre conservation designed development in Woodstock with accommodations for 282 homes. Approximately 50 percent of the land is set aside as open space. Both pre-existing and restored natural areas are interspersed throughout the home sites. Walking trails allow access to a restored prairie in the center of the development, with scattered glacial depressions called "kettles" providing natural stormwater detention. The development also has oak and hickory savannas, woods, and wetlands.

The use of "green" engineering practices, including minimizing mass grading, reducing road widths, and eliminating curbs and storm sewers in many places, protects groundwater and water quality. Through the use of these practices, the development has experienced a savings of over 28 percent in land development costs. In addition, by maximizing the natural areas and minimizing the extent of manicured landscapes the master operators association (MOA) is seeing a significant savings in maintenance fees and costs. Typical maintenance costs for mowed and fertilized areas range from \$2,500 to \$5,000 per acre depending on the extent of maintenance activity. By keeping much of the common area in a restored natural state, the MOA has seen its overall maintenance costs reduced from a high of approximately \$1,500 per year in 2005 to less than \$900 per acre in 2010.

Source: City of Woodstock

providing clean, healthy base flows to streams and wetlands.

### **Recommendations**

- Conservation developments in the City should include provisions to restore native vegetation in buffers next to water bodies and wetlands to filter out damaging pollutants, preserve aquatic habitat, and protect stream banks from erosion.
- The City in cooperation with the development community, as well as with local and regional conservation organizations, should promote the expanded implementation of conservation

design for both residential and nonresidential development.

- The City should add provisions for commercial and industrial conservation design standards in its Unified Development Ordinance.
- The City should evaluate and update those land characteristics and features that trigger the use of the conservation design process. Conservation development should be targeted to all development parcels that include areas designated in this Plan as part of the green infrastructure buffer zone network.
- The City should review its conservation design regulations to verify that they incorporate provisions for:
  - A minimum percentage of open space, such as 40 to 70 percent, depending on the underlying zoning. Generally, open space should be preserved or restored to a natural condition.
  - A detailed open space management plan that includes a permanent legal mechanism for long-term ownership and funding options. It should also specify clear performance criteria for short- and long-term management of open space natural areas.
  - A land planning approach, such as the clustering of residential lots, to avoid sensitive natural areas and minimize land disturbance and grading.
  - Protection of significant native tree groupings on the site, particularly native oaks and hickories.
  - The identification of responsible parties to provide funding and long term maintenance, including detailed management plans which clearly define the roles of the developer, property owner, or qualified third party
- The City should encourage the giving of designated open spaces, or dedication of conservation easements for such spaces, within conservation design developments to qualified conservation organizations, land trusts, or public land agencies. This will help their long-term stewardship and protection as part of the green infrastructure network.

- The City should consider additional flexibility in Woodstock's conservation design regulations in order to allow for mixed densities and uses within new subdivisions. This may be achieved by encouraging the use of neo-traditional development, transit-oriented development, and traditional neighborhood development.

### **Greenway Connections**

Greenway planning and protection is a major theme both in the Comprehensive Plan 2008 and the Environmental Plan 2010. A greenway is a public or private open space that is concentrated in a generally linear manner along a natural or artificial corridor. Greenways can provide connectivity between adjacent natural areas and buffers for linear features such as streams, and can sometimes serve as corridors for recreation or trails. In many instances, greenways coincide with green infrastructure systems and networks.

The 2008 Comprehensive Plan's Land Use Map identifies resource conservation areas and resource conservation corridors, and states that these features should be preserved and protected in their natural state. Once identified and evaluated in greater detail, they can be protected by a variety of mechanisms discussed in this Plan, including public acquisition, conservation easements, developer donations, natural landscaping, and ecological stewardship.

### **Recommendations**

- Qualified conservation organizations and public land agencies should promote public awareness and provide technical assistance regarding greenway protection to private landowners and homeowners associations.
- The City, with the participation of other local governments and open space organizations such as McHenry County, MCCD, and TLC, should work together to link local open spaces to existing and planned green infrastructure networks. Initial areas for this activity are those sites prioritized in this Plan and on the GIBM.
- The City should continue to utilize a variety of creative greenway preservation tools such as linkages identified in land use plans, intergovernmental agreements, buffer zones, and conservation design principles.
- Woodstock and local open space groups should work with their counterparts in neighboring communities and unincorporated

McHenry County to create greenway connections across multiple jurisdictions.

- The City and local conservation groups should identify and offer incentives for private land-owners to donate lands (or in some instances cash in lieu of land) or conservation easements to protect important greenways such as stream corridors or natural trail systems.
- The City should require the connection of adjacent buffer zones and existing natural and open space areas when new development projects are proposed.
- The interconnection of open space and greenways should be required by Woodstock during the subdivision and development approval process. Further, land owners and developers should be encouraged to permanently preserve greenway connections to provide opportunities for natural resource protection, habitat enhancement, recreation, and environmental education.

### **Trails and Bikeways**

Trails are widely supported in Woodstock's planning documents as a means of promoting pedestrian activity in the community, providing recreation, linking the community with local open spaces and natural resources, and connecting people to schools, jobs, and commercial centers. This Plan promotes the development of a trail system throughout Woodstock and its planning jurisdiction as a means of establishing open space linkages. Where appropriate, it encourages access for a variety of users, including pedestrians and bicyclists, where appropriate. Much like the connection and preservation of greenways, successful trail planning and implementation requires extensive coordination between local governments, open space agencies, transportation agencies, and private land owners and developers.

### **Recommendations**

- The designation of trail systems and bikeway improvements by the City should be done in coordination with the goals and recommendations of the City of Woodstock Master Bicycle Plan (September 2009).
- Along with McHenry County, local governments, and the McHenry County Department of Transportation, the City should



Gerry Street Park nature trail. Source: City of Woodstock.

coordinate efforts to plan and implement trail corridors throughout Woodstock and the County to provide clear, safe connections between communities and existing and future open space areas. These trail systems should include connections between adjacent communities and subdivisions, as well as with local and regional trail amenities.

- When evaluating locations for trail corridors, the City should identify multiple-use riparian (i.e., streamside) greenway opportunities to accommodate trails, wildlife corridors, and vegetative buffers.
- The City should encourage and plan for improved walkability throughout the community.
- Existing pedestrian pathways should be identified and connected.
- Where appropriate and as part of mandatory public improvements, Woodstock should require the installation of pedestrian and bicycle trail amenities that will contribute to or result in linear connections between buffer zones.

### **Buffer Zones**

According to the Comprehensive Plan 2008, the City's character is due in part to "the presence of open spaces and undeveloped lands" between the City and neighboring municipalities. These open spaces serve as transitional areas between the developed parts of the City and development

activity occurring in other communities and unincorporated portions of McHenry County.

Woodstock's planning documents strongly encourage the establishment of permanent buffers within these transitional areas. The City's land use regulations and planning documents seek to locate land uses next to each other that are compatible, mutually supportive, and that define the character of Woodstock. For example, higher density residential uses are often located between commercial uses and lower density residential activity or low density uses are often located between mid-density residential uses and agricultural areas. In some cases, however, existing land uses, the timing of development activity, and the presence of physical and environmental resources prevent this from happening and a different approach is necessary. An effective way of minimizing conflict between incompatible land uses, of contributing to Woodstock's character and identity, and protecting significant natural resources between Woodstock and its neighboring communities and unincorporated areas of McHenry County, is to establish or create the opportunity for buffer zones.

Both the Comprehensive Plan 2008 and the Environmental Plan 2010 acknowledge that many of the areas between Woodstock and other developed areas are characterized by significant environmental and natural features. The importance of maintaining these areas and preserving valuable environmental features has often been acknowledged by the City. Reasons set forth in the Comprehensive Plan 2008 for the creation of buffer zones around the City include:

- The preservation, restoration and protection of environmental amenities and natural resources especially in locations where building and development activity is anticipated.
- The connection of natural features with environmental corridors to provide flora and fauna habitat and connected ecosystems.
- The preservation, enhancement, and connectivity between existing and future greenway resources and amenities.
- The protection of the City's extraterritorial jurisdiction from encroachment.
- The establishment of landscape areas which will contribute to Woodstock's character and identity and provide separation between Woodstock and neighboring communities.

- The establishment of strategically located buffer zones around Woodstock and between the City and neighboring communities.
- The use of buffer zones to assist in creating scenic vistas particularly for residents and visitors entering and leaving the City.

The Environmental Plan 2010 also recommends several actions related to the establishment and setting aside of buffer zone areas. These include:

- The creation of a Woodstock green infrastructure map which identifies important natural and environmental elements and creates buffers around them.
- The acquisition of lands to protect or enhance Woodstock's biodiversity and the development of a land acquisition strategy.
- The protection of the West Woodstock Prairie by expanding its size through fee simple acquisition or easements.
- The provision of adequate naturalized buffer zones within all new developments located along Woodstock's wetland systems.

The accomplishment of these goals can be achieved in part by creating a system of buffers beyond the City's current municipal limits, and by using environmental resources and natural features to determine the general location and extent of such buffer zones. The information set out in this Plan, as well as other sources, identifies the location of such assets in and around the City. Many of these areas are also identified in the Comprehensive Plan 2008 as "resource conservation" and defined as:

Areas used and intended exclusively for the preservation and protection of wildlife habitat, wetlands, floodplains, open water, groundwater recharge, woodlands, and similar natural features and resources, which may be held in private or public ownership.

Areas designated as "resource conservation" are linked by "resource conservation buffers" which the Comprehensive Plan defines as:

Areas adjoining Resource Conservation lands which function as a buffer or transition between Resource Conservation areas and other land uses, or serve as a connecting corridor between isolated

conservation areas. Development within this land use is generally not encouraged unless conservation design techniques are applied to protect the adjoining Resource Conservation lands.

Both of these categories were referenced earlier in this Plan. Since they are comprised largely of natural resource sites and have been designated as appropriate for preservation, they can be used along with the features generally designated in the GINM to form the basis for Woodstock's buffer system depicted on the GIBM.

### **Buffer Zone Creation**

Many typical development proposals and plans presented to the City attempt to maximize the use of land and do not adequately acknowledge the need to protect or expand natural resources or open space. Because of this, it is important to look beyond zoning, planned unit development approvals, and annexation agreements for ways to create buffer amenities.

The most direct means by which a municipality can use land for buffer purposes is outright ownership of the land or the right to use it, or by establishing incentives or regulations that encourage land to be used in a specific way. However, because ownership of buffer areas is often beyond the fiscal means of local municipalities, the use of incentives or regulations to encourage buffer zones is preferred. The most common ways of reserving or setting aside land for buffer purposes are listed below.

**Voluntary Donation** - This is a less costly way of designating land for buffer purposes. An example was the previously referenced donation of the 8.86 acre Prairie Ridge Nature Area along Dean Street. This land was donated to the City by a local developer and is now being managed for the City by TLC. Woodstock should continue to partner with The Land

Conservancy, the MCCD and other entities regarding the donation of land for buffer zone and open space purposes.

### **Annexation and Development Agreements**

- This approach occurs when a property is annexed into the City or to a lesser extent when it moves through the platting/planned unit development review and approval process. As part of annexation agreement negotiations, specific land uses and standards can be determined. The establishment of buffers can be provided and improvements to such a buffer area can be made the responsibility of the developer. An example of this was the former Riverwoods Subdivision located southwest of Centegra Memorial Hospital, along the south side of the Kishwaukee River. A significant portion of the woodlands and floodplain on this site was subjected to a "conservation easement" as a condition of preliminary and final plat approval, and was intended to be managed by the McHenry County Land Conservancy.

**Purchase** – This option involves the City buying land intended to be used as a buffer zone. The sale price and purchase terms are negotiated between the owners of the land and the City. This approach assumes that the owner is willing to sell and that both parties can agree to an acceptable price. However, it has the potential to be the most costly method of acquiring land and since activities within a buffer zone are limited, it can be difficult to justify the financial expense. In today's economic climate, the purchase of buffer zones by the City is not feasible, unless partnering with other public and/or private entities can occur or if grant opportunities or other funding mechanisms can be used.



MCCD Dufield Pond site, acquired by the City and MCCD. Source: City of Woodstock

**Condemnation** - This method is also costly and assumes that the land owner is not interested in selling the property or that the City and the owner are unable to reach purchase terms. The value of the buffer area property is determined through appraisal and the City would have to pay this amount without the benefit of a negotiated price. Condemnation usually occurs after purchase negotiations have failed. It is also time consuming and can incur significant legal costs. Again, due to the costs of acquisition, this option is not encouraged in today's economic climate.

**Acquisition of Development Rights** - In this approach, the development rights to a parcel are purchased. Although ownership of the land does not change, the ability to use it for urban development is removed. For example, if the development rights to an agricultural land parcel are acquired, the land may continue to be used for crop production, but could not be used for building and development purposes. Although usually less expensive than outright land purchase, this method also involves negotiations between the City and the land owner regarding price and terms.

In some instances, when development rights are acquired they can be conveyed to another land parcel, a process known as "transfer of development rights" or TDR. TDR is a land use regulatory tool whereby development rights can be removed from a tract of land and sold in a market transaction. The parcel from which the rights are transferred is then

permanently limited from future development, and the purchaser of the rights can, with City approval, assign them to a different parcel to gain additional density. In theory this allows for the preservation of land suitable for buffering purposes without having to spend public funds to acquire it.

**Easement Dedication** - This approach results in a restriction being placed on the use of a land parcel. As with the acquisition of development rights, the underlying ownership of the property does not change. The easement language indicates exactly what activities are allowed on the property and what restrictions may exist, and can also specify who is authorized to approve any proposed activity. Easements for buffer zones may be acquired through purchase or through dedication as part of Woodstock's platting and development process. Such easements can be held by the City, other units of government (such as the MCCD), conservation groups, or private individuals. If held by the City, agreements can be made with other entities for the management and maintenance of the easement site. Furthermore, there may be positive tax implications which benefit the property owner if easements which regulate and restrict the use of the site are held by the City.

In most instances, buffer zones can be established during the zoning and development approval process. Zoning and land use approvals, especially those involving the

annexation and development of property on Woodstock's fringe, can be used to set aside buffer areas or require that said development proceed through the conservation design process if they are intended to be developed.

Zoning and land use approvals can also be used to limit development activity on land that is appropriate as a buffer or that can be used to enhance an existing buffer area. Although buffers may be required for certain types of natural features, such as wetland parcels, land use restrictions established during the development review process can provide additional protection for natural and open space features.

### **Buffer Zone Characteristics and Location**

Based on language in the Comprehensive Plan 2008 and the Environmental Plan 2010, buffer zones are appropriate for select existing open spaces between the urban areas of Woodstock and neighboring municipalities and developments. Existing areas between the City and other communities are for the most part comprised of undeveloped agricultural parcels, natural areas, or large lot residential sites. Many of these areas, especially those containing significant wetlands, water features, or floodplain, are not appropriate for building and development activity, and are ideal for buffer purposes. The value and importance of these areas can be enhanced by creating public awareness of their location and maintaining their visibility through the establishment of scenic vistas which make them more visually prominent. At a minimum, buffer zone sites and locations should address the following criteria:

- To the greatest extent possible, buffer zones should be maintained in their natural condition or restored to a natural condition or setting.
- Buffer areas should coincide with natural drainage ways and stream corridors, woodland areas, and conservation sites.
- Areas serving as connections between natural areas and forming part of the buffer should be

converted to and maintained as natural landscapes.

- Access by motor vehicles should be limited; if access is provided, it should be through a limited system of bicycle/pedestrian trails and/or service drives.
- Naturalized buffer areas should reflect the natural communities that existed when early settlers arrived in the Woodstock area (ca. 1830s), such as prairies, wetlands, woodlands, and oak savannas.
- Development on adjoining parcels should be designed to ensure that urban runoff is directed away from the buffer area or, in the event that topographic conditions render such an approach infeasible, that appropriate filtration provisions are incorporated into the project design.
- Storm water management improvements on adjoining lands should be designed to complement buffer areas, both in terms of appearance and in the treatment of stormwater.

An example of an area which meets the above criteria is the Klehm/Lamb Road wetlands complex, located between Lamb Road and IL Route 47, north of Woodstock's corporate limits, along with the neighboring Nippersink Creek tributaries east of Rose Farm Road and north of the Klehm/Lamb Road site. This area, which contains major wetlands, water features, floodplain, and woodland features, is depicted on the following page, and extends north to the McHenry County Conservation District's Bystricky Prairie site. Observation points and locations which provide scenic vistas of this area could be created at various points along IL Route 47. It is logical that these areas be designated for buffer purposes. By using natural areas as buffer zones, the City can maintain its unique and distinct character, while at the same time taking major steps to protect natural resources and amenities in and around the City.



Klehm/Lamb Road wetlands complex. Source: City of Woodstock

Based on a review of the Comprehensive Plan 2008 and Environmental Plan 2010, the establishment of buffer zones should be strongly considered at strategic locations in and around Woodstock. The majority of areas appropriate for the creation of buffer zones are identified or referenced in the City’s planning documents and generally depicted on the GINM and GIBM.

**Recommendations**

- The City, neighboring communities, and local conservation organizations should support and advocate the creation and preservation of buffer zones in unincorporated areas beyond the Woodstock corporate limits. At a minimum, these areas should be characterized by natural features, open landscapes, conservation areas, public and private park and recreation sites, and similar features.
- Utilize natural areas, dedicated open space, public and private parks and recreational sites, trail systems, and conservation areas to

designate areas for buffer zones between the City and neighboring municipalities.

- Work with the County and neighboring communities, particularly Crystal Lake, Lakewood, and Bull Valley, to establish common principles for the location of buffer zones, as well as appropriate land uses and design standards.
- Work with neighboring communities to identify greenway and trail connections through and next to buffer zones.
- The City and local conservation organizations should evaluate land which provides a connection between significant natural areas and environmental resources for designation as a potential buffer zone.
- The City, other local governments, and local conservation organizations should support the establishment of connections between natural resource sites on the GINM and the creation of

buffer zones on those natural resource corridors and systems depicted on the GINM, GITM, and GIBM

- Property owners and developers should be advised by City personnel of Woodstock's emphasis on buffer zone formation when land for such zones is proposed for development or land disturbing activities requiring City approval.
- When proposals for the development of land which includes designated buffer zones is submitted to Woodstock for land use approval, either in the County or upon annexation, Woodstock should require that the land designated for buffer zone use be set aside for such purpose.

### **Landscape Retrofitting of Developed Land**

While much of the green infrastructure network in and around Woodstock exists in rural and undeveloped areas, there is significant green infrastructure in and adjacent to land that has already been developed for urban land uses. These "developed" lands are often on existing or former wetlands, floodplains, stream corridors, or woodlands. While they may be considered degraded in an ecological sense, they can provide significant opportunities for retrofitting and enhancement.

There have been numerous examples of successful retrofits of such urban lands that can benefit green infrastructure. For example, stormwater detention basins can be retrofitted by planting native vegetation in lieu of turf grass or riprap edges. Stream buffers can be enhanced through the removal of invasive brush and weeds and their replacement with native riparian vegetation. Rain gardens and bioswales can be installed adjacent to wetlands and stream corridors. Individually, these actions may not have a substantial impact but their cumulative effect, if done over a larger area, can be significant.

### ***Recommendations***

- Woodstock should identify retrofit opportunities to preserve and restore natural base-flows in local streams and water bodies to protect their ecology and quality.
- The City should prioritize retrofit opportunities on sites where natural conditions have been previously altered and where there is good

potential for the successful restoration of natural ecosystem and hydrologic functions.

- The City should identify and implement opportunities to incorporate green infrastructure into public works and capital improvement projects. In particular, green infrastructure options should be identified for new and existing roads, parking lots, and for stormwater drainage and detention facilities.
- The City should consider limiting development and restoring native vegetation in buffer areas adjacent to water bodies in order to filter out damaging pollutants, preserve aquatic habitat, and protect stream banks from erosion.
- The City's development ordinances and regulations should be reviewed on a regular basis to ensure that they allow and/or encourage the use of native vegetation, including within public right of ways.
- Educate and encourage property owners' associations to allow the use of natural landscaping under their covenants and deed restriction documents.
- The City should increase its capacities to protect, restore, and manage watershed resources with effective and consistent regulations, leadership, and public education.
- Develop written direction and guidelines regarding the use and benefit of natural landscaping and publicize this information as part of the City's "good neighbor" brochure program.

### **Local Scale Green Infrastructure Efforts**

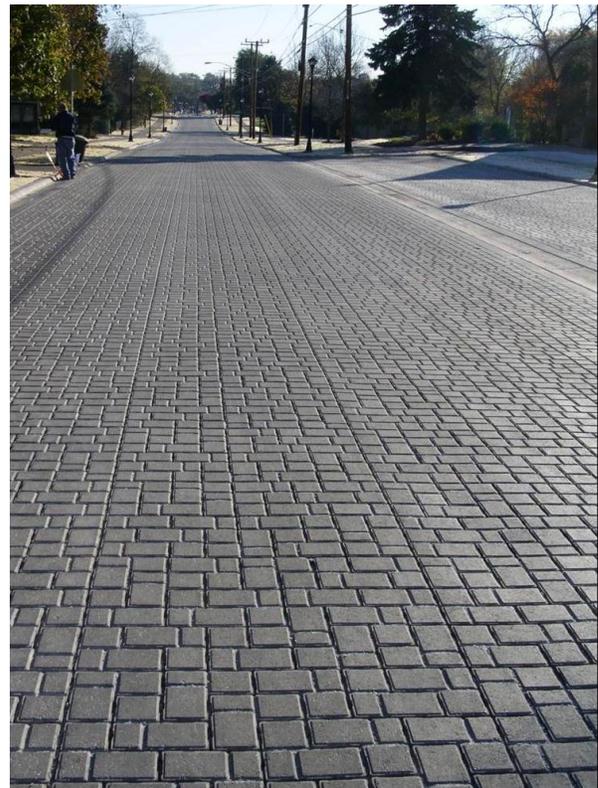
As previously discussed, efforts at the local level to enhance natural resources and provide alternatives to gray infrastructure can assist in the protection and preservation of green infrastructure. The use of specific techniques and practices on individual sites and land parcels can have a cumulative effect and beneficial impact on the overall community.

### ***Recommendations***

- The infiltration of clean runoff in developed areas utilizing bio-swales, permeable paving, natural landscaping techniques, and similar methods should be addressed by the City through its ordinances and programs.

- The City's Stormwater Management Ordinance should be reviewed and strengthened to allow, encourage, and (where appropriate) require the use of constructed wetland detention basins with native vegetation on projects that require detention. Additional incentives, options, and requirements should be examined to further the use of natural drainage BMPs and small scale controls, including naturalized landscaping, permeable paving, green roofs, bio-swales and rain gardens. Options to improve wetland protection by limiting "buffer averaging" and the installation of detention basins within the wetland buffer should be explored by the City.
- The City and local conservation groups should partner with the SWCD to promote the sale of rain garden kits to residents through the SWCD's annual plant sale and other events.
- Performance standards for rain gardens and rain barrels should be adopted by the City.
- The City should adopt construction regulations or amend existing building codes to encourage the creation of rain gardens, bio-swales, and permeable pavers in new construction.
- The use of natural plant and landscaping materials for detention and retention basins and related stormwater management facilities should be required by the City.
- Encourage land owners through City developed handouts and brochures, to practice rainwater harvesting, use natural drainage areas, replace impervious surfaces with natural, permeable surfaces, and use natural conveying of stormwater runoff. Include recommendations as part of building permit process.
- The City should review and if appropriate amend its zoning, subdivision, and landscaping ordinances and standards to allow and encourage green infrastructure BMPs for new development and redevelopment projects. A suggested checklist for reviewing local regulations is provided in Appendix D.
- The City should evaluate the use of native plant species and natural design features for all public projects where landscaping is a component.
- Woodstock should consider the use of permeable paving materials when resurfacing

or rebuilding existing roads and public parking facilities in the City. Streets where such materials may be appropriate include those providing direct access to the Woodstock Square (*including Throop, Jefferson, Dean, South, Jackson, Judd, Clay, and Calhoun Streets*), local neighborhood streets (*including Madison, Newell, North, First, Tryon, Lincoln, Hayward, Pleasant, Hill, and Gerry Streets*). The installation of natural drainage and storm water management BMPs, as discussed earlier, is also recommended to occur at the same time street retrofitting measures take place.



Warrenville Road with permeable pavers.  
Source: Dennis Dreher

- The City should pursue grants and creative funding options (such as IEPA Section 319 and Illinois Green Infrastructure Grant programs) to design and implement green infrastructure demonstration projects.
- The City should highlight its green infrastructure development and retrofit activities through interpretive signage, press releases, and other communication measures to serve as a guide and role model for developers and private land owners.

As an overall policy, consideration should be given by the City and local governmental bodies to having all public lands use green infrastructure techniques. Such features and techniques can do much to reduce pollution, prevent runoff, lessen erosion, and protect the City's water resources. Such features include:

- Cluster developments
- Natural land preservation
- Reduced pavement widths and lengths
- Avoiding the overbuilding of parking lots
- Infiltration basins and trenches
- Permeable or pervious pavement
- Disconnected downspouts
- Raingardens
- Bioretention landscaping
- Rain barrels
- Rainwater recycling

- Stormwater storage beneath or integrated into parking lots
- Depressional stormwater storage in landscape islands
- Green roofs
- Strategic elimination of parking lot curbs and gutters
- Vegetated swales, filter strips, and buffers
- Native and drought tolerant plant species
- Preservation of existing trees and vegetation, especially mature and large trees
- Use of trees and shrubs instead of turf, or the replacement of turf with trees and shrubs
- Vegetation of medians with trees, shrubs, and native flowers (to the extent that such plantings are compatible with traffic safety)
- Reforestation
- Maintaining grasses at longer lengths

## **SUMMARY**

- Green infrastructure is the ecological framework and a significant component of our environmental, social, and economic health.
- A long-term commitment on the part of the City and other governmental bodies is needed to preserve and enhance green infrastructure and to maintain its many benefits to the community.
- Green infrastructure preservation and enhancement is not an activity that can be successful without intergovernmental cooperation and partnerships among several diverse groups and organizations, as well as the involvement and support of private landowners and the development community.
- Green infrastructure planning should be an integral part of each community's planning and development activities and strategy, and should be acknowledged as linked and interconnected to the "built" environment.
- The GINM, GITM, and GIBM are intended to be used for general planning purposes. Along with other planning documents of the City, they can serve as a basis for providing direction and establishing specific land use policies, standards, and guidelines concerning the preservation and linking of natural resource features. They can also be used to designate those areas where natural resources should be preserved and protected, and where buffer zones should be established in and around specific parts of Woodstock and its planning jurisdiction.
- The mapping documents included as part of this Plan should be used when evaluating new land use and development proposals, when determining their impact on the natural environment, and when considering the appropriateness of new and/or enhanced open space amenities.
- Current land use and development regulations and natural area protection practices may not be sufficient to preserve the Woodstock area's green infrastructure. The City's land use regulations, including those in the Unified Development Ordinance, should be evaluated to determine if additional measures are needed to generate better protection and long-term maintenance of our natural and environmental resources. Standards and specifications regarding the use of areas appropriate for buffer zone purposes or for the establishment of buffer overlay designations should be created.

# **APPENDIX A: SENSITIVE AQUIFER RECHARGE AREAS MAP** **DESCRIPTOR, MCHENRY COUNTY, ILLINOIS MAY 2009**

**BACKGROUND:** In response to rapid growth and development and the corresponding potential for increased groundwater withdrawals and contamination, the Illinois State Geological Survey (ISGS) began a geological mapping project, focused on the groundwater resources of McHenry County, in 1991. This study noted that McHenry County covers 611 square miles (603 sq. miles land, 8 sq. miles water), of which aquifers lie within 100 feet of the land surface in 70% of the County. It was further noted that three fourths of the counties water comes from within 100 feet of land surface, and this resource is vulnerable to contamination.

**MAP APPLICATIONS:** Development of a recharge map bridges the gap between water resource planning and land use planning. The interpretation and use of this map will guide land use planners in the planning stages of development to site developments and facilities in optimum locations that protect groundwater resources.

**PURPOSE:** The primary purpose of the Sensitive Aquifer Recharge Areas Map is to:

- Spatially identify areas throughout McHenry County with respect to their potential for aquifer contamination and recharge.
- Identify the most sensitive areas within McHenry County that can effectively preserve and protect the recharge of our groundwater shallow aquifers to ensure sustainable yields for current and future generations.

The composite map classifies these areas based on previously identified near surface materials and previously taken soil and well borings.

**MAP OBJECTIVES:** As McHenry County develops, it will increasingly rely on its shallow aquifers. It is of the utmost importance to protect and preserve the quality and quantity of groundwater from our shallow aquifers, and a critical step is the protection of Sensitive Aquifer Recharge Areas through land use planning.

- To provide information about sensitive recharge areas throughout McHenry County.
- To provide a basis for a zoning overlay map for local and regional planning efforts.
- To stimulate the discussion and planning toward development of a countywide Wellhead Protection program.<sup>1</sup>
- To work toward the development of a Countywide Groundwater Protection Ordinance.<sup>1</sup>
- To encourage the adoption of Stormwater Best Management Practices (BMPs), including water quality BMPs, and to view Stormwater as a resource county-wide.
- To encourage watershed planning.
- To encourage intergovernmental cooperation in order to protect groundwater recharge and a sustainable water supply for an expanding population.

**MAP CHARACTERISTICS:** The map depicts the relative potential of aquifers within 100 feet of land surface to become contaminated from pollution sources at or near the ground surface. Routes to contamination of a groundwater sources are the same as the routes to recharging a shallow aquifer. Map areas designated in **GREEN** represent areas critical for aquifer recharge. \*

**Map Unit A: High Potential for Aquifer Recharge/ Contamination:** Sand and gravel deposits are more than 20 feet thick (commonly 50 feet thick) and are situated within 20 feet of the surface. About 37% of the County falls in Unit A.

**Map Unit B: Moderately High Potential for Aquifer Recharge/Contamination:** Sand and gravel deposits less than 20 feet thick and are within 20 feet of the surface and are either at land surface or overlain by the Haeger diamicton or fine-grain deposits. 20% of McHenry County is classified as Unit B. Undefined map areas are considered less at risk for shallow aquifer contamination and have less potential as significant recharge areas. All lands, regardless of sensitivity, provide routes to surface water and shallow aquifers for both recharge and contamination and should therefore require a site specific evaluation to confirm site soil/geology to maintain recharge and protect against contamination\*\*.

## DEFINITIONS:

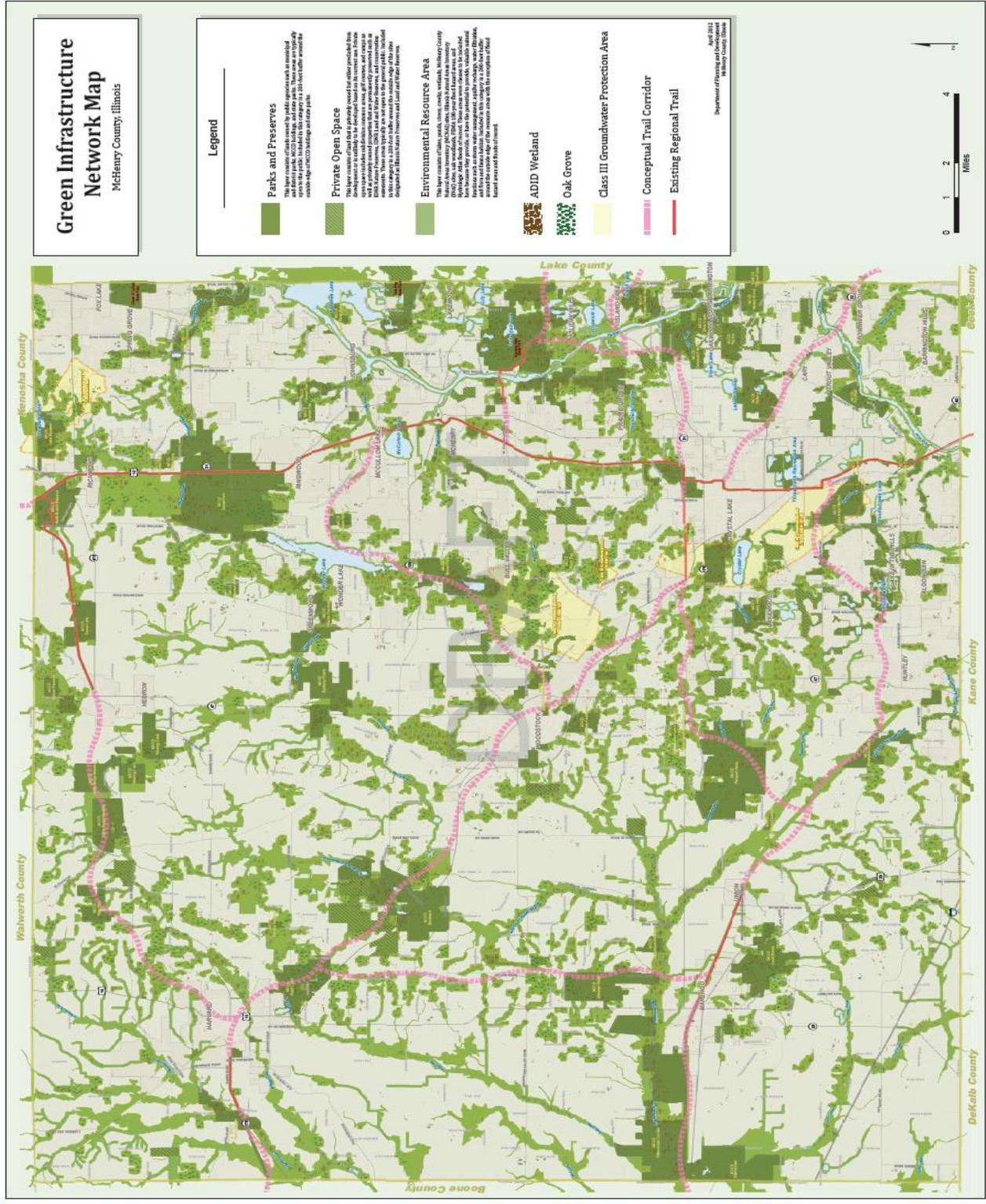
**GROUNDWATER RECHARGE:** Recharge is the process by which precipitation reaches and re-supplies the groundwater. Areas that have conditions that favor rapid recharge are the main areas where the groundwater is replenished. Groundwater can be extracted from anywhere, but can only be re-supplied (naturally or artificially) through recharge areas. Therefore, recharge areas provide a fast conduit to re-supply groundwater and counter the effects of human consumptions. On the other hand, the characteristics that encourage rapid refreshment of the groundwater are the same characteristics that favor the travel of contaminants from the surface to the groundwater and which can degrade the groundwater supply. Activities that use materials that might generate contaminants when released to the ground have the potential to cause these contaminants to migrate rapidly to groundwater.

**AQUIFER:** means saturated (with groundwater) soils and geologic materials, which are sufficiently permeable to readily yield economically useful quantities of water to wells, springs, or streams under ordinary hydraulic gradients. [35 IL Adm. Code 620.110]

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\* This map has been modified from the 1997 map to exclude: groundwater discharge, hydric soils, steep slopes (4% or greater), soils with restricted permeability (NRCS Soil Survey 2008). \*\*The SARA map cannot substitute for evaluation of individual sites. All sites and regions where proposed or present land use activities could adversely affect groundwater quality should be separately investigated because of the variations in earth materials and the uneven distribution of data used to develop the geologic maps (ISGS 559, p 48). 1. Baxter and Woodman, *McHenry County Groundwater Resource Management Plan, Part 3, Groundwater Quantity and Quality Protection Plan 2005*.

# APPENDIX B: MCHENRY COUNTY GREEN INFRASTRUCTURE NETWORK MAP



## Legend

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### Parks and Preserves

This layer consists of lands owned by public agencies such as municipal and district parks, MCCD holdings, and state parks. These areas are typically open to the public. Included in this category is a 200-foot buffer around the outside edge of MCCD holdings and state parks.



### Private Open Space

This layer consists of land that is privately owned but either precluded from development or is unlikely to be developed based on its current use. Private open space includes subdivision common areas, golf courses, and camps as well as privately owned properties that are permanently preserved such as IDNR Nature Preserves, IDNR Land and Water Reserves, and conservation easements. These areas typically are not open to the general public. Included in this category is a 200-foot buffer around the outside edge of the sites designated as Illinois Nature Preserves and Land and Water Reserves.



### Environmental Resource Area

This layer consists of lakes, ponds, rivers, creeks, wetlands, McHenry County Natural Areas Inventory (MCNAI) sites, Illinois Natural Areas Inventory (INAI) sites, oak woodlands, FEMA 100-year flood hazard areas, and Hydrologic Atlas floods of record. These areas were chosen to be included here because they provide, or have the potential to provide, valuable natural functions such as storm water management, aquifer recharge, water filtration, and flora and fauna habitat. Included in this category is a 200-foot buffer around the outside edge of the resource areas with the exception of flood hazard areas and floods of record.



### ADID Wetland



### Oak Grove



### Class III Groundwater Protection Area

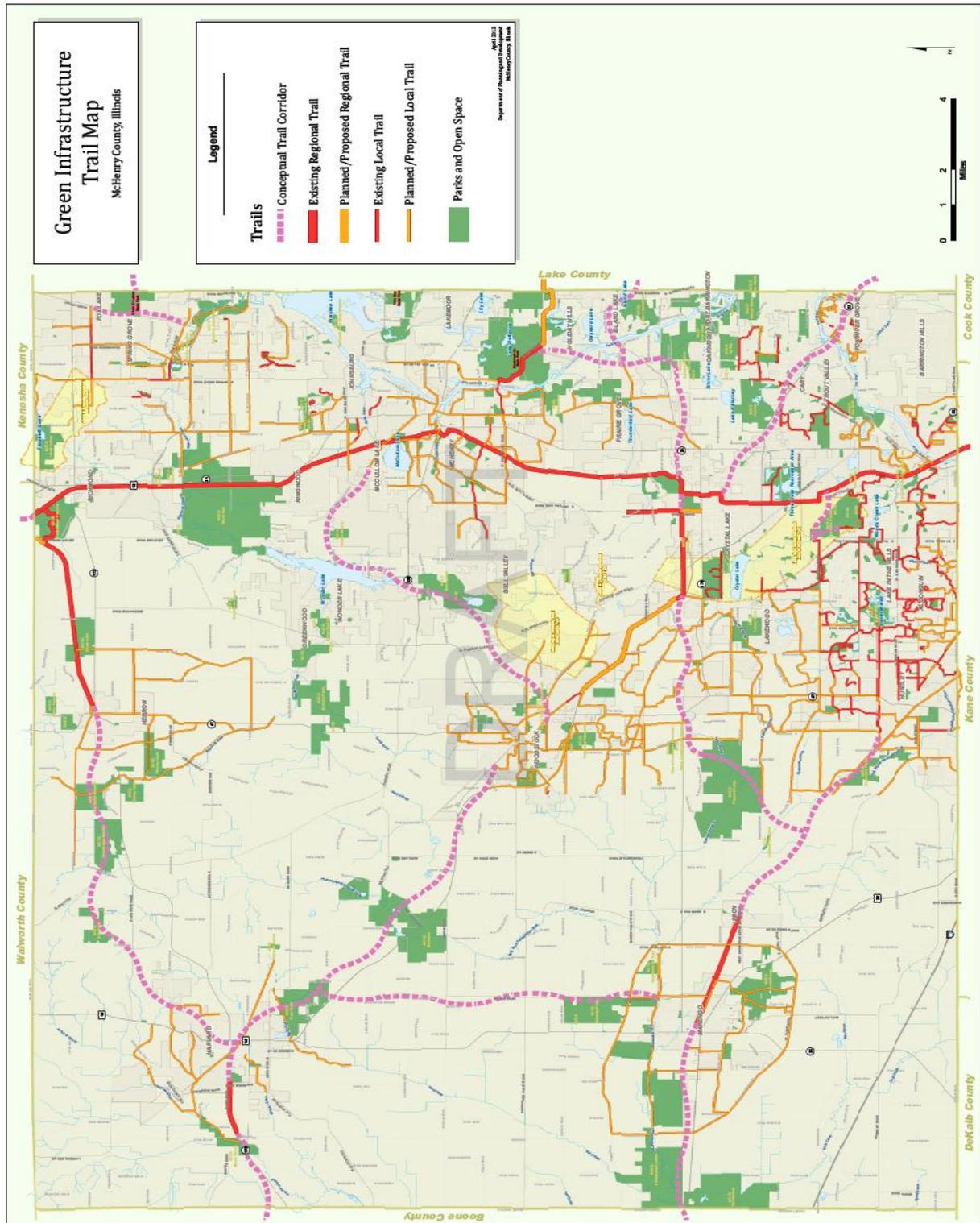


### Conceptual Trail Corridor



### Existing Regional Trail

# APPENDIX C: MCHENRY COUNTY TRAIL MAP



# Legend

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## Trails

 Conceptual Trail Corridor

 Existing Regional Trail

 Planned/Proposed Regional Trail

 Existing Local Trail

 Planned/Proposed Local Trail

 Parks and Open Space

April 2012  
Department of Planning and Development  
McHenry County, Illinois

# **APPENDIX D: ORDINANCE REVIEW CHECKLIST**

## **1. BACKGROUND AND PURPOSE**

The purpose of this checklist is to provide a template for the review of municipal stormwater, subdivision, zoning, and related development ordinances. The checklist emphasizes key stormwater provisions, including detention, floodplain, erosion control, and stream/wetland. It also looks at relevant subdivision, zoning, landscaping, and any conservation design provisions that would be desirable in promoting sustainable development and redevelopment in the City of Woodstock and surrounding area.

This checklist is based on a combination of local, regional, and national ordinances and resources, including:

- NIPC *Facility Planning Area Nonpoint Source Management* checklist
- Progressive provisions of local municipal ordinances, countywide stormwater ordinances, and other municipal or county conservation design ordinances
- NIPC/CMAP *Ecological Planning and Design Directory*
- U.S. EPA *Water Quality Scorecard*
- Center for Watershed Protection, *Better Site Design (Code and Ordinance Worksheet and related publications)*

The ordinance review will consider the following five major topical areas:

- 1) Comprehensive Stormwater Standards
  - a. Stormwater drainage and detention
  - b. Soil erosion and sediment control
  - c. Floodplain management
  - d. Stream and wetland protection
- 2) Natural Area and Open Space Standards
- 3) Landscaping Standards
- 4) Impervious Area Reduction: Street and Parking Requirements
- 5) Conservation Design: Zoning/Subdivision Standards

### **1. Comprehensive Stormwater Standards**

McHenry County has a countywide stormwater ordinance that covers, in part, the direct stormwater impacts of development. This ordinance has been adopted by the City of Woodstock and the City is authorized by the County to administer and enforce it. This ordinance can be strengthened in a number of areas to exceed minimum standards and improve water quality, natural hydrology, and aquatic resources.

**General Recommendations:** Adopt progressive, comprehensive standards for the protection of water resources and related aquatic resources. In particular, ordinances should go beyond a core emphasis on stormwater rate and quantity to also emphasize the overall protection of water quality, natural hydrology, and aquatic habitat. These items can be addressed through an integrated approach to stormwater drainage and detention, soil erosion and sediment control, floodplain management, and stream and wetland protection.

### **2. Natural Area and Open Space Standards**

This section focuses on protection, restoration, and management of natural areas. These recommendations address both remnant landscapes and also restored/created natural areas. Woodstock's Stormwater Ordinance already addresses, to a limited degree, protection of streams through its floodplain management provisions. However, it does not specifically address associated upland natural

areas – such as prairies, savannas, and woodlands – that buffer aquatic systems and provide critical landscape linkages for wildlife.

**General Recommendations:** Identify and create a green infrastructure network that recognizes aquatic and upland resources to be protected, along with appropriate buffers. Identified natural areas can be protected via strict development prohibitions or through creative zoning that allows for clustering around sensitive areas. Specific standards should address natural area identification, allowable uses and vegetative cover within the natural area, buffer transitions, and other design elements. In addition, preparation of management plans should be required for designated natural areas and buffers and performance criteria, qualified management entities, and revenue sources for management activities should be established.

### **3. Landscaping Standards**

Natural landscaping can greatly benefit the water quality enhancement and the preservation of natural hydrology. Natural landscaping can be encouraged and/or required, where appropriate, in common areas in lieu of conventional turf grass landscapes. It also can be specifically targeted to BMP applications, such as bio-infiltration swales, rain gardens, filter strips, and naturalized detention basins.

**General Recommendations:** Landscaping ordinances should encourage or require the integration of pervious, landscaped areas with impervious areas on a site. Runoff, where feasible, should be routed across and through landscaped areas. Wherever feasible and appropriate, deep-rooted natural landscaping should be used in lieu of conventional, shallow-rooted turf grass landscaping. Language to specifically allow or require integration of bio-infiltration into parking lot islands and street side landscape strips should be adopted.

Existing tree protection language in the Unified Development Ordinance and City Code should be reviewed and, if necessary, revised to provide greater protection of desirable native trees and shrubs. Flexibility should be provided to allow removal of trees where appropriate for proper forest and natural area management, along with the inclusion of replacement criteria for the unavoidable removal of desirable species.

### **4. Impervious Area Reduction: Street and Parking Requirements**

A significant proportion of the impervious surfaces and source of stormwater impacts is related to streets and highways. Limiting the amount of impervious cover to that which is necessary and to the most appropriate areas is a key to ecologically sensitive design.

Similarly, parking facilities often create large impervious surfaces that result in an increase in stormwater runoff and negative water quality. A decrease in the amount of required parking area and the use of alternative porous paving materials can help to reduce impervious surfaces and facilitate infiltration and groundwater recharge.

#### **General Recommendations:**

Revised design standards for narrower street widths, along with allowances for street designs that utilize naturalized stormwater infiltration and conveyance systems, should be incorporated into Woodstock's current development codes. Also, since stream crossings can cause significant stream impacts, recommended standards related to the number of crossings and the design of crossings should be considered.

Parking standards can be reviewed and revised to allow for shared parking, parking credit programs (i.e., purchasing credits for public parking in lieu of creating private spaces), and preferred parking for compact cars and non-motorized vehicles. Specific language to allow permeable parking surfaces such as interlocking concrete pavers, porous asphalt, and porous concrete is recommended.

## 5. Conservation Design: Zoning and Subdivision Standards

Regulations set forth in Woodstock's Unified Development Ordinance allow property to be developed through the conservation design review and approval process. These regulations emphasize the use of the conservation design approach for residential and residential-mixed use developments, but do not address the use of conservation design practices in a commercial or industrial setting. Some of the approaches and standards discussed above may be inconsistent with existing zoning and subdivision codes on business properties. Therefore, greater flexibility is needed in existing codes to allow, encourage, and/or require creative, conservation-based business site designs.

**General Recommendations:** Conservation design should be encouraged or required for those zoning and subdivision regulations which are applicable to commercial and industrial land. Conservation design standards and procedures should be established for commercial and industrial sites, and should ideally incorporate the following site design process for non-residential developments.

- Identify and preserve natural resources and conservation areas.
- Locate buildable areas to minimize impacts on natural areas and to take advantage of open space and scenic views.
- Design common access points and shared site improvements, including storm water management facilities, drainage infrastructure, and parking accommodations to minimize encroachment into sensitive natural areas.
- Require the use of green infrastructure techniques to minimize impacts on the natural environment.
- Establish lot lines and lot sizes following a compact development approach.

It can also be desirable to offer site development bonuses as an incentive to engage in conservation design practices and activities that exceed the minimum ordinance requirements.

## 2. CHECKLIST

### 1. Comprehensive Stormwater Standards

#### a. Stormwater drainage and detention

Does the City's Stormwater Ordinance:

- Include control of runoff *rate*, *volume*, and *quality* in the purpose statement?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Encourage the use permeable paving, green roofs, and similar practices that reduce the quantity of runoff that must be handled with innovative or conventional drainage practices?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Encourage or require the use of natural drainage practices such as swales, filter strips, bio-infiltration devices, and natural depressions over storm sewers, to minimize runoff volumes and enhance pollutant filtering?  
Requires \_\_\_\_\_ Encourages \_\_\_\_\_ Neither \_\_\_\_\_
- Provide detention credit for practices, such as permeable paving or bio-infiltration, which provide temporary storage of runoff in the sub-surface void spaces of stone or gravel?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require that peak post-development discharge from events less than or equal to the two-year, 24-hour event be limited to 0.04 cfs per acre of watershed?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Other \_\_\_\_\_

- Require detention design standards that maximize water quality mitigation benefits, with a requirement for “naturalized” wet bottom and/or wetland basins over dry basins?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require conformance to numerical water quality performance standards (such as percent removal of sediment or phosphorus)?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Prohibit detention in the floodway? Yes \_\_\_\_\_ No \_\_\_\_\_
- Prohibit on-stream detention, unless it provides a regional stormwater storage benefit (e.g., for upstream properties and/or multiple sites) and is accompanied by other upstream water quality BMPs, such as bio-infiltration?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Prohibit the direct discharge of undetained stormwater into wetlands?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require formal maintenance plans and contracts for the long-term maintenance and vegetative management of all new detention facilities?  
Yes \_\_\_\_\_ No \_\_\_\_\_

**b. Soil erosion and sediment control**

Does the soil erosion and sediment control ordinance:

- Include a comprehensive purpose statement which limits sediment delivery, as close as practicable, to pre-disturbance levels and minimizes effects on water quality, flooding, and nuisances?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Include a comprehensive set of principles that minimize sediment transport from the site for all storms up to the ten-year frequency event? (These principles should include provisions to minimize the area disturbed and the time of disturbance; follow natural contours; avoid sensitive areas; require that sediment control measures be in place as part of land development process before significant grading or disturbance is allowed; and require the early implementation of soil stabilization measures on disturbed areas).  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require ordinance applicability for any land disturbing activity in excess of 5,000 square feet, or 500 square feet if adjacent to stream, lake, or wetland?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Other (Describe) \_\_\_\_\_
- Include explicit site design requirements for sediment control measures, conveyance channels, soil stabilization, construction adjacent to water bodies, construction entrances, etc.?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Adopt by reference the "Illinois Urban Manual" published by the Natural Resources Conservation Service and the Illinois Environmental Protection Agency (1995, updated 2010) and the "Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control" published in 1988 (the Greenbook)? (These references provide additional design standards and guidelines beyond the specific standards spelled out in the ordinance).  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require routine maintenance of all erosion and sediment control practices?  
Yes \_\_\_\_\_ No \_\_\_\_\_

- Require construction site inspection by appropriately trained personnel at critical points in the development process to ensure that measures are being correctly installed and maintained?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Provide effective enforcement mechanisms including letters of credit, performance bonds, stop-work orders, and penalties, as appropriate?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_

**c. Floodplain management**

Does the floodplain management ordinance:

- Include protection of hydrologic functions, water quality, aquatic habitat, recreation, and aesthetics in the purposes for the ordinance?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Restrict modifications in the floodway to the following appropriate uses: public flood control projects, public recreation and open space uses, water dependent activities, and crossing roadways and bridges? (The ordinance would thereby prohibit new treatment plants and pumping facilities; detached garages, sheds, and other non-habitable structures; parking lots and aircraft parking aprons; and roadways which run along the length of a watercourse).  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Discourage stream channel modification and require mitigation of unavoidable adverse water quality and aquatic habitat impacts? (This would be done in cooperation with the Army Corps of Engineers for federally jurisdictional waterways).  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require effective soil erosion and sediment control measures for all disturbances in the floodway?  
Yes \_\_\_\_\_ No \_\_\_\_\_

**d. Stream and wetland protection**

Does the applicable stream and wetland protection ordinance:

- Include a comprehensive purpose statement which addresses the protection of wetland values and functions, including those pertaining to hydrology, hydraulics, water quality, habitat, aesthetics, and social and economic impacts?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Protect the beneficial functions of streams, lakes, and wetlands from damaging modifications, including filling, draining, excavating, damming, impoundment, and vegetation removal? (This may be done through a combination of avoidance and mitigation requirements, similar to Army Corps of Engineer requirements for federally jurisdictional waters).  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Prohibit the modification of high quality, irreplaceable wetlands, lakes, and stream corridors?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Discourage the modification of wetlands for stormwater management purposes unless the wetland is degraded and nonpoint source BMPs are implemented on the adjacent development?  
Yes \_\_\_\_\_ No \_\_\_\_\_

- Designate a minimum 100 foot setback zone from the edge of identified wetlands and water bodies in which development is limited to the following types of activities: minor improvements like walkways and signs, maintenance of highways and utilities, and park and recreational area development?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Other (if not 100 feet) \_\_\_\_\_
- Establish a minimum 25-foot wide protected native vegetation buffer strip along the edge of identified wetlands and water bodies?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Other (if not 25 feet) \_\_\_\_\_
- Restrict watercourse relocation or modification except to remedy existing erosion problems, restore natural habitat conditions, or to accommodate necessary utility crossings; and require mitigation of unavoidable adverse water quality and aquatic habitat impacts?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Encourage the restoration of stream and wetland habitat, hydrology, and morphology on development sites that contain degraded aquatic systems? (This could be accomplished through a streamlined permitting process and/or other development incentives).  
Yes \_\_\_\_\_ No \_\_\_\_\_

## **2. Natural Area and Open Space Standards**

Does the applicable ordinance require:

- Protection of remnant natural areas, including steep slopes, prairies, woodlands, and savannas (in addition to regulated wetlands and floodplains)?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Setting aside onsite open space for residential development, generally conforming to the following guidelines: estate residential: 60%; moderate residential: 45%; urban residential: 30%? (Common open space is preferable, but deed-restricted open space also is acceptable).  
Yes \_\_\_\_\_ No \_\_\_\_\_ Other \_\_\_\_\_
- Restoration of protected natural areas to reduce invasive species and enhance biodiversity?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Identification of an open space ownership entity, with a preference for a qualified public or private land conservation organization?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Dedication of natural open space via a binding conservation easement or similar binding legal instrument that ensures protected in perpetuity?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Secure and permanent funding arrangements for the long-term management and maintenance of open space, natural areas, and stormwater facilities once responsibilities are turned over to a conservation entity or the homeowners/property owners association? (Said funding arrangements shall be noted and made part of any proposed covenants and deed restrictions).  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Establishment of a back-up special service area (SSA) in order to provide funds necessary to support the maintenance of common areas, open space, and stormwater management areas (in the event that the responsible land owner/manager does not meet the required maintenance standards)?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Other arrangement \_\_\_\_\_
- Long-term management/stewardship plans for all common and open space areas, natural areas, and stormwater facilities?

Yes \_\_\_\_\_ No \_\_\_\_\_

- Meeting measurable performance standards for managed areas, including ground coverage, species diversity, and control of invasive species?  
Yes \_\_\_\_\_ No \_\_\_\_\_

### **3. Landscaping Standards**

Does the applicable ordinance:

- Include “noxious weed” provisions that might intentionally, or unintentionally, restrict or preclude natural landscaping because of vegetation height standards or similar restrictive provisions?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Encourage or require the use of native plant materials for the default landscaping of common areas, stormwater facilities, common open space areas, and the buffers of streams, lakes, wetlands and other natural areas?  
Encourage \_\_\_\_\_ Require \_\_\_\_\_ Neither \_\_\_\_\_
- Specify a minimum percentage of pervious landscaping for parking lots?  
Yes \_\_\_\_\_ No \_\_\_\_\_ If yes, specify percent \_\_\_\_\_
- Encourage/require the use of recessed landscape islands instead of raised islands to facilitate the infiltration and filtering of parking lot runoff?  
Encourage \_\_\_\_\_ Require \_\_\_\_\_ Neither \_\_\_\_\_
- Require provisions for long-term oversight, management, funding, and performance criteria for common areas and natural landscapes (as referenced above in greater detail)?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Require planting street trees? Yes \_\_\_\_\_ No \_\_\_\_\_  
  
If yes, how many trees?  
Residential: Per 100 feet of roadway \_\_\_\_\_ Per lot \_\_\_\_\_ Other \_\_\_\_\_  
Commercial: Per 100 feet of roadway \_\_\_\_\_ Per lot \_\_\_\_\_ Other \_\_\_\_\_  
Industrial: Per 100 feet of roadway \_\_\_\_\_ Per lot \_\_\_\_\_ Other \_\_\_\_\_
- Require protection of native/desirable trees (i.e., a tree protection ordinance)?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require replacement of any trees unavoidably impacted by construction activities?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require payment into a tree replacement fund or “mitigation bank” when removed trees cannot be replaced/mitigated on site?  
Yes \_\_\_\_\_ No \_\_\_\_\_

### **4. Impervious Area Reduction: Street and Parking Requirements**

Does the applicable ordinance:

- Encourage/require residential street widths that are narrower than suburban norms (i.e., encourage streets to be no wider than is necessary to move traffic effectively, to slow traffic and create safer conditions, and to safely accommodate pedestrians and bicyclists)? (As an example, the *Better Site Design* manual recommends a pavement width of 18 feet to 22 feet for streets with < 500 average daily trips).

Encourage \_\_\_\_\_ Require \_\_\_\_\_ Neither \_\_\_\_\_

- Encourage/require shared driveways, reduced driveway widths, and two-track driveways for single-family developments?  
Encourage \_\_\_\_\_ Require \_\_\_\_\_ Neither \_\_\_\_\_
- Require parking stalls to be less than or equal to 9 x 18 feet?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment/Other \_\_\_\_\_
- Allow for reduction in parking stall size to account for vehicle overhang onto landscaped islands or perimeter landscaping? (E.g., such flexibility might allow for an 18-foot deep stall to be reduced to 16 or 16.5 feet deep.)  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Promote use of pervious materials for paved areas, including alleys, streets, sidewalks, crosswalks, driveways, and parking lots?  
Yes \_\_\_\_\_ No \_\_\_\_\_ If yes, specify which: \_\_\_\_\_
- Provide flexibility regarding alternative, reduced parking requirements (e.g., shared parking, off-site parking, banking of parking spaces) and discourage over-parking of developments?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Require a parking ratio for a professional office building that is 3 spaces, or less, per 1,000 sf?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Require a parking ratio for retail uses that is 4.5 spaces, or less, per 1,000 sf?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Require a parking ratio for a single family home that is 2 spaces, or less?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Establish parking requirements as a maximum or a minimum?  
Maximum \_\_\_\_\_ Minimum \_\_\_\_\_
- Provide flexibility in downtown areas to permit developers to make payments in lieu of providing parking on-site, with the revenues to be used for a public parking facility?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Vary parking requirements by zone to reflect places where more trips are on foot or by transit? (E.g., can the provision of bicycle parking substitute for some automobile parking?)  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Discourage cul-de-sacs?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Require subdivisions to achieve a certain score on an index for internal street connectivity?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_

## **5. Conservation Design Standards (Flexible Land Use and Development Codes)**

Does the applicable ordinance:

- Encourage/require clustering of residential lots around sensitive natural areas, thereby creating a protected common open space area?  
Encourage \_\_\_\_\_ Require \_\_\_\_\_ Neither \_\_\_\_\_

- Require a minimum area of protected naturalized open space in new residential developments?  
Yes \_\_\_\_\_ No \_\_\_\_\_ If yes, specify minimum percentage \_\_\_\_\_
- Provide density bonuses for conservation developments that exceed minimum standards?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Allow conservation design as a “by-right” form of development?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Does the zoning map indicate areas where conservation development is required?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_

[Reinvestment and Compact/Contiguous Development]

- Is there a downtown overlay zoning district or another mechanism to encourage mixed-use development in neighborhood centers?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_
- Are there reduced impact fees or other incentives to encourage infill development?  
Yes \_\_\_\_\_ No \_\_\_\_\_ Comment \_\_\_\_\_

## **APPENDIX E: “CONCLUSIONS” FROM BANKING ON GREEN: A LOOK AT HOW GREEN INFRASTRUCTURE CAN SAVE MUNICIPALITIES MONEY AND PROVIDE ECONOMIC BENEFITS COMMUNITY-WIDE**

Green infrastructure approaches offer many opportunities for cost savings and cost-effectiveness, even though their costs and performance are somewhat more dependent on local conditions than gray infrastructure. As a result, green infrastructure practices are valuable and flexible tools to complement or decrease reliance on traditional stormwater technologies.

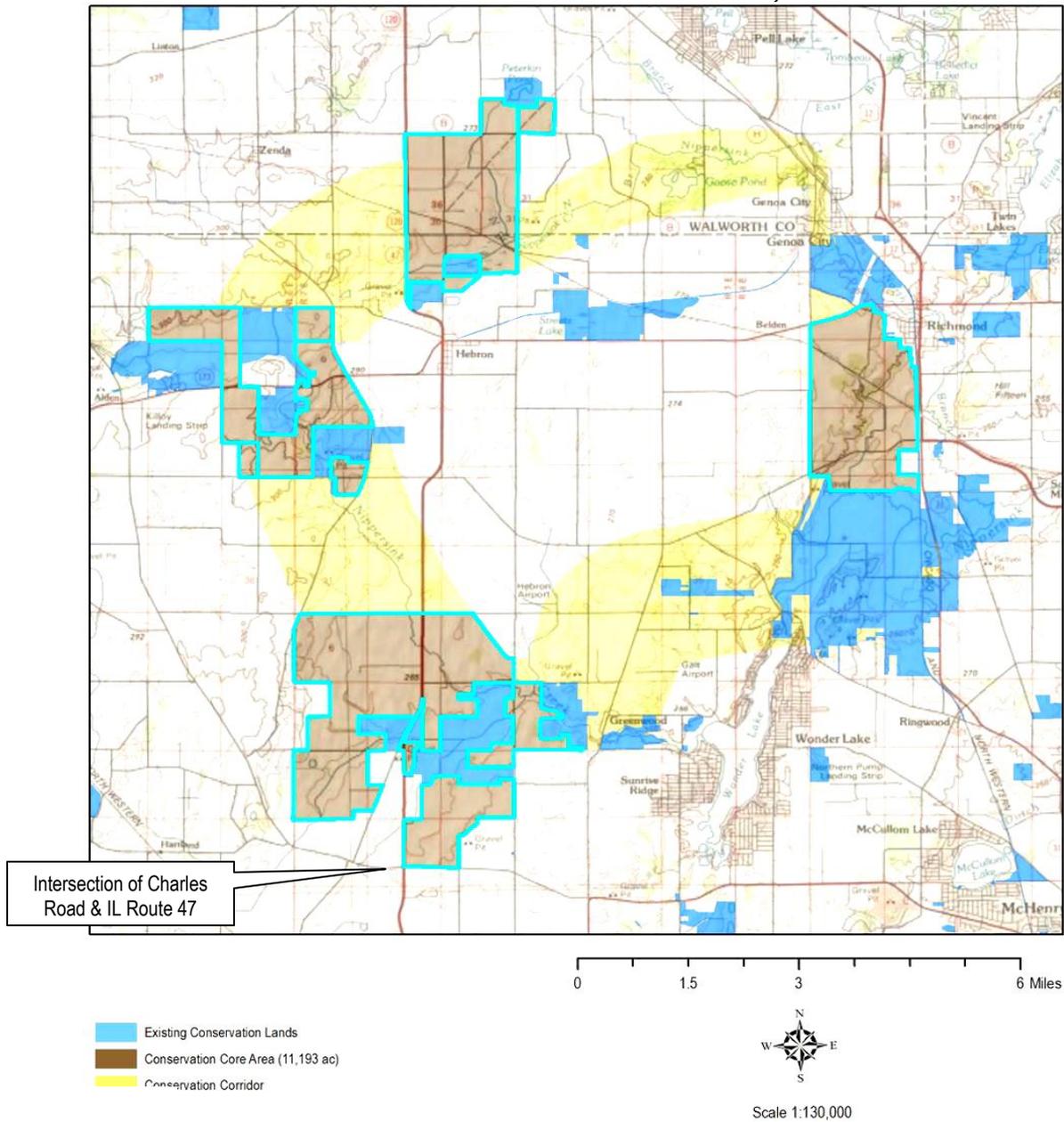
The range of costs, benefits, and effectiveness of green infrastructure techniques allows local stormwater managers to tailor solutions that are more resilient and affordable than gray-only systems. Further, as plantings mature the effectiveness of green practices may improve over time compared to more traditional, gray infrastructure, likely with diminished O&M requirements. A few important considerations to remember when considering green infrastructure costs and cost-effectiveness are:

- ***Green infrastructure construction costs can be lower than conventional costs*** - Some green infrastructure projects often allow elimination or reduction of costly material components of projects, such as curbs and drains, and stormwater conveyance pipes and tanks. Others, such as green roofs, may be more expensive than traditional counterparts, but provide life-cycle efficiencies that make them less expensive over time. And finally, some green infrastructure materials might currently be more expensive than conventional versions, but because they reduce overall stormwater management needs, the total project construction costs can be reduced.
- ***Green infrastructure may not require the same extent of ongoing costs of conventional infrastructure*** - A variety of costs in the conveyance, storage, and operation of stormwater infrastructure can be avoided when functioning natural systems are used to manage stormwater, even though operation and maintenance expenses may be more regular or born by different workers. With appropriate maintenance, green infrastructure practices can regenerate and strengthen over time rather than wearing down and requiring replacements leading to lower overall life cycle costs.
- ***Green infrastructure benefits can extend beyond stormwater for total project cost-effectiveness*** - Green infrastructure cost savings can combine with other benefits in terms of avoided costs for other aspects of a project, such as space requirements, landscape requirements, and maintenance efforts such as to address erosion, flooding, snow, and ice. As we learn more about putting green infrastructure into practice, we will likely learn far more about these cost advantages.

Source: A Joint Report by American Rivers, the Water Environment Federation, the American Society of Landscape Architects, and ECONorthwest, April 2012.

# APPENDIX F: HACKMATACK NATIONAL WILDLIFE REFUGE

*Land Protection Priorities for the Hackmatack National Wildlife Refuge.  
Source: U.S. Fish & Wildlife Service 2011).*



## Hackmatack National Wildlife Refuge

In August 2012 and in recognition of the value of McHenry County's natural and environmental resources, the U.S. Fish and Wildlife Service (USFWS) approved the establishment of a national wildlife refuge in McHenry County and Walworth County, Wisconsin. The purpose of the refuge is to:

- Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the federal Endangered Species Act of 1973.
- Create opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the Refuge and other protected lands in the region.
- Promote science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of the region.

The USFWS has drafted a *Proposed Hackmatack National Wildlife Refuge Environmental Assessment, Land Protection Plan, and Conceptual Management Plan* that recommends a “cores and corridors” approach. The “cores and corridors” approach identifies existing conservation lands and then proposes additional conservation core areas and conservation corridors. The “preferred action alternative” is represented in the map below. The refuge takes its name from an Algonquin Indian word for the Tamarack tree.

The Hackmatack National Wildlife Refuge will not be officially established until the first parcel of land is purchased and legal interest in lands is obtained. Legal interest can encompass anything from fee simple ownership to conservation easement. No federal money has been earmarked for the refuge, so funding for the acquisition of land is dependent upon congressional approval and the willingness of property owners to sell their land.

In February 2013, the State of Illinois recently announced acquisition of the first parcel of land designated for inclusion in the new refuge, a 72-acre plot in northern McHenry County. The acquisition was made for \$511,000. Acquisition of the land by a public-sector body triggered the completion of the legal act of creating the new refuge.

## **APPENDIX G: REFERENCES & RESOURCES**

A number of resources are available which provide additional information relative to green infrastructure. Many of these include specific guidelines and directions for utilizing green infrastructure techniques and achieving improved environmental resource protection. These include:

*Sustainable Development Principles*

[http://www.chicagowilderness.org/pdf/Sustainable\\_Development\\_Principles.pdf](http://www.chicagowilderness.org/pdf/Sustainable_Development_Principles.pdf) .

*The Better Site Design Handbook*

The Center for Watershed Protection

[http://www.cwp.org/Resource\\_Library/Better\\_Site\\_Design/](http://www.cwp.org/Resource_Library/Better_Site_Design/).

*Protecting Nature in Your Community* guidebook

[http://www.chicagowilderness.org/sustainable/biodiversity\\_community.php](http://www.chicagowilderness.org/sustainable/biodiversity_community.php) .

“Building Sustainable Communities” fact sheets

[http://www.chicagowilderness.org/sustainable/development\\_guidebook.php](http://www.chicagowilderness.org/sustainable/development_guidebook.php) .

*Conservation Development in Practice*, The Nature Conservancy and Chicago Wilderness

[http://www.chicagowilderness.org/sustainable/conservation\\_dev\\_practice.php](http://www.chicagowilderness.org/sustainable/conservation_dev_practice.php) .

*Banking on Green: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-wide.*

A Joint Report by American Rivers, the Water Environment Federation, the American Society of Landscape Architects, and ECONorthwest.

[http://actrees.org/site/resources/research/banking\\_on\\_green\\_a\\_look\\_at\\_how\\_green\\_infrastr.php](http://actrees.org/site/resources/research/banking_on_green_a_look_at_how_green_infrastr.php)

*The Green Streets Municipal Handbook*, U. S. Environmental Protection Agency. 2008.

[http://www.epa.gov/npdes/pubs/gi\\_munichandbook\\_green\\_streets.pdf](http://www.epa.gov/npdes/pubs/gi_munichandbook_green_streets.pdf)

A more detailed discussion of conservation design ordinance considerations, including subdivision and zoning codes, can be found in the following items:

*Conservation Design Resource Manual*

[http://www.chicagowilderness.org/sustainable/conservationdesign/Manual/Conservation\\_DesignResource\\_Manual.pdf](http://www.chicagowilderness.org/sustainable/conservationdesign/Manual/Conservation_DesignResource_Manual.pdf) .

*The Northeastern Illinois Regional Greenways and Trails Plan*, developed by CMAP which provides assistance to local governments on planning and implementing local greenways

<http://www.cmap.illinois.gov/bike-ped/greenways-and-trails>

*IDNR's Illinois Trail Grant Programs* (trail planning advice and financial assistance)

<http://dnr.state.il.us/ocd/newtrail2.htm> .

Nationally there are several references on retrofitting techniques from organizations such as

Center for Watershed Protection

[http://www.cwp.org/documents/cat\\_view/68-urban-subwatershed-restoration-manual-series/89-manual-3-urban-stormwater-retrofit-practices-manual.html](http://www.cwp.org/documents/cat_view/68-urban-subwatershed-restoration-manual-series/89-manual-3-urban-stormwater-retrofit-practices-manual.html) ).

Illinois Environmental Protection Agency

Section 319 of the Clean Water Act provides funds for nonpoint source pollution control projects

<http://www.epa.state.il.us/water/financial-assistance/non-point.html>.

The Illinois Green Infrastructure Grant (IGIG) program provides funding for green infrastructure practices to control stormwater runoff to improve water quality  
<http://www.epa.state.il.us/water/financial-assistance/igig.html>.

Communities and land owners engaging in ecological restoration projects should have a firm grasp of effective practices. Chicago Wilderness has developed several papers on ecological restoration and management, including:

:

Conservation of woodlands

[http://chicagowilderness.org/members/downloads/General/CW\\_WoodlandHealthFinal20031125.pdf](http://chicagowilderness.org/members/downloads/General/CW_WoodlandHealthFinal20031125.pdf)

Controlled burning

[http://chicagowilderness.org/members/downloads/General/CW\\_ControlledBurnFinal20031125.pdf](http://chicagowilderness.org/members/downloads/General/CW_ControlledBurnFinal20031125.pdf)

The Illinois Nature Preserves Commission also has a number of valuable publications for natural area restoration and stewardship, including recommended control techniques for various invasive species, which can be found at

Management guidelines

[http://dnr.state.il.us/INPC/Management\\_guidelines.htm](http://dnr.state.il.us/INPC/Management_guidelines.htm).

Restoring and Managing Stream Greenways: A Landowner's Handbook:

[http://www.chicagowilderness.org/sustainable/water\\_greenways.php](http://www.chicagowilderness.org/sustainable/water_greenways.php)

There are also several qualified contractors that can assist in designing and conducting restoration projects. The Land Conservancy identifies local natural area contractors on its website:

<http://www.conservemc.org/resources/contractors.html>.

The Natural Resources Conservation Service. There are a number of financial incentive and grant programs for ecological restoration projects. A comprehensive summary of grants for conservation projects can be found at:

[http://www.will-scookswcd.org/images/schema/resource/pdf\\_27.pdf](http://www.will-scookswcd.org/images/schema/resource/pdf_27.pdf)

There is a large amount of resources for conservation design and green infrastructure techniques. Applicable sources and links include.

*Conservation at Home:* <http://www.theconservationfoundation.org/conservation--home.html>

*Conservation Development in Practice:*

[http://www.chicagowilderness.org/sustainable/conservation\\_dev\\_practice.php](http://www.chicagowilderness.org/sustainable/conservation_dev_practice.php)

*Restoring and Managing Stream Greenways: A Landowner's Handbook:*

[http://www.chicagowilderness.org/sustainable/water\\_greenways.php](http://www.chicagowilderness.org/sustainable/water_greenways.php)

*Protecting Nature in Your Community:*

[http://www.chicagowilderness.org/sustainable/biodiversity\\_community.php](http://www.chicagowilderness.org/sustainable/biodiversity_community.php)

Source Book on Natural Landscaping for Local Officials:

[http://www.chicagowilderness.org/sustainable/landscaping\\_sourcebook.php](http://www.chicagowilderness.org/sustainable/landscaping_sourcebook.php)

*Conservation Development in Practice*, The Nature Conservancy and Chicago Wilderness, 2004.  
[http://www.chicagowilderness.org/sustainable/conservation\\_dev\\_practice.php](http://www.chicagowilderness.org/sustainable/conservation_dev_practice.php)

*Ecological Planning and Design Directory*, Chicago Wilderness,  
[http://www.chicagowilderness.org/sustainable/directory\\_documents.php](http://www.chicagowilderness.org/sustainable/directory_documents.php)

Grand Illinois Trail, Openlands, <http://openlands.org/greenways/projects/biking-trails/the-grand-illinois-trail.html>

*Grant Information Summary for Conservation Projects in Illinois*, U.S. Department of Agriculture, Natural Resources Conservation Service, 2008.  
[http://www.will-scookswcd.org/images/schema/resource/pdf\\_27.pdf](http://www.will-scookswcd.org/images/schema/resource/pdf_27.pdf)

*Green Infrastructure: Linking Landscapes and Communities*, Benedict, M. A. and E.T. McMahon, The Conservation Fund, Washington, DC, 2006.

*Green Infrastructure Vision*, Northeastern Illinois Planning Commission and Chicago Wilderness, 2004.  
[http://www.cmap.illinois.gov/uploadedFiles/archives/nipc/environment/sustainable/Green\\_Infrastructure\\_Vision\\_Final\\_Report.pdf](http://www.cmap.illinois.gov/uploadedFiles/archives/nipc/environment/sustainable/Green_Infrastructure_Vision_Final_Report.pdf).

*Northeastern Illinois Regional Greenways and Trails Plan*, Chicago Metropolitan Agency for Planning, 2009, <http://www.cmap.illinois.gov/bike-ped/greenways-and-trails>

*Protecting Nature in Your Community*, Navota, J. and D. Dreher, Northeastern Illinois Planning Commission, 2000.

*Managing Wet Weather with Green Infrastructure*, U.S. Environmental Protection Agency,  
[http://cfpub.epa.gov/npdes/home.cfm?program\\_id=298](http://cfpub.epa.gov/npdes/home.cfm?program_id=298)