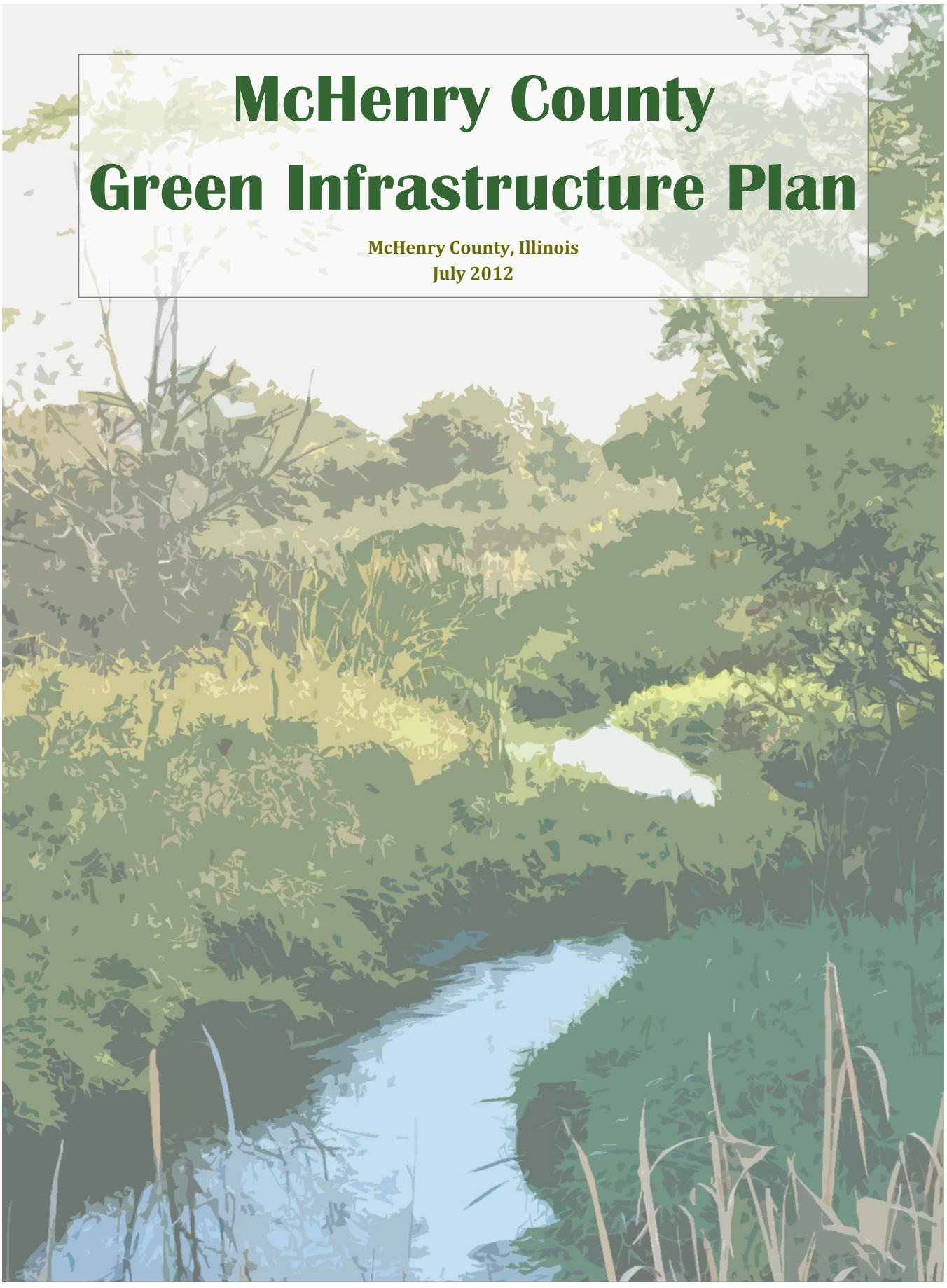
McHenry County Green Infrastructure Plan

McHenry County, Illinois
July 2012



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PROLOGUE

The Once and Future McHenry County

by Ed Collins, MCCD

Sometimes one can wander thousands of miles, only to find that the truly miraculous lies waiting just outside the doorway.

Imagine a McHenry County, if you will…

…whose bedrock was born in an ancient Silurian sea…

…whose surface was incinerated in a planet-wide natural disaster 65 million years ago…

…whose rolling hills and long vistas were sculpted by a 2,000-foot thick glacier…

…whose deep agricultural soils were first born in a 3,000 year drought…

…whose ancient oak woodlands survived centuries of fires…

…whose land was the last Illinois wilderness to pass into oblivion…

…whose prairies were broken by the first steel moldboard plows…

…whose woodlands were grazed by the cattle of hundreds of family farms…

…whose wetlands were drained in a civil engineering feat eclipsing any bridge or road ever constructed…

…whose communities are now awash in a new wave of change, shaping what this county will look like for generations to come…

…yet still remains the keeper of immensely important natural and cultural treasures.

As residents of McHenry County, we live in a most wondrous place. The long journey of our last great places provides us both a sense of history and a sense of ecological destiny. It also compels us to remember that a society is defined not only by what it creates, but what it refuses to destroy as well.

OVERVIEW

Background and Purpose

The *McHenry County 2030 Comprehensive Plan*, adopted in April 2010, makes recommendations for the development and adoption of a green infrastructure plan for the county. To that end, and with the continued support of the County Board and Planning and Development Committee, this plan was undertaken in late 2010 by the Department of Planning and Development with the assistance of the Chicago Wilderness Sustainable Watershed Action Team (SWAT) and green infrastructure expert Dennis Dreher, who provided project coordination and technical and policy guidance.

Modeled on the *Green Infrastructure Vision* developed by Chicago Wilderness and inspired by McHenry County's unique landscapes, the primary objectives of the Green Infrastructure Plan were to create a detailed inventory of natural resources using the latest technology and information, use that information to create a green infrastructure map, work with local governments and agencies to identify additional green infrastructure opportunities, and develop policies and implementation recommendations.

Though initiated by the McHenry County Board, it is the ultimate goal of this plan to be the foundation for green infrastructure planning and implementation in McHenry County at every level—from the county, municipalities, and park districts—to individual property owners and businesses.

What is Green Infrastructure?

The term *green infrastructure* has many definitions. Some focus on efforts to manage natural lands for their ecological and recreational value. Others see it as networked lands that support biodiversity and habitats for plant and animal life. Yet, others view the term as a description of the technologies and engineering (e.g. green roofs, vegetated swales, and permeable pavement) that replicate natural water and environmental processes—as opposed to conventional *gray infrastructure* methods. This plan takes a broad view of green infrastructure by incorporating the common goals and complimentary functions of each of these definitions. Different sections of this plan highlight the different ways in which green infrastructure can be defined and applied, from a regional scale all the way down to individual sites.

Why a network?

A network of green infrastructure is important for three main reasons:

1. It reflects the often unseen natural processes that are already at work in the county. These interconnected processes form a network that provides us with stormwater management, drinking water supply and filtration, and habitat for our flora and fauna.
2. Natural processes are interconnected and an enhancement of one area ultimately benefits many more. In a green infrastructure network, every connection strengthens the network further. By identifying and mapping a network, we reveal areas of the county that have regional significance whose value might otherwise be easily overlooked by local residents or agencies. This knowledge provides them with an opportunity to connect their local actions to the regional benefit.
3. A network allows for connections between the county's most valuable natural areas. Not only do these linkages provide migratory routes for wildlife, they also provide opportunities for recreational trails.

How was it developed?

Using powerful computer mapping tools, several resources maps, including lakes, rivers, streams, floodplains, wetlands, woodlands, and protected and conservation lands, were overlaid on one another to produce a comprehensive look at the county's environmental resources at a scale and level of detail that had never before been seen. This exercise helped natural resource and land management experts visually identify the natural connections that already exist between environmentally valuable areas as well as opportunities for new connections. The experts, who represented resource management agencies, municipalities, park districts, and town-

ships refined the map based on their detailed knowledge of the county's geography and ecological management.

How will it be implemented?

The establishment of a green infrastructure network is not intended to be the foundation for a major county land acquisition effort. While land acquisition is one tool for implementing the policies of this plan, the county is not in the business of land management. Instead, the county is best suited to promote and further green infrastructure goals and strategies by revising its zoning regulations and development design standards and assisting municipalities in their green infrastructure planning and ordinance revision efforts.

Other jurisdictions, such as municipalities and park districts, that choose to adopt this plan—either in whole or in part—will have the opportunity to tailor their green infrastructure implementation policies and techniques in a manner to which they are best positioned. In some cases this may include the acquisition of green infrastructure areas that match their own land management objectives.

As stated before, green infrastructure can mean different things to different people. This plan adopts a comprehensive approach by uniting as many of those meanings as possible. Implementation at one scale can look very different than the next. For example, McHenry County Conservation District's mission of preserving, restoring, and managing natural areas fits well with green infrastructure implementation on a *regional scale*. At a *community scale*, park districts and municipalities are able to protect and preserve open space and municipalities can adopt land use and zoning codes that further green infrastructure goals. At a *neighborhood scale*, the county, and municipalities like Woodstock, have adopted conservation design standards for subdivisions that protect environmentally sensitive areas while encouraging green infrastructure design technologies and methods. And for the individual homeowner or business, there are many options at the *site scale*, such as planting native vegetation, using permeable pavement, or installing rain gardens.

When taken together, each approach can reinforce and enhance the next. On their own, each has its own benefits, but when connections are made from one scale to the next or from one jurisdiction to the next, the network grows stronger and more robust.

Implementation Recommendations

In furtherance of the numerous green infrastructure objectives, principles, and policies of the *McHenry County 2030 Comprehensive Plan*, this plan recommends a comprehensive approach to implementing green infrastructure by highlighting the opportunities that exist at every scale.

First and foremost is to concentrate on a regional green infrastructure network, which can be created and protected through:

- Acquisition by public agencies
- Conservation easements on private land
- Targeted land use planning and zoning
- Conservation development
- Greenway connections
- Trails, including bikeways, equestrian trails, and water trails
- Landscape retrofitting of previously developed land
- Ecological restoration of degraded landscapes
- Farmland protection

Additional steps can be taken to protect 'supporting' green infrastructure, which includes sensitive aquifer recharge areas (SARA), Class III Special Resource Groundwater Protection Areas, and hydric soils.

Implementation at a local scale can be carried out by almost anyone. Applications include:

- Permeable paving
- Green roofs
- Rain barrels
- Bio-swales and rain gardens
- Natural landscaping
- Naturalized detention basins

No single government or agency can form this green infrastructure network alone. This plan provides a vision for making the network a reality in McHenry County. The more people, agencies, and governments that adopt or embrace the principles of this plan, the greater the likelihood of its success.

UNDERSTANDING GREEN INFRASTRUCTURE

DEFINING GREEN INFRASTRUCTURE

The task of defining *green infrastructure* is not an easy one. Both nationally and regionally, the term has a range of meanings. That range is simplified here into three categories.

1. Landscape-based green infrastructure

This is perhaps the meaning most commonly applied to green infrastructure. It is based in the idea that certain lands have an inherent value that can be made even greater when a part of a network. The Conservation Fund defines it this way:

> *Strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations.*

Under this definition, the foundation of green infrastructure networks are the natural elements – woodlands, wetlands, rivers, grasslands – that work together as a whole to sustain ecological values and functions. But green infrastructure also can include working lands, trails and other recreational features, and cultural and historic sites.

2. Biodiversity-based green infrastructure

In its definition, Chicago Wilderness' *Green Infrastructure Vision* adopts another meaning for green infrastructure—one which focuses on the goal of supporting biodiversity. Chicago Wilderness defines green infrastructure as:

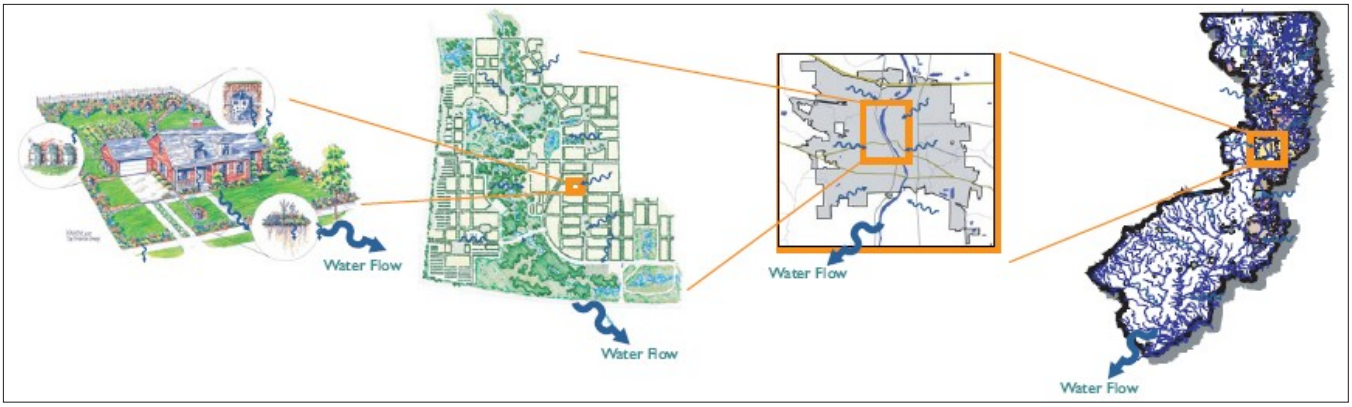
> *The interconnected network of land and water that supports biodiversity and provides habitat for diverse communities of native flora and fauna at the regional scale. It includes large complexes of remnant woodlands, savannas, prairies, wetlands, lakes, stream corridors and related natural communities. Green infrastructure may also include areas adjacent to and connecting these remnant natural communities that provide both buffers and opportunities for ecosystem restoration.*

This definition reflects both existing green infrastructure – conservation district holdings, state parks, and designated natural areas – as well as opportunities for expansion, restoration, and connection.

3. Nature-based alternatives to gray infrastructure

This definition of green infrastructure focuses on nature-based alternatives to conventional "gray infrastructure" technology and engineering. In this context, green infrastructure can be used to describe products, technologies, and practices that use natural systems – or engineered systems that mimic natural processes – to enhance overall environmental quality and provide utility services. The U.S. Environmental Protection Agency identifies green infrastructure techniques, such as green roofs, porous pavement, rain gardens, and vegetated swales, which use soils and vegetation to infiltrate, evapotranspirate, and/or recycle stormwater runoff. In addition to effectively retaining and infiltrating rainfall, these technologies also can filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon.

This plan integrates each of these meanings into a single comprehensive view of green infrastructure. It encourages not only sustainable land use and open space protection but also innovative, green technology to better protect water and other natural resources.



Green infrastructure at different scales: site, neighborhood, community, regional

GREEN INFRASTRUCTURE EXAMPLES

While this plan emphasizes large-scale, countywide maps of green infrastructure and trails, it recognizes that implementation of green infrastructure plans and policies should be undertaken at multiple spatial scales by various local governments, agencies, organizations, businesses, and private landowners in order to maximize the benefits. The figure below highlights the range of scales for green infrastructure planning and implementation.

The following are some examples of green infrastructure planning and implementation at different geographic scales and how they relate to the *McHenry County 2030 Comprehensive Plan*.

At the Regional Scale

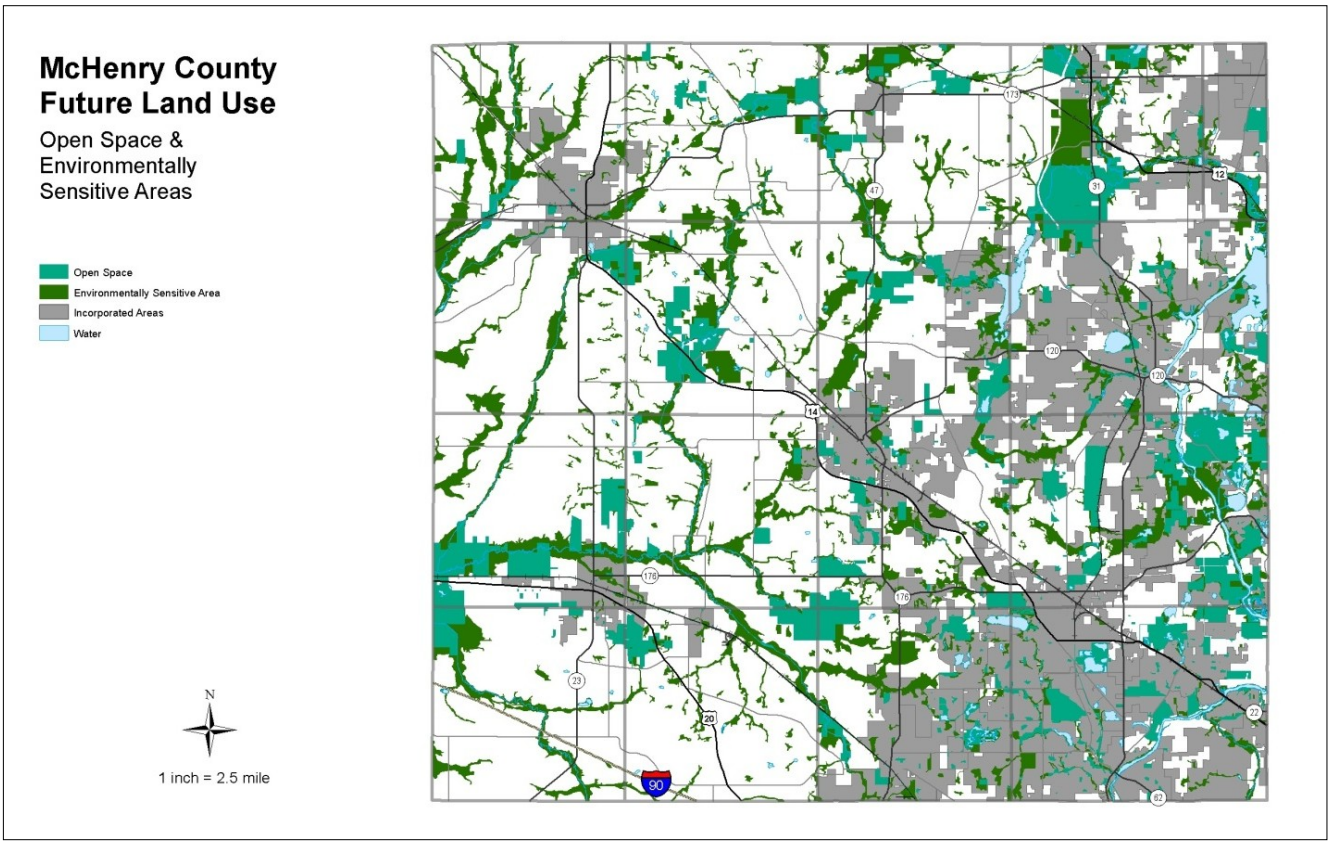
The Chicago Wilderness *Green Infrastructure Vision* provides a regional framework for green infrastructure mapping and planning. Within McHenry County, the *Green Infrastructure Network Map* and the *Green Infrastructure Trails Map*, developed for this plan, exemplify regional-scale green infrastructure planning. The US Fish and Wildlife Service has recommended the creation of a regional network of conservation areas, to be known as Hackmatack National Wildlife Refuge, which would span the Illinois-Wisconsin border. *(Learn more about Hackmatack on pages 16-17.)* Regional green infrastructure implementation can be seen in the remarkable open space and trail protection work of McHenry County Conservation District that spans numerous municipalities and townships across the county. Watershed planning can be at the regional or community scale. Ultimately, the best way to protect watersheds is to have a common baseline of protections and design standards for all communities in a watershed.

The *2030 Plan* on Regional Green Infrastructure...

- Create and maintain a countywide inventory of natural resources for protection
- Create and adopt a countywide open space plan
- Utilize the *Northeastern Illinois Regional Greenways and Trails Plan* as a template for a countywide greenways master plan
- Consider the *Northeastern Illinois Regional Water Trails Plan* as a component of the countywide plan
- Collaborate with municipalities to link local open spaces to the countywide open space network

At the Community Scale

At the community level, municipalities, park districts, and townships can incorporate green infrastructure principles into their land use and land protection plans. The City of Crystal Lake continues to be at the forefront of planning for green infrastructure and water protection. In 2007, the city adopted the *Crystal Lake Watershed Design Manual* and the *Design Manual Implementation Plan,* which call for the protection of the Crystal Lake watershed and establishes limits on new impervious surface, encourages onsite infiltration, and promotes green infrastructure technologies. The city has also adopted its own *Green Infrastructure Vision,* which includes a green infrastructure map. Woodstock, with the assistance of Chicago Wilderness Strategic Watershed Action Team (SWAT) and McHenry County, has drafted a green infrastructure plan and map. Land use plans of other municipalities, such as Spring Grove, embrace green infrastructure principles. In addition, municipalities can adopt conservation-based zoning, subdivision, and landscaping codes and conservation design ordinances. Some local park districts, notably Crystal Lake and Cary, are members of the Chicago Wilderness consortium and are engaged in the pro-



Excerpt from the 2030 Plan

tection and management of significant natural areas, such as Sterne's Woods, Wingate Prairie, and Sands Main Street Prairie.

The *2030 Plan* on Community Green Infrastructure...

- Identification of open space and environmentally sensitive areas in the Future Land Use Map
- Numerous policy recommendations addressing:
  - Preservation of oak woods and other natural areas
  - Greenways and trails
  - Sensitive aquifer recharge areas
  - Conservation design
  - Collaboration with municipalities

At the Neighborhood Scale

Neighborhoods, both existing and new, can be transformed to incorporate conservation design principles. This means the subdivision review process includes open space protection, natural landscaping, and stormwater best management practices that preserve biodiversity and natural resource functions in the design of the neighborhood. Not only does this preserve and enhance the natural environment, it also brings nature closer to families and children.

Local governments, including the county, Woodstock, Crystal Lake, and Algonquin, are regional leaders in developing conservation design ordinances for new development on sensitive sites. Several residential developments, including the Sanctuary of Bull Valley in Woodstock and McAndrew's Glen in Bull Valley, incorporate conservation design themes.

The *2030 Plan* on Neighborhood Green Infrastructure...

- Implement conservation design strategies for any new development
- Protect sensitive aquifer recharge areas (SARA), wetlands, hydric soils, woodlands in new developments
- Implement wastewater reclamation and reuse practices

Green infrastructure for Sites

Small sites, including residential yards, businesses, school grounds, and parks can incorporate habitat for native species through practices like rain gardens and natural landscaping. Some examples are MCCD's Lost Valley Visitor Center, Other World Computing in Woodstock, and several rain garden installations in Crystal Lake and Algonquin can serve as models for other communities and land owners.

The *2030 Plan* on Small Site Green Infrastructure...

- Implement best management practices to minimize impervious surfaces and soil compaction
- Promote infiltration and cleansing of runoff with bio-swales, filter strips, permeable paving, and natural landscaping
- Promote natural landscaping and tree protection policies
- Revise the countywide Stormwater Management Ordinance to reduce runoff pollution

CONTEXT FOR THE PLAN

THE FOUNDATION: *McHenry County 2030 Comprehensive Plan*

This plan has its foundation in the *McHenry County 2030 Comprehensive Plan*, which lays out numerous green infrastructure objectives, principles, and policies. Some of these are touched upon in the previous chapter. Below is a more thorough exploration of the *2030 Plan* as it relates to green infrastructure.

Greenways, Open Space & Natural Resources

This chapter begins with a discussion of the importance of green infrastructure.

Green infrastructure is defined as an interconnected network of open space, green-ways, and natural areas. The *2030 Plan* notes that green infrastructure incorporates re-sources and facilities at a range of scales and serves varied functions in the lives of residents. The Plan also calls for an inventory of valuable open space assets, greenways, and natural resources in order to inform and facilitate wise land use decisions that protect environmentally sensitive areas and provide quality opportunities to experience healthy, vibrant natural settings for generations to come. That is a central focus of this *Green Infrastructure Plan.*

The stated goal of the Greenways, Open Space & Natural Resources Chapter is to:

> *Make wise land use decisions that recognize the qualities of natural resources and the environment, protect environmentally sensitive areas, and provide aesthetically pleasing places.*

Its objectives are to:

- Promote land uses that:
  - Maintain the integrity of regional natural systems
  - Preserve natural features
  - Minimize the impact on land, water, energy, and other natural resources
  - Minimize soil erosion, promote development of healthy soil, and minimize air pollution.
- Promote the retention and management of open space for conservation, wildlife habitat, and recreation.
- Promote the designation and management of greenways to:
  - Link open space areas, particularly waterways, within the county
  - Permit wildlife movement between areas
  - Preserve environmentally sensitive corridors
  - Connect existing trails and public open space
  - Enhance recreational opportunities for trail uses that are compatible with the natural resources.

Water Resources

This chapter of the *2030 Plan* also supports a number of green infrastructure principles. Notably, it emphasizes a holistic approach that integrates: 1) the management of groundwater and water supply; 2) the health of streams, lakes, and wetlands; and, 3) effective stormwater management and flood prevention.

The water resources goal is to:

> *Make wise land use and development decisions that preserve and enhance existing surface and groundwater resources.*

Related water resource objectives are to:

- Preserve, improve, and replenish the quality and quantity of existing groundwater resources.
- Preserve the capacity of groundwater systems to supply projected drinking and irrigation water needs and to provide adequate flows to sustain healthy aquatic ecosystems.
- Protect and preserve Sensitive Aquifer Recharge Areas as a priority of the *2030 Plan*. The SARA map shall be utilized as a determining factor in

any proposed land use change.

- Preserve and enhance the chemical, physical, biological, and hydrologic integrity of streams, lakes and wetlands.
- Protect and enhance the capacity of streams and lakes to meet recreational demands for fishing, swimming, and boating.
- Prevent increases in flooding and flood damages and associated channel erosion related to increased stormwater runoff.

Infrastructure

This chapter supports the efficient integration and expansion of the county's infrastructure to accommodate growth and change, identifying opportunities for both green and grey infrastructure. Some of its relevant objectives are to:

- Promote and encourage the development of multimodal systems of transportation and the expansion and integration of existing transportation system for travel within and outside of the county.
- Promote and encourage the development of appropriate and adequate facilities (parks, greenways, conservation easements, equestrian trails, bike paths, etc.) for the use of pedestrian, equestrian and non-motorized traffic safety and convenience and for recreational purposes.
- Provide, to the extent possible, for the greater interconnection of pedestrian and non-motorized transportation networks.
- Encourage future development in the county to concentrate adjacent to existing infrastructure and maximize use and efficiency of existing facilities.

Agricultural Resources

The goal of this chapter is to preserve the most productive farmland as a source for viable agricultural activities that will enhance the county's economy and contribute to its rural character. Relevant objectives are to:

- Encourage best management practices to reduce potential negative impacts to natural resources.
- Recognize the cultural, social, recreational, conservation, economic, environmental, and aesthetic benefits provided by agricultural land use.

This chapter also notes the strong connection between agricultural protection and the preservation of water quality, groundwater recharge, wildlife habitat, and other natural resources.

Economic Development

Even economic development is tied to green infrastructure. For example, the *2030 Plan* recommends developing and promoting ecotourism resources, such as parks, natural resources, and similar points-of-interest. More specifically, it recommends the promotion of water-based recreation and outdoor entertainment in the Fox River Valley in order to establish McHenry County as a regional destination that attracts tourists from throughout the Chicago region.

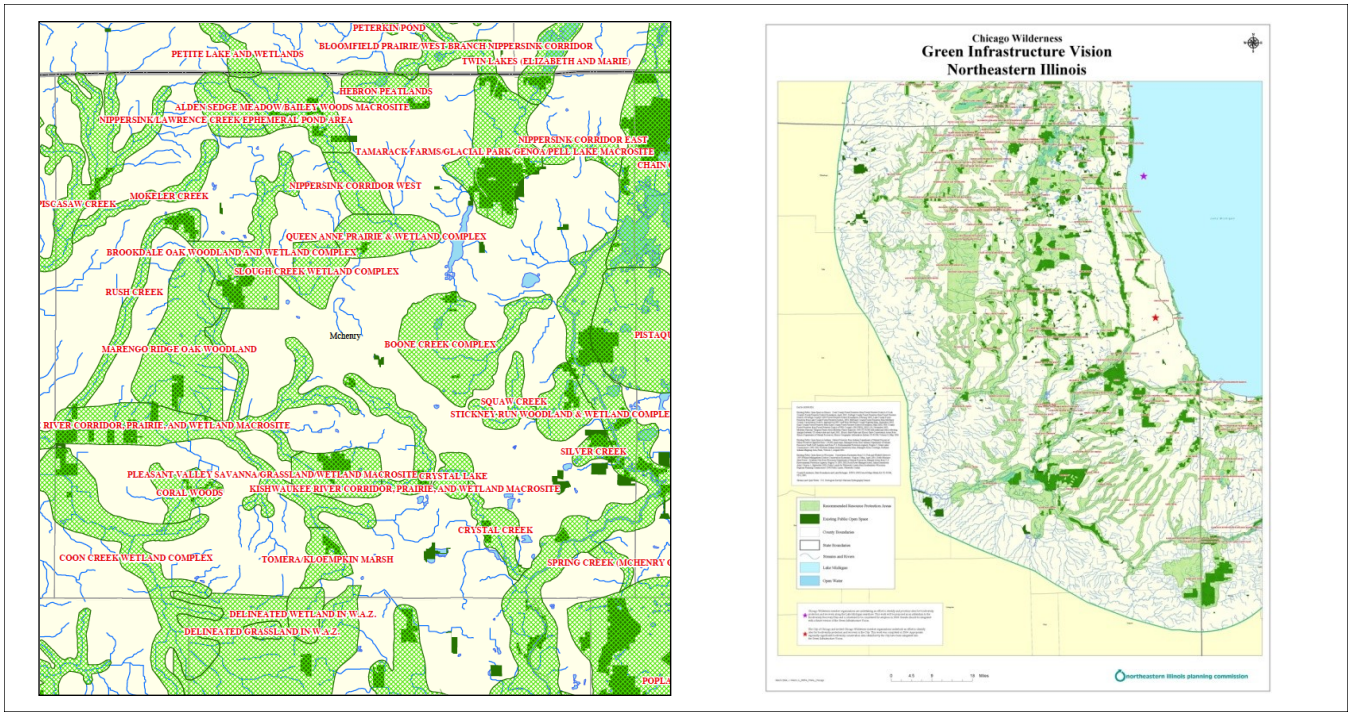
THE MODEL: Chicago Wilderness *Green Infrastructure Vision*

The county green infrastructure plan was modeled after the regional *Green Infrastructure Vision*, or *GIV*, developed by the Chicago Wilderness consortium. Chicago Wilderness has over 260 member organizations, including the McHenry County Conservation District, the Park Districts of Cary and Crystal Lake, Environmental Defenders of McHenry County, The Land Conservancy, and other McHenry County organizations.

The Chicago Wilderness regional *Green Infrastructure Vision* identified and mapped over 140 recommended resource protection areas totaling over 1.8 million acres within the broader 6 million-acre Chicago Wilderness assessment area. Notably, over 360,000 acres of protected "natural" public lands currently exist within the Chicago Wilderness region.

The mapping of green infrastructure through a series of connected large "resource protection areas" was not intended to suggest precise plans for acquisition or restoration areas. The intent of the mapping was to stimulate the many ongoing local conservation efforts at the community and watershed scale by offering the implicit support of Chicago Wilderness for regional and local conservation actions.

GIV planning efforts recommend implementation at multiple spatial scales, ranging from regional to very local. At



McHenry County detail of the GIV *map, left, and the full* GIV *map, right*

a regional scale, the Chicago Wilderness GIV and the green infrastructure network map developed for McHenry County provide frameworks for multiple local governments, agencies, and organizations to integrate their efforts to protect and enhance important natural resources. At a community level, individual governments can develop improved land use plans, trail maps, and ordinances that emphasize the importance of green infrastructure. At a neighborhood scale, subdivisions and planned developments can incorporate conservation design elements to preserve and enhance natural areas, greenways, stream corridors, and open space. At a site scale, individual properties can utilize green infrastructure designs such as bioswales, rain gardens, and permeable paving in lieu of conventional gray infrastructure approaches for drainage and landscaping.

This Plan recognizes that achieving protection of natural resources identified in green infrastructure mapping will not rely exclusively on traditional land acquisition, or restrictive regulations. In fact, much of the identified greenway and trail connections in the future ideally will be achieved by creative, conservation-oriented land development and redevelopment.

The suite of potential green infrastructure protection techniques could include:

- Acquisition by public agencies
- Conservation easements on private land
- Targeted land use planning and zoning
- Conservation development
- Greenway connections
- Landscape retrofitting of previously developed land
- Ecological restoration of degraded landscapes
- Farmland protection

THE INSPIRATION: McHenry County's Last Great Places

McHenry County's Last Great Places

by Ed Collins, MCCD

In every corner of McHenry County, secreted in forgotten pioneer cemeteries, hidden in wet pastures and tucked deep into the rolling landscape left by the last ice sheet lie McHenry County's last great places.

Places shaped by continental ice and sculpted by landscape-scale fires. Places where the plants and animals survived a drought that lasted 3,000 years. Places where the trees still live that once shaded bison herds and felt the footsteps of native peoples.

These last great places form the backbone of the McHenry County Green Infrastructure Plan. The streams and glacial features that connect them form the arteries and veins of that same body.

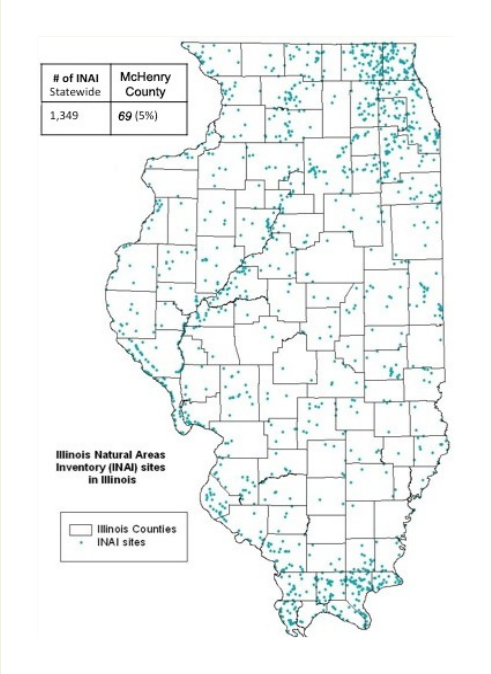
Despite the impacts to the county's natural ecosystems and the intense changes to its landscape since the arrival of European settlers, examples of that natural heritage can still be found today. The Illinois and McHenry County Natural Areas Inventory, McHenry County ADID Wetland Study and the Oak Ecosystem Inventory have all identified important natural features worthy of long term protection and appreciation by the county's residents. Even today after 140 years of intense modification to streams, wetlands and lakes of McHenry county ranks among the top five Illinois counties in remaining wetlands.

Generally isolated from one another, these last great places can benefit and be enhanced by striving to interconnect them once again. Such a green infrastructure vision would utilize a combination of approaches to achieve these connections. These might include utilizing existing natural lands along streams and rivers, naturalized transportation corridors, private lands easements and continued protection of high quality natural lands by local open space agencies.

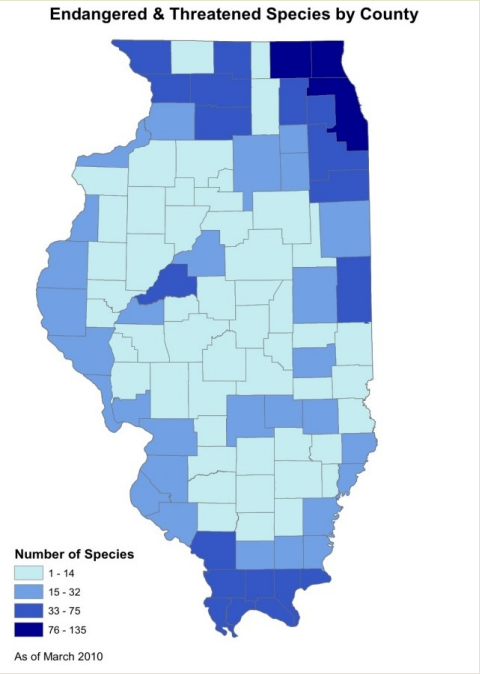
In his writing, Ed Collins wonderfully captures the wonder and awe of McHenry County's great places. He reminds us that these places are millions of years in the making and provide us with a direct link to our past. But the greatness of these places are not just one man's opinion. The importance of the county's natural and environmental resources he describes are recognized by state and federal agencies.

Illinois Natural Areas Inventory (INAI)

First completed in 1978, the INAI designates the state's most rare natural areas. It serves as a guide for the Illinois Department of Natural Resources and the Illinois Nature Preserves Commission when determining the eligibility of lands for protection. Currently there are only 654 identified high-quality, undisturbed natural communities in the state. Approximately half of these areas are unprotected. The INAI is undergoing a comprehensive update to identify new high quality sites and existing sites are being re-evaluated. The update will include a Sustainable Natural Areas Plan with green infrastructure playing a role. McHenry County is home to one of the largest numbers of remaining INAI sites of the 101 counties in Illinois. While the county represents 1% of the state's land area, it contains 5% of its INAI sites.



Illinois Natural Area Inventory (INAI) Sites



Illinois Endangered and Threatened Spcies

Endangered and Threatened Species (E & T)

Red-Headed Woodpecker by Michael Jeffords.

McHenry County is also home to many of the rare species listed on the Illinois Department of Natural Resources database of E & T species. The county's many diverse habitats provide homes for species such as the red-headed woodpecker and the Blanding's turtle. Green infrastructure planning helps ensure continued habitat linkages for our many birds, fish, mammals and plants.

Blanding's Turtle by Nancy Williamson.

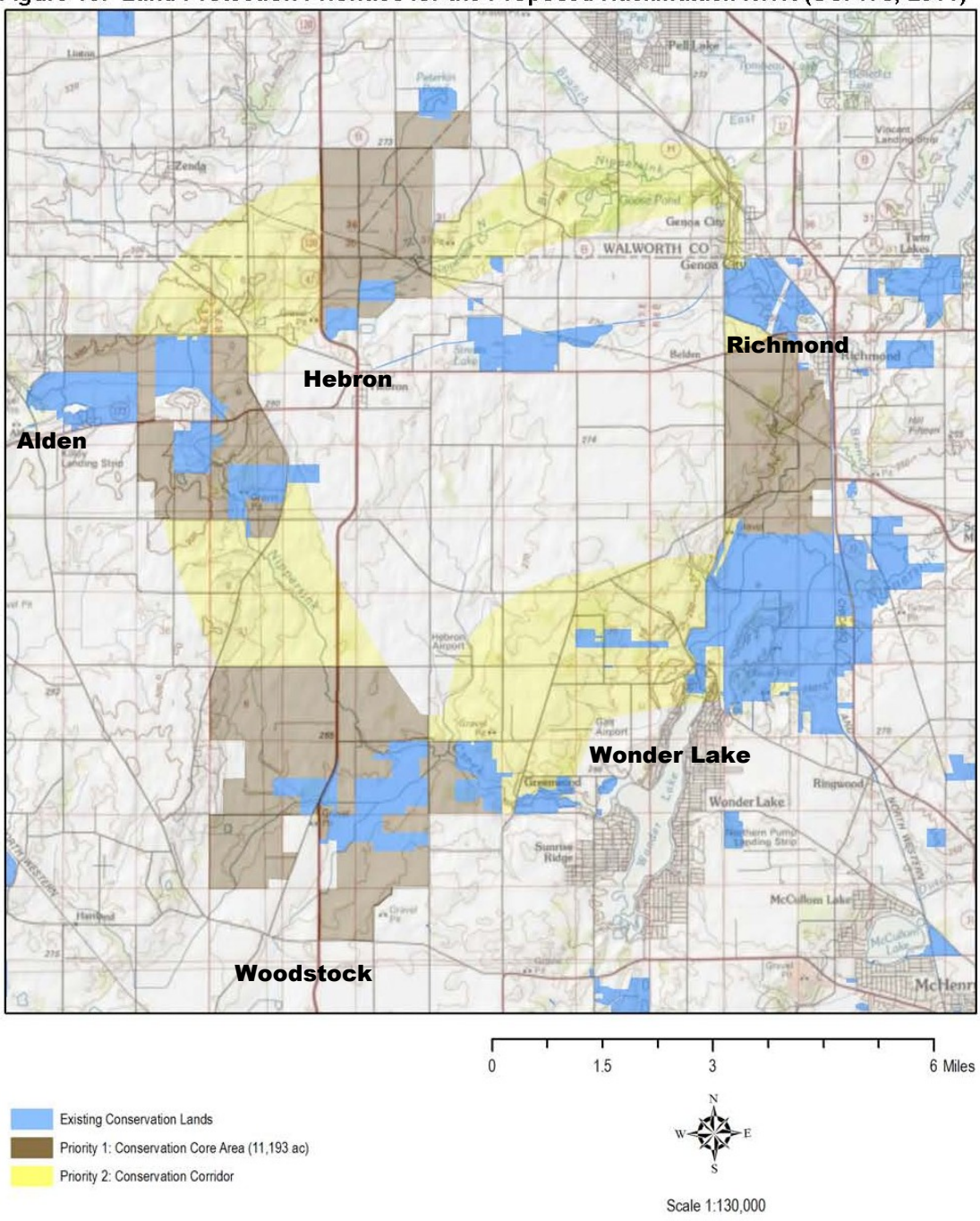
Hackmatack National Wildlife Refuge

In further recognition of the value of McHenry County's natural and environmental resources, the U.S. Fish and Wildlife Service (USFWS) has proposed 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. A concept also found in this plan., 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 proposed refuge takes its name from an Algonquin Indian word for the Tamarack tree.

Figure 10: Land Protection Priorities for the Proposed Hackmatack NWR (USFWS, 2011)



Source: US Fish & Wildlife Service Proposed Hackmatack National Wildlife Refuge Environmental Assessment, Land Protection Plan, and Conceptual Management Plan

THE PLANNING PROCESS

PROJECT BACKGROUND

In response to numerous recommendations in its *2030 Comprehensive Plan,* McHenry County embarked on a green infrastructure planning process—the first county in Illinois to do so.

The planning process began in December 2010 with assistance from the Chicago Wilderness Sustainable Watershed Action Team (SWAT). The project was initiated with the letter of support of the County Board Chairman and the endorsement of the Planning and Development Committee. The objectives were to:

- create a detailed inventory of natural resources using geographic information system (GIS) technology
- develop a green infrastructure network map with the help of natural resource organizations
- identify additional open space, greenway, and trail opportunities by working with municipalities, park districts, and townships
- develop green infrastructure policy and implementation recommendations

Benefits of Green Infrastructure in McHenry County

The principal focus of the Chicago Wilderness *GIV* mapping process, which served as the model for this plan, was preservation and enhancement of biodiversity, but the McHenry County planning process took a wider view. With the input of the project team and advisors, the following list of green infrastructure purposes and benefits was identified as the basis for green infrastructure mapping and the policy recommendations for this plan:

- Biodiversity—aquatic and terrestrial habitat
- Improved water quality
- Enhanced groundwater recharge
- Reduced flood damage
- Reduced life-cycle costs of infrastructure
- Greenway, trail, and open space connections
- Enhanced recreational opportunities
- "Ecotourism" opportunities
- Community health
- Climate change mitigation

Existing Natural Resource and Open Space Inventory Mapping

McHenry County has some of the most extensive natural resource data mapping of any county in Illinois. The McHenry County Department of Planning and Development compiled relevant data on the county's geographic information system (GIS) based on the data sets used in the Chicago Wilderness *GIV* project, which included:

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

Data sources were then supplemented with or replaced by more current local data sets where appropriate, such as wetlands data from the McHenry County ADID study to replace regional wetland data and oak woodlands mapping from the McHenry County Conservation District to replace the state woodland cover data set.

Green Infrastructure Mapping Principles

After the initial inventories were assembled, advice and assistance was sought from experts of regional and local conservation organizations. The advisors included:

- Illinois Nature Preserves Commission
- Illinois Department of Natural Resources
- McHenry County Conservation District
- United States Natural Resources Conservation Service
- McHenry County Soil and Water Conservation District

- The Land Conservancy of McHenry County
- Environmental Defenders of McHenry County
- Openlands
- Several watershed planning groups

The most important data layers with respect to habitat, biodiversity, and water resources protection, regardless of whether they are currently protected or regulated, were identified by the group. These data layers became the foundation for what is referred to in this plan as *core green infrastructure*. Core green infrastructure is the backbone of the green infrastructure network, including, and connecting, large clusters of ecologically important areas.

The advisors endorsed several key green infrastructure planning principles that are widely supported in prominent green infrastructure writings, including the principle that the size and connectivity of resource areas are of great importance. Elements of this approach include:

- Protecting large *core reserves* (or nodes)
- Linking core areas with *corridors* (or landscape linkages)
- Protecting *complexes* of adjacent resource areas (e.g., wetland, woodlands, and prairies)
- *Buffering* critical areas from conflicting activities or land uses

Because mapping was being done at a large, countywide scale there was consensus that very small, isolated resource areas should not always be included in the base mapping. Though still important for long-term protection, exclusion of small isolated resource areas would reduce map "clutter" and help strengthen planning focus emphasis on creating a county-scale, interconnected network.

In consideration of these factors, the following core natural resource data layers were included in the base mapping:

- Water: lakes, ponds, rivers, creeks. (Small lakes and ponds of less than 10 acres were excluded.)
- Wetlands: NRCS and ADID. (All ADID High Quality Habitat wetlands were included, but other small wetlands less than 5 acres were excluded.)
- McHenry County Natural Areas Inventory Sites (MCNAI)
- Illinois Natural Inventory Sites (INAI)
- IDNR Nature Preserves
- IDNR Land and Water Reserves
- Remnant oak woodlands from 2005 MCCD inventory. (Small woodlands of less than 10 acres were excluded.)
- McHenry County Conservation District (MCCD) and IDNR sites and trails.
- 200-foot buffers. (Buffers were added to all of the natural resource layers above.)
- FEMA 100-year flood hazard areas
- Hydrologic Atlas (HA) series flood of record mapping
- The Land Conservancy holdings and conservation easements
- Threatened and Endangered Species locations
- Class III Special Resource Groundwater Protection areas
- Open space mapping (from *McHenry County 2030 Comprehensive Plan*)

A buffer of 200 feet, as noted above, was placed on the periphery of the most critical natural resource layers. This buffering approach was based, in concept, on the approach used in mapping the Chicago Wilderness *GIV*. Buffers signify that it is important to not only protect critical resources, such as important habitat areas, but to also be sensitive to activities and lands uses in adjacent areas. Buffers also provide mapping connections for natural resource areas that appear separate on a map but actually function as one.

The use of a 200-foot buffer is intended for planning purposes, and is not necessarily intended as a regulatory recommendation. For comparison, the McHenry County Stormwater Management Ordinance stipulates stream and wetland buffer requirements ranging from 30 to 100 feet, depending on resource quality and size. In comparison, recommended habitat buffers reported in some writings on green infrastructure can exceed 300 feet for sensitive wetland habitats or sites containing certain endangered or threatened species.

In addition to the core natural resource layers, McHenry County has a wealth of additional natural resource mapping. These additional resource data were characterized as supporting green infrastructure. It was established that the supporting data would be used on a case-by-case basis to inform decisions about core green infrastructure

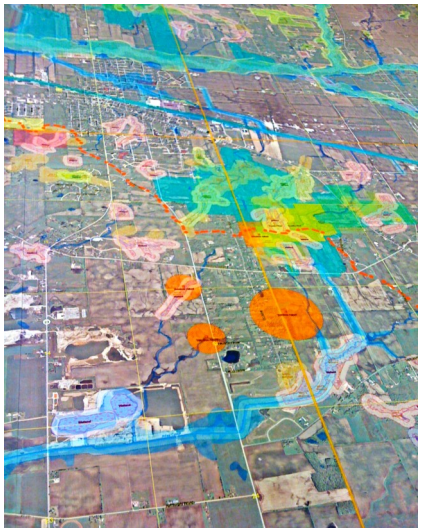
mapping. The following supporting natural resource data layers and information were collected:

- Hydric soils
- Organic soils (includes peat and muck areas that may be opportunities for wetland restoration)
- Sensitive Aquifer Recharge Areas (SARA)
- Highly erodible soils
- Watersheds and sub-watershed boundaries
- Chicago Wilderness Green Infrastructure Vision Resource Protection Areas
- Lake McHenry Wetland Conservation Opportunity Area (COA), and the Crow Coon Kishwaukee COA
- Hackmatack study area boundaries (from the U.S. Fish and Wildlife Service)
- Natural resource and open space mapping from adjacent counties (to identify possible inter-county connections)
- Relevant mapping from adopted watershed plans
- Agricultural areas (under the Illinois Agricultural Areas Conservation Act)

WORKSHOPS

Green Infrastructure Mapping Procedures and Rules

Using the mapping data and assumptions described above, the project team and representatives of natural resource and conservation organizations participated in an all-day green infrastructure mapping workshop. The focus of the workshop was an immense printed map – 16 feet by 18 feet in size. The map was color coded with all of the referenced core natural resource data layers, including buffers, all overlain atop an aerial photo. Supporting this map was the capability to digitally project additional supporting natural resources data on a screen.



Above: Workshop participants review the map. Bottom left: A closer look at the map.

This map was used to guide resource experts in the mapping of an interconnected green infrastructure network. At the workshop, the experts were engaged in two specific tasks. The first task was to revise and finalize the mapping rules regarding:

- identification of natural resource areas to include in the recommended countywide green infrastructure network
- identification of areas to exclude (e.g., certain small, isolated resource areas)
- establishment of a minimum size for including natural resource areas, or complexes, as ecologically significant isolated polygons
- definition of specific circumstances to make connections between nearby natural resource areas, thereby pulling certain isolated areas into the network

A summary of these rules follows.

1. If adjacent resource areas are within 200 feet, establish a connection (or corridor) between the resources. In special circumstances (e.g., the connection of MCCD macrosites), the connection distance was extended.
2. If a municipal park without any significant natural characteristics (e.g., a turfed playing field complex) is isolated with no connectivity to other natural resource areas, do not include it in the GI network map.
3. If a flood-of-record is in an area that has been subsequently urbanized, resulting in the elimination of a watercourse or its apparent capture in a storm sewer, it should be eliminated from the map.

4. Linear flood-of-record reaches that are not associated with an apparent surface drainage feature should be selectively eliminated (e.g., to avoid making an unrealistic connection to a distant isolated natural resource area).
5. Isolated resource complexes of 50 acres should be retained on the map.
6. Do not include Threatened and Endangered species locations. The locations are not specific natural resource areas and would be misleading.
7. Do not include Class III special resource groundwater protection boundaries as standard core GI layers. Rather, these areas should be identified as overlays in the final GI mapping network.
8. Selectively add areas of organic soils where they enable connections between adjacent wetland or provide opportunities for strategic, large-scale wetland restoration.
9. Where necessary, refine the boundaries of select MCNAI sites that are mapped as large planning areas, rather than as specific habitat complexes. A notable example is the large MCNAI area in the Alden area.

The second workshop task was to mark the map with notes and other markings to clarify any confusing or borderline situations. With very few exceptions, the mapping rules described above were followed unless unique circumstances or professional judgment dictated otherwise.

The maps also were marked to identify locations where *supporting* green infrastructure data was recommended for addition to the *core* green infrastructure mapping. For example, there were instances where mapped organic soils were used to expand the boundaries and interconnect isolated wetlands into a larger complex. MCCD has used organic soils as the basis for several large-scale wetland protection and restoration projects.

The map review and marking proceeded on a watershed and sub-watershed basis around the entire county. As this was done, relevant watershed-specific goals and information were recorded. These are included in the Appendix.

After the mapping workshop, the mapping rules were applied through the county GIS and map markups also were incorporated. The subsequent draft green infrastructure network map was distributed for review to the natural resource organizations. The revised map was then shared with local governments in a series three of workshops. Invited participants included municipalities, park districts, townships, MCCD, and county board members. The local government participants commented on the draft green infrastructure network map, offered suggestions for revisions and additions of some local open space areas, and some communities shared their own trails and green infrastructure mapping. The resulting draft map, incorporating community input, was then posted on county's website.

TRAILS

Trails: Our Link to Green Infrastructure

As mentioned before, trails can play a significant role in the development of a green infrastructure network. Trails form linkages between natural resource areas and allow species to move between habitat areas. They also form linkages between people and nature. Trails make the natural world more accessible, and, in doing so, allow more people to experience its beauty and its value. The more people to make a connection with the land, the bet-

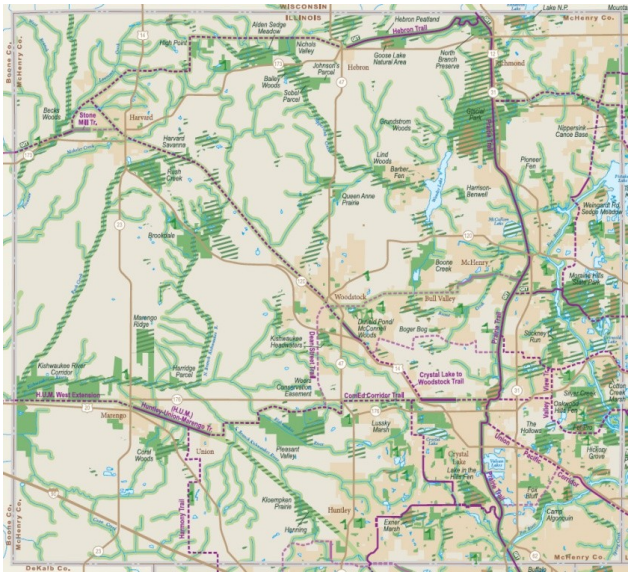
ter the chances that more natural areas will be preserved. So, in providing the benefits of recreation and transportation to people, trails are also serving nature.

While the emphasis of this section is on regional trails and connections, an extensive survey of existing trails and planned trails for the county was conducted. The survey included regional trail maps, county trail maps, municipal bike maps and comprehensive plans, and park district maps. Mapped trails, both existing and planned, were digitized and inputted into GIS to produce the county's first comprehensive trails map. This exercise made it possible to better identify the areas in which new regional trails would be most beneficial. The resulting trails map includes both planned and existing local and regional trails as well as proposed conceptual trail corridors, which are intentionally drawn so as not to endorse any specific route.

Trails Mapping Process

The trails mapping process began with a review of regional greenways and trails mapping. 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 in McHenry County. Subsequently, the Chicago Metropolitan Agency for Planning (CMAP) 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. This trail network includes planned sections running from Elgin to McHenry, McHenry to Hebron, and Hebron to Caledonia.



Above: Northeastern Illinois Regional Greenways and Trails Plan. *Bottom left: McHenry County detail . (CMAP, 2009)*

These planned regional trails contain significant elements of the existing and planned trails of the McHenry County Conservation District (MCCD). These include the following trail elements (existing or planned):

- Prairie Trail – Algonquin to North Branch Preserve in Richmond
- Hebron Trail – North Branch Preserve to Hebron
- H.U.M. Trail – Union to Marengo and eventually to Boone County
- Ridgefield Trace – Crystal Lake to Woodstock
- Stone Mill Trail – Harvard to Chemung and eventually to Boone County

Existing and potential regional trail connections described above didn't necessarily reflect the more recent and detailed trail development and planning work of many local governments in McHenry County. To identify and obtain more local trails information, local municipali-

ties, townships, and park districts were invited to three planning workshops organized by county geography. The stated objective was to identify existing and planned trail connections at a sub-regional level. The focus was on opportunities to provide for county and community-scale, non-motorized movement—such as hiking and bicycling—for purposes of recreation, as well as commuting, and shopping. More specifically, the intent was to identify connections that:

- Linked municipalities
- Interconnected local trails to MCCD regional trails
- Connected local trails and communities to open space sites
- Linked open spaces to each other

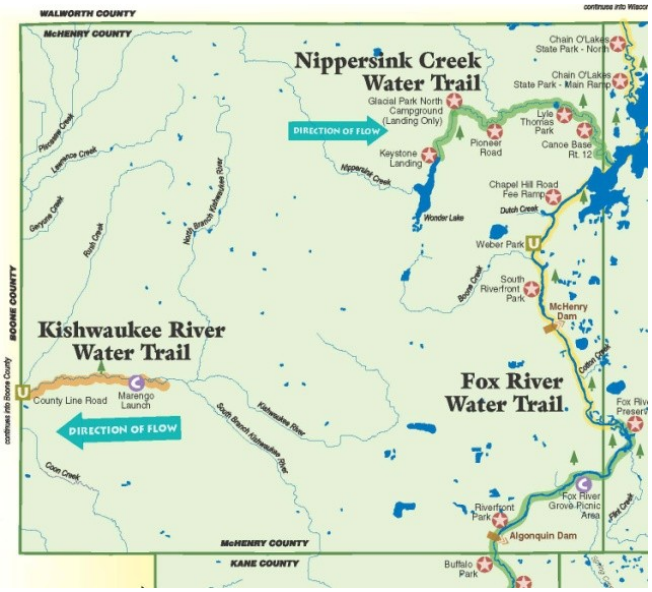
Based on the local government workshops and subsequent interaction with local governments, the following sources of information were identified and collected. However, because this is a county-scale planning effort, not every trail was mapped—specifically, certain trails within residential subdivisions, private trails, or the private equestrian trail systems found in some communities were deemed to not have regional significance.

- *Algonquin Parks, Trails, and Open Space Map*
- *Algonquin Illinois Route 31 Bypass plan* (draft)
- *Cary Park District Trail Map*
- *Crystal Lake (City) Recreational Trails and Paths*
- *Crystal Lake (City) Proposed Bikeway Facilities* (2010 draft)
- *Crystal Lake Park District Off Road Bike and Walking Trails* (2007)
- *DeKalb County Greenways & Trails Plan* (2005)
- *Fox River Grove Park and Trail Map* (2009)
- *Harvard Comprehensive Plan* (2006)
- *Hebron Comprehensive Land Use Plan* (2007)
- *Huntley Park District Park and Pathway Map*
- *Johnsburg Parks, Trails, and Sidewalks Plan* (2010)
- *Kane & Northern Kendall Counties Bicycle Map* (2011-12)
- *Lake in the Hills Bike Path Map*
- *Marengo Transportation and Open Space Plan Map* (2004)
- *McHenry Park & Trail Map*
- *Northwest Municipal Conference Bike Plan & Map* (2010)
- *Openlands Kishwaukee Headwaters Proposed Intergovernmental Bike Trail Plan*
- *Prairie Grove Terra Cotta Concept Land Use Plan* (2005)
- *Prairie Grove Comprehensive Plan* (2006)
- *Richmond Vision Plan: Envisioning Connections Greenways and Paths*
- *Spring Grove Open Space & Greenway Plan*
- *Woodstock Master Bicycle Plan -2009*

MCCD and the McHenry County Division of Transportation (MCDOT) were consulted to identify additional opportunities. In particular, gaps were identified in the countywide network, resulting in the identification of potential conceptual connecting corridors, such as between Woodstock and Harvard, and Marengo and Harvard.

Water Trails

Like trails and bike routes, McHenry County's waterways can be valuable components of a green infrastructure network. Water trail opportunities exist throughout the county. Water trails include routes, access points, resting places and attractions for users of human powered water craft (canoes and kayaks) on lakes and rivers. The *McHenry County 2030 Plan* recommends the *Northeastern Illinois Regional Water Trails Plan* as a guide in the development of a local network of stream and river canoe access facilities.



McHenry County detail of Northeastern Illinois Regional Water Trails Plan *map (Openlands and NIPC, 1999) .*

Northeastern Illinois Regional Water Trails Plan *map (Openlands and NIPC, 1999) .*

The Regional Water Trails Plan identifies Nippersink Creek and the Fox River as developed water trails suitable for paddling. It also identifies the Kishwaukee River as a planned but unimproved water trail. The Kishwaukee River is currently constrained by the presence of numerous debris and log jams that limit movement of watercraft.

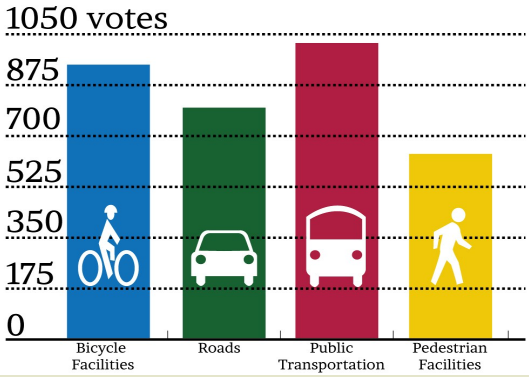
This plan was briefly presented at the previously mentioned local government workshops. There was general support for a water trails element in the plan and a few suggestions of local facilities that could be added to the regional water trails map. In addition, there was limited discussion about adding additional stream segments to the map, such as one or more of the Kishwaukee River tributaries. For example, there may be some stream segments that are accessible by watercraft seasonally when water levels are good. However, there was not agreement on any specific additions.

McHenry County Residents Express Their Support for Bike and Pedestrian Facilities

As part of the planning process for the 2040 Long-Range Transportation Plan, the McHenry County Department of Transportation has held "pop-up" meetings at 13 different locations. The purpose was to obtain general input on how the public would like to see transportation improved in the County. Participants at each "pop-up" meeting were asked, in a Piggy Bank activity, how they would spend money on transportation in the area. They were also asked what "big ideas" about transportation they had for McHenry County. Below are few results from the more than 1,100 participants.

- *"Pedestrians and bikes should come first. Also, the bike trails are nice, but they need to go somewhere. They need to connect to places."*
- *"McHenry County needs a bike route along the train route from Harvard to Cary for an easy route for bike riders."*
- *"More bike facilities: bike lanes, engineering for on-street bike lanes, safe routes to schools, and more bike parking."*
- *"Any roads being redone or repaved should be re-done with a 3 foot shoulder on one side so that our kids can safely bike."*
- *"I want to see more bike facilities for TRANSPORTATION instead of (and/or) for recreation. More focus needs to be on biking for transportation."*
- *"In Bull Valley Area add a bike lane to Crystal Springs Road. I have to pass bikers at least once a week and I feel the road is unsafe for them currently."*

Piggy Bank Results (About 1,100 Participants)



GREEN INFRASTRUCTURE MAPS

The green infrastructure mapping process (described in the previous section) resulted in the creation of two maps—the *Green Infrastructure Network Map* and the *Green Infrastructure Trail Map*. It is a goal of this plan that these maps provide a foundation for green infrastructure throughout the county. The *Network Map* provides an awareness of where important environmental resources lie and reveals the interconnectedness of those resources. It includes regional trails and conceptual trail corridors. The *Trail Map* provides a comprehensive compilation of existing and proposed trail plans in McHenry County.

GREEN INFRASTRUCTURE NETWORK MAP

This map is dominated by the three shades of green that represent the green infrastructure network. It also includes water, wetland, oak woodland, and regional trail information.

Parks and Preserves

These areas are drawn in dark green. They are comprised 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

These areas are drawn in hatched light and dark green. They are comprised 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

These areas are drawn in light green. They are comprised 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

This category identifies areas of wetlands that were mapped in the county's Advanced Identification (ADID) wetland survey. While most wetlands are found within the mapped green infrastructure network, some areas are not. This is not meant to diminish the local significance of these wetlands and the need for their protection. Excluded wetlands were determined to be of a size or location that did not substantiate their inclusion in a regional plan.

Oak Grove

This category identifies areas of oaks woodlands and savannas that were mapped in a 2005 study by MCCD. These areas are the last remnants of the vast woodlands that predated European settlement in the county. While most woodlands are found within the mapped green infrastructure network, some areas are not. This is not meant to diminish the local significance of these woodlands and the need for their protection. Excluded woodlands were determined to be of a size or location did not substantiate their inclusion in a regional plan.

Class III Special Resource Groundwater Protection Area

These areas are drawn in light yellow. Class III Special Resource Groundwater Protection areas are designated by the Illinois Pollution Control Board for areas that are deemed to be demonstrably unique and irreplaceable groundwater sources. They are not included in the mapped green infrastructure network, but were included because of the important environmental function they play.

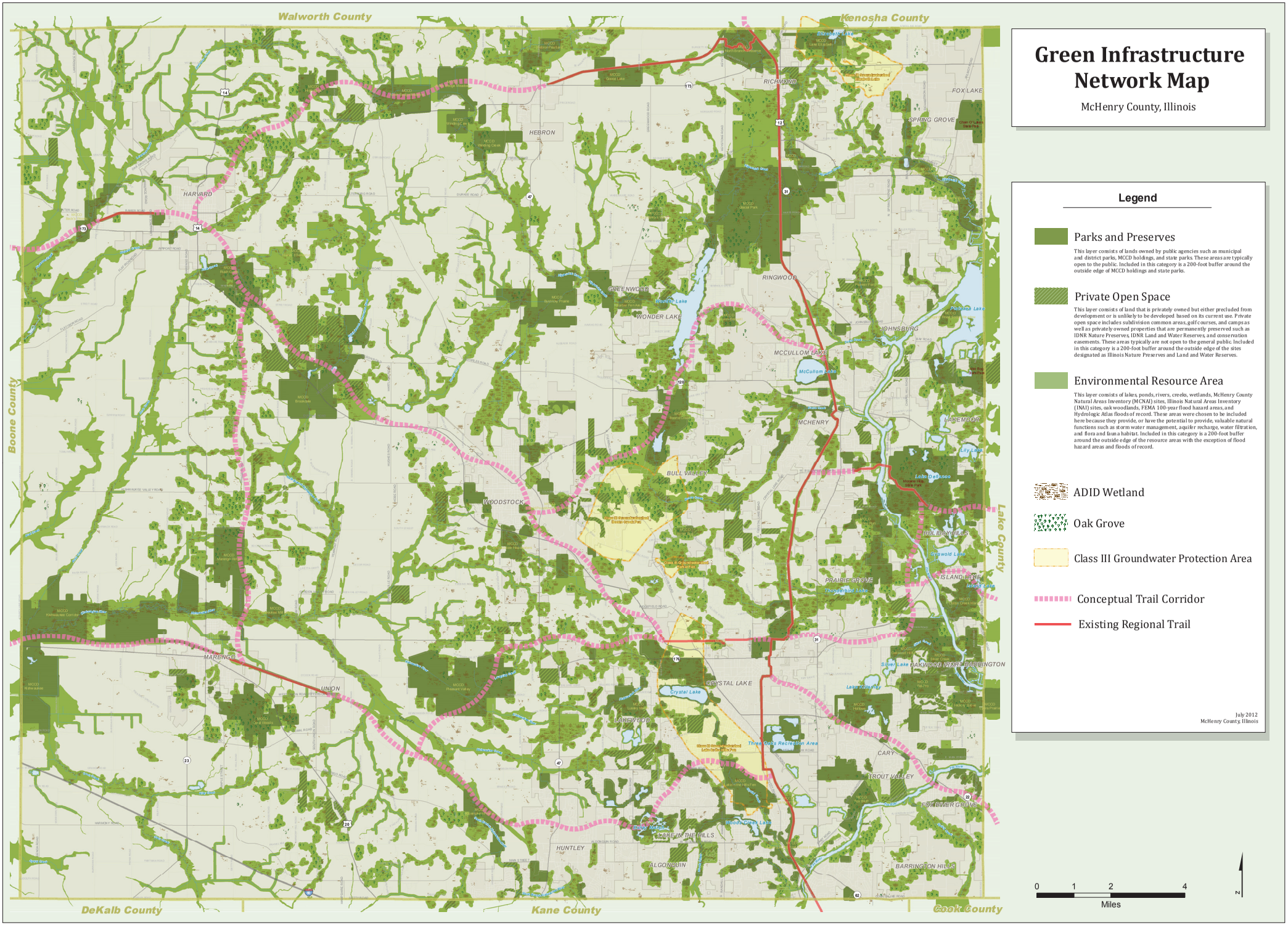
Conceptual Trail Corridor

This category is identified by pink dashed lines. The conceptual trail corridors were created for this plan and included in this map to provide ideas for future

regional trails. No exact route is being proposed and no agency is identified to create such trails.

Existing Regional Trail

This category is identified by red lines. For the most part, these are trails managed by MCCD. The most notable regional trail is the Prairie Trail that extends the length of the county.



Green Infrastructure Network Map

McHenry County, Illinois

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

Conceptual Trail Corridor

Existing Regional Trail

July 2012
McHenry County, Illinois

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Miles

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GREEN INFRASTRUCTURE TRAIL MAP

This map consists of numerous trails—regional and local, existing and proposed, and conceptual corridors. It was created by combining trail and planning maps from municipalities, park districts, MCCD, and regional groups such as Openlands and CMAP. The conceptual trail corridors are proposed by this plan.

This section provides a framework for planners to use in guiding future decisions. It attempts to be a comprehensive collection of each of the county's individual municipal and open space agency's intentions to create a trail network. That being said, for a trail network to be complete and linked to important community resources, every trail concept has the potential to touch multiple jurisdictions. It is the goal of this plan to spawn interagency discussion and cooperative planning in creating this network, however, it is understood that the final determination of a whether a trail's implementation is proper for the given circumstance lies solely with the entity which retains the jurisdiction upon which the alignment is shown.

Conceptual Trail Corridor

This category is identified by pink dashed lines. The conceptual trail corridors were created for this plan and included in this map to provide ideas for future regional trails. One of the concepts represented by the conceptual corridors is the opportunity to create a regional trail that circles much of the county. No exact route is being proposed and no agency is identified to create such trails. This map shows how these corridors might tie in to existing and planned local trails and regional trails.

Existing Regional Trail

This category is identified by a thick red line. For the most part, these are trails managed by MCCD. The most notable regional trail is the Prairie Trail that extends the length of the county.

Planned/Proposed Regional Trail

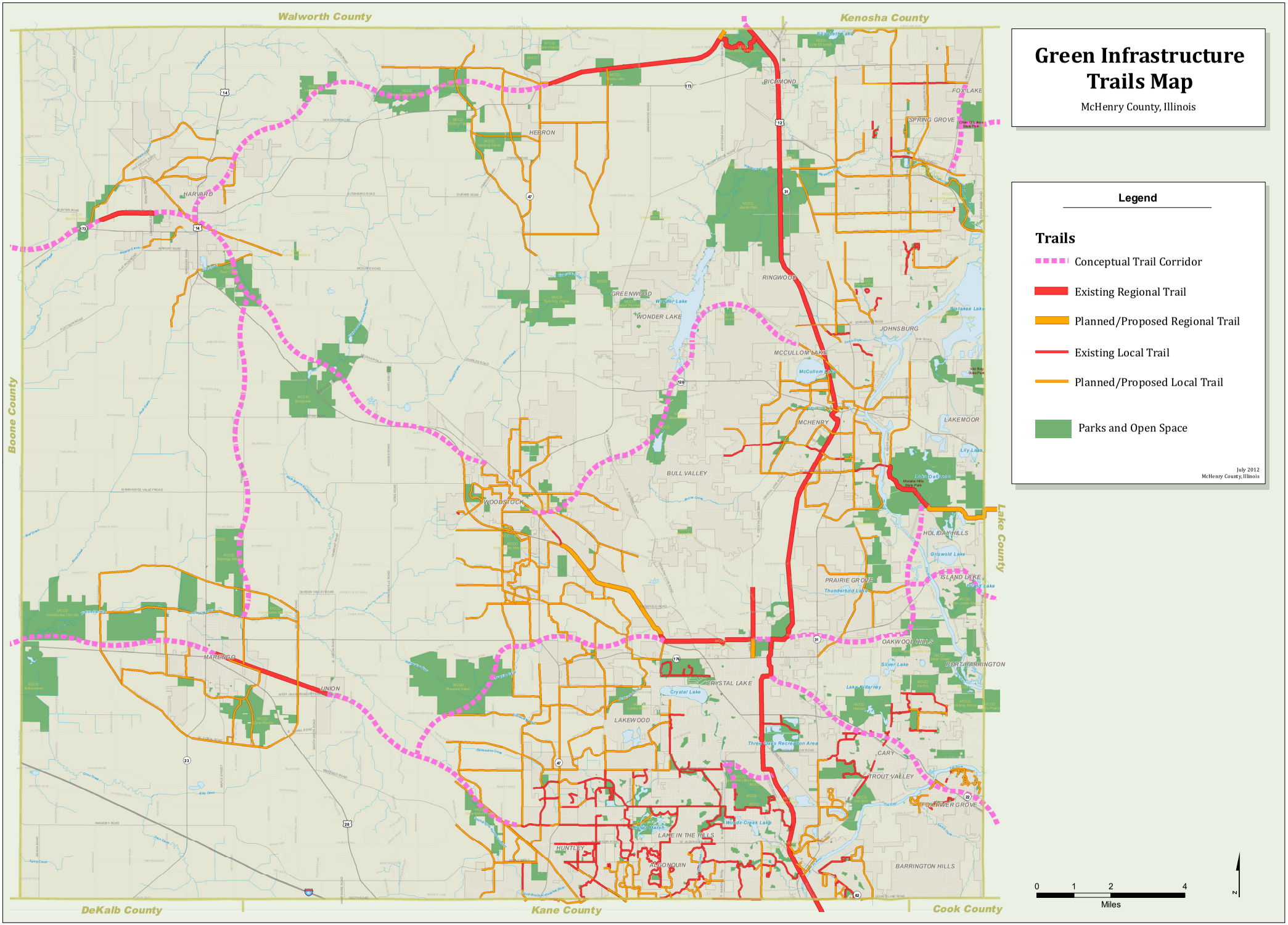
This category is identified by a thick orange line. For the most part, these are trails planned or proposed by MCCD. One exception is the regional connection between Moraine Hills State Park and Lake County, which is planned by IDNR.

Existing Local Trail

This category is identified by a thin red line. Local trails were assembled into this map from municipal and park district maps and plans. The characteristics of these trails vary from jurisdiction to jurisdiction. A local trail can be; off road, road adjacent, or on road; maintained by a park district, subdivision, or municipality; intended for bikes only, pedestrians only, or multi-use; and paved or unpaved. Maps and plans do not always make these distinctions. Therefore, all existing local trails are included on the map under one category.

Planned/Proposed Local Trail

This category is identified by a thin orange line. Planned/proposed local trails were assembled into this map from several municipal, park district, and regional planning agency maps and plans. The form these trails will take, if constructed, will vary from jurisdiction to jurisdiction. A local trail can be; off road, road adjacent, or on road; maintained by a park district, subdivision, or municipality; intended for bikes only, pedestrians only, or multi-use; and paved or unpaved. Maps and plans do not always make these distinctions. Therefore, all planned/proposed local trails are included on the map under one category.


Walworth County
Kenosha County
Boone County
Lake County
DeKalb County
Kane County
Cook County
HARVARD
HEBRON
RICHMOND
FOX LAKE
SPRING GROVE
RINGWOOD
GREENWOOD
WONDER LAKE
JOHNSBURG
MCCULLOM LAKE
MCHENRY
LAKEMOOR
BULL VALLEY
WOODSTOCK
HOLIDAY HILLS
PRAIRIE GROVE
ISLAND LAKE
OAKWOOD HILLS
FORT BARRINGTON
MARENGO
UNION
CRYSTAL LAKE
LAKEWOOD
CARY
TROUT VALLEY
INVERNESS
LAKE IN THE HILLS
HUNTLEY
ALGONQUIN
BARRINGTON HILLS
Green Infrastructure Trails Map
McHenry County, Illinois
Legend
Trails
Conceptual Trail Corridor
Existing Regional Trail
Planned/Proposed Regional Trail
Existing Local Trail
Planned/Proposed Local Trail
Parks and Open Space
July 2012
McHenry County, Illinois
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IMPLEMENTATION RECOMMENDATIONS

This section identifies recommended policies, strategies, and actions to achieve the green infrastructure purposes identified in the Green Infrastructure Background chapter. Where appropriate, it also identifies specific implementation tools, potential funding sources, and local examples.

COORDINATE IMPLEMENTATION

One of the most important themes of the *2030 Comprehensive Plan* is the need for coordination between the county and local governments to achieve many of the goals and objectives of the Plan. This is particularly true for green infrastructure objectives. Coordinated planning and implementation are critical because green infrastructure resources do not observe political boundaries. A few examples of coordinated planning actions and opportunities follow:

- Protection of sensitive stream or lake resources is best achieved if all of the communities in a watershed work together to develop consistent stormwater and conservation design ordinances. Working with ordinances and education programs, local governments can maximize the opportunity for water to be treated with green infrastructure practices, such as rain gardens, before it moves offsite.
- Similarly, protection of groundwater aquifers requires the coordinated efforts of the county and local governments to identify and plan for the protection of critical recharge areas. And it also requires responsible actions of roadway maintenance agencies, as well as businesses and residents, to control the use of road salts and other potentially damaging chemicals. In McHenry County, such actions are catalogued into the recently adopted Water Resources Action Plan.
- McHenry County has a remarkable regional open space and trail system owned and managed by MCCD. This plan identifies opportunities for municipal and park district trails to interconnect to these regional facilities. But, ultimately, connectivity will be optimized when new subdivisions, parks, businesses, and commercial developments incorporate local greenways, trail linkages, and bikeways where people live, work, recreate, and shop.

PROTECT CORE GREEN INFRASTRUCTURE

As noted previously, there is an array of techniques that can be used to protect green infrastructure. These techniques may be applied not only to lands mapped in the green infrastructure network, but also to smaller areas that, though unmapped, have local importance and are deserving of protection (e.g., wetlands, woodlands, greenways, etc.). Recommendations are provided for each of the following techniques.

- Acquisition by public agencies
- Conservation easements on private land
- Targeted land use planning and zoning
- Conservation development
- Greenway connections
- Trails
- Landscape retrofitting of previously developed land
- Ecological restoration of degraded landscapes
- Farmland protection

Acquisition by Public Agencies

Open space and natural area acquisition is one of the principal methods recommended for protection of areas identified in the green infrastructure network map. It is a method that has been used with great success by MCCD and other open space agencies in protecting over 33,000 acres of open space in the county.

While MCCD has been the leader in natural area protection with more than 25,000 acres in holdings, other entities also play a significant role. IDNR has very substantial holdings at Moraine Hills and Chain O' Lakes state parks.

Recommendations

- The McHenry County Conservation District (MCCD), park districts and municipal park departments, townships, and state and federal agencies should continue to acquire natural open space with a priority placed on areas identified in the green infrastructure network map. Cumulatively, these agencies should strive for a countywide goal of 15 percent open space as recommended in the *2030 Plan*.

- Park districts, park departments, and township open space districts should identify green infrastructure priorities in their master plans. In particular, they should identify and implement opportunities for protecting local natural areas that are part of the green infrastructure network and educate their constituents about the value of natural resources.

- Where appropriate, open space entities should strive for intergovernmental partnerships to leverage resources and to create macrosites of natural communities for protection of plants and animals that require large tracts of land to survive. In particular, assemblages of wetlands, stream corridors, prairies, savannas, and woodlands should be targeted.

- MCCD, park districts and departments, the county and other local agencies should coordinate their efforts to promote ecotourism resources, such as parks, natural resources, and similar points-of-interest.

Resources

Communities interested in preserving natural areas as public open space should consider 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[1] and the federally funded Land & Water Conservation Fund program (LAWCON)[1].

Local Examples

Crystal Lake Park District: The Crystal Lake Park District has been acquiring and managing natural areas since it was formed by voters in 1921 for the purpose of preserving Crystal Lake. Among its important natural areas, Veteran Acres Park and Sterne's Woods and Fen are remarkable glacially formed landscapes that total 341 acres. Within Veteran Acres, Wingate Prairie is an Illinois Nature Preserve that accounts for 85% of the rare gravel hill prairie that is protected in the entire state of Illinois. Sterne's Fen, also an Illinois Nature Preserve, supports several rare and endangered wildlife species. In 1968, the 109 acre Lippold farm

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tract directly north of the lake was purchased with the aid of a state grant. After purchasing the adjacent 200-acre sod farm, the park district developed plans that include a 60 acre wetland system. Urban and agricultural runoff from over 1,300 acres in the Crystal Lake watershed flows through these wetlands before entering Crystal Lake. Today, with over 1,400 acres of park land, the Park District continues a commitment to preserve and protect the land and water areas over which it has stewardship.

Conservation Easements on Private Land

Privately owned natural areas and open spaces can be voluntarily dedicated for long-term protection under a conservation easement provision. Under this provision, these areas remain in private ownership, but the rights to change the use are given to a controlling agency, usually an entity whose mission includes the protection of open spaces. Conservation easements provide an effective method to preserve open space for future generations. As of 2011, The Land Conservancy of McHenry County owns or controls easements on roughly 1,920 acres of open space that includes 511 acres of MCNAIs and nearly 500 acres of farmland.

Another option for private landowners is protection of land through the Illinois Nature Preserves Commission (INPC). Land enrolled in the Illinois Nature Preserves System (either dedicated as an Illinois Nature Preserve or registered as an Illinois Land and Water Reserve) confers the highest level of protection for land in Illinois. The landowner retains title to the property and neither program provides public access to the land. The INPC 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 could include a prairie, woodland, or wetland that has largely survived undisturbed or supports populations of 1 or more of the State's list of endangered and threatened species. The two land-protection programs available through the INPC provide flexibility in working with landowners who wish to voluntarily protect their land. To date, the Illinois Nature Preserves Commission has enrolled 3,678 acres of land in McHenry County into the Illinois Nature Preserves System. Of that total, approximately 819.6 acres have been protected by 21 different private landowners.

Recommendations

- The Land Conservancy of McHenry County, the Illinois Nature Preserves Commission, and related organizations should continue to identify private land opportunities for protecting critical natural areas, buffers, and connections within and supporting the mapped green infrastructure network.

- Local governments and conservation organizations should continue to educate private landowners and developers about opportunities to set aside land for conservation as well as farmland protection purposes.

Resources

The Land Conservancy provides guidance to landowners who may be interested in land protection options. Its website[2] 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 an easement 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 that is dedicated as an Illinois Nature Preserve or Nature Preserve Buffer is taxed at a rate of $1 per acre per year. Land that is 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 determine

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whether their land qualifies for these programs, and help the landowner implement a land-protection program. More information about the State-wide mission of the INPC, its authority to protect land under State statute, management of land, the land protection programs, and its defense programs are available at its website[3].

Local Examples

In 2009, three of the projects that TLC completed with private landowners were conservation easements that provide buffers to MCCD's Glacial Park. The properties together preserve 30 acres of land that will remain undeveloped and in private hands forever. The landowners continue to use the properties (for hunting and/or nature enjoyment) and also pay property taxes on the lands, but know that they will never be developed, even when they no longer live there.

In 2011, TLC accepted a 56 acre conservation easement on property that adjoins MCCD's Brookdale Conservation Area as well as the Illinois Natural Area Inventory Site known as Lakota Wetlands, providing an important natural buffer to these resources that are already recognized as important at the local and state level. The easement allows the landowners to continue to restore the property, hunt the land and to build a small home in the future.

In September 2009, the Illinois Nature Preserves Commission approved registration of a 437.4 acre tract of land located adjacent to McHenry County Conservation District's Brookdale Conservation Area as an Illinois Land and Water Reserve. This site lies within the upper reaches of the Kishwaukee River watershed (the river is known State-wide for its high water quality and diversity and richness of aquatic life). It supports several species of wildlife considered by the Illinois Department of Natural Resources (IDNR) as: "… species in greatest need of conservation", provides critical habitat for the State-endangered Blanding's turtle, and provides protection for important wetland and woodland habitat. The landowners retained the right to implement an approved forest management plan by the IDNR and provide for artistic and educational venues designed to introduce the region's citizens to conservation and the values associated with the county's open spaces.

Targeted Land Use Planning and Zoning

Several of the core goals of the *2030 Plan* are focused on making wise land use and development decisions that protect green infrastructure. These goals specifically focus on protection of natural resources and the environment, preserving environmentally sensitive areas, pro-

viding aesthetically pleasing places, and preserving and enhancing existing surface and groundwater resources.

Further, the Plan identifies and maps key elements of green infrastructure, including:

- Remnant oak woodlands
- McHenry County Natural Area Inventory (MCNAI) sites
- Existing open space
- Regional trails
- Sensitive aquifer recharge areas (SARA)
- Class III groundwater protection areas
- Hydric soils
- Wetlands
- Lakes and streams

Environmentally sensitive natural resources, as well as mapping of prime farmlands, are the principal underpinnings of the county's Future Land Use map. The land use goal is to "make efficient use of the county's limited land resources and infrastructure and preserve the county's natural, water, and agricultural resources." This is to be achieved, in large part, by promoting increased density and compact, contiguous development near existing infrastructure to maximize use and efficiency of existing facilities.

One of the primary ways to implement land use policy is through zoning and other ordinances. In that vein, the *2030 Plan* recommends that the county review and revise the county zoning, subdivision, and other development related ordinances to be consistent with the visions, goals, and policies of the *2030 Plan*. The Plan also recommends working with municipalities and other local governments to achieve a consistent approach to resource protection at local, watershed, and countywide scales.

Recommendations

❖ The county should work with municipalities, townships, and other local governments to develop green infrastructure maps and plans consistent with the principles of this plan. The development of local green infrastructure maps should consider small-scale opportunities for resource protection and greenways.

❖ Local governments should incorporate green infrastructure elements into their land use plans and zoning maps, with a priority on protection of critical natural resources, open space, and linked greenways.

❖ Local governments should link development priorities to natural resource constraints and opportunities, particularly streams, lakes, wetlands, and their respective watersheds and recharge areas. Development should be avoided in the most sensitive natural resource areas.

❖ Tools such as overlay protection districts should be implemented to clearly identify sensitive areas where development intensities should be limited. Overlay districts can be structured to provide advance knowledge of site constraints to developers as well as identifying creative design techniques such as lot clustering.

❖ The McHenry County SWCD should utilize county and local green infrastructure maps as it advises local governments, private land owners, and agricultural producers on natural resource issues. In particular, the SWCD should incorporate green infrastructure maps in its Natural Resource Information reports for all zoning and land use changes that it reviews.

Resources

Chicago Wilderness, in cooperation with its partners, has developed several guides that would be useful to local governments including *Sustainable Development Principles for Protecting Nature in the Chicago Wilderness Region*[4], *Protecting Nature in Your Community*[5], and the *Building Sustainable Communities*[6] series of fact sheets.

Local Examples

Several municipal land use plans promote the protection of natural resources and green infrastructure as core planning themes.

- The City of Crystal Lake recently developed the *Green Infrastructure Vision Study and Report*[7] based on Chicago Wilderness planning principles.
- The *Woodstock Comprehensive Plan 2008*[8] includes extensive mapping of recommended resource conservation areas and resource conservation corridors and the city currently is engaged in a green infrastructure planning process.
- The Spring Grove *Comprehensive Land Use Plan*[9] also embraces green infrastructure principles.

Conservation Development

Conservation development employs a combination of creative land planning and innovative stormwater management practices to protect water and natural resources, preserve natural areas and open space, and enhance wildlife habitat. McHenry County's "Land First" approach to development embraces conservation design principles and is an important theme of the *2030 Plan*. The county's adoption of a conservation design addendum to its subdivision ordinance has established it as a regional leader (McHenry County Department of Planning and Development, 2009). The ordinance requires conservation design for all development sites that have significant areas of sensitive natural resources and allows conservation development as a right for all other subdivisions.

Considering that many of the lands mapped in the green infrastructure network are within the planning and zoning jurisdictions of local governments, conservation development offers a valuable tool to protect sensitive areas, establish greenway and trail connections, and provide for long-term enhancement and stewardship of ecologically important lands.

Conservation development entails a thorough review of a development site to evaluate potential green infrastructure elements – such as wetlands, streams, woodlands, and steep slopes. But where the traditional land planning process may search for ways to build through these natural areas – resulting in loss and fragmentation of natural resources – conservation design seeks out creative approaches to preserve and enhance them. A core tool of residential conservation design is "clustering" – i.e., accommodating the same number of houses onto smaller lots. This results in less fragmentation of natural areas, reduced land grading and associated infrastructure construction, and more functional open space. Preserved open spaces can be enhanced with trail systems that connect to adjacent developments and public trails and 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 quality. Low impact development (LID) designs feature narrower streets, permeable paving, and stormwater 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 providing clean, healthy baseflows to streams and wetlands.

Recommendations

- The county and other local governments, in cooperation with the development community and conservation organizations, should promote the expanded implementation of conservation design for both residential and nonresidential development throughout the county.

- Local governments should amend their zoning, subdivision, and landscaping ordinances to allow or encourage cluster development and other conservation design techniques by right without requiring a planned unit development.

- Conservation development should be targeted to all development parcels that include areas mapped in the green infrastructure network.

- Conservation design ordinances should build upon the successful ordinances adopted by the county and several municipalities by incorporating provisions for:
  - A minimum percentage of open space (the county requirement ranges from 40 to 70 percent, depending on the underlying zoning). Generally, open space should be preserved or restored to a natural condition.
  - An open space management plan that includes a permanent legal mechanism and includes the identification of long-term ownership and funding options. It also should 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.

- Conservation developments should incorporate provisions to restore native vegetation in buffers adjacent to water bodies and wetlands to filter out damaging pollutants, preserve aquatic habitat, and protect stream banks from erosion.

- The county and local governments should encourage

the dedication of open space within conservation developments to qualified conservation organizations, land trusts, or public land agencies to ensure their long-term protection and stewardship as part of the green infrastructure network.

- The county and municipalities should investigate and promote additional flexibility in their conservation design ordinance to allow for mixed densities and uses within new subdivisions such as through neo-traditional development, transit-oriented development, and traditional neighborhood development.

Resources

A number of excellent resources have been developed for Northeastern Illinois by the Northeastern Illinois Planning Commission, Chicago Wilderness, and others. An overview of conservation design techniques is provided in *Conservation Development in Practice*[10]. A more detailed discussion of conservation design ordinance considerations, including subdivision and zoning codes, can be found in *Conservation Design Resource Manual*[11].

For specific ordinance language, it is recommended that communities consider the following conservation design ordinances adopted by the county and three municipalities .

Local Examples

Conservation Design Ordinances: The City of Woodstock was the first community in McHenry County to adopt conservation design standards[12] as part of its Unified Development Ordinance. The county subsequently adopted its own ordinance[13] based, in part, on the approach taken by Woodstock. More recently, the Village of Algonquin[14] and City of Crystal Lake[15] have incorporated conservation design requirements into their ordinances, largely modeled after the county ordinance.

Sanctuary of Bull Valley: The Sanctuary of Bull Valley is a 300-acre conservation designed development in Woodstock, Illinois, with plans 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 homesteads. Walking trails allow access to the prairie in the center of the development, with scattered glacial depressions called "kettles" acting as natural stormwater detention. The development also has oak-hickory savannas, woods, and wetlands. Natural areas in the Sanctuary are critical groundwater recharge areas within the Boone Creek Class III Groundwater Protection Area. The use of "green" engineering practices – such as minimizing mass grading, reducing road widths, and eliminating curbs and storm sewers in many places – protects groundwater and water quality, and the development saved over 28 percent in land development costs as a consequence. In addition, by maximizing the natural areas and minimizing the 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 $2500-5000/acre depending on level of maintenance. By keeping much of the common areas in a restored natural state, the MOA has seen its overall cost to maintain reduced from a high of around $1500/ac per year in 2005 to less than $900/acre in 2010 which should stabilize going forward.

Greenway Connections

Greenway planning and protection is a recurring theme in the *2030 Plan*. A greenway refers to public or private open space that is concentrated in a linear manner along a natural or artificial corridor. Greenways can provide connectivity between adjacent natural areas, provide buffers for linear features such as streams, and sometimes serve as corridors for recreational trails.

The *2030 Plan* calls for the development of a countywide *Greenways Master Plan*. Once greenway opportunities are identified, their protection can be achieved by a variety of mechanisms including public acquisition, conservation easements, developer donations, natural landscaping, and ecological stewardship.

Recommendations

- The county, local governments, park districts, McHenry County Conservation District (MCCD), The Land Conservancy, and other open space organizations should collaborate to link local parks and open spaces to existing and planned portions of the countywide green infrastructure and open space networks.

- MCCD and local park districts and departments should be leaders in establishing new public greenways, particularly along the Fox River, the Kishwaukee River, and their tributaries.

- Local governments should identify and utilize a suite of creative greenway preservation tools such as linkages identified in land use plans, intergovernmental agreements, community buffers, and "land first" conservation design principles.

- Local governments should encourage the interconnection of open space and greenways during the subdivision approval process. Further, they should work with land owners and developers to encourage the permanent preservation of greenway connections to provide opportunities for habitat enhancement, recreation, and environmental education.

- Local governments and open space organizations should work with their counterparts in neighboring counties to make greenway connections across county boundaries.

- Local governments and The Land Conservancy should identify and offer incentives for private landowners to donate lands (or cash in lieu of land) or conservation easements to protect important greenways such as stream corridors.

- Greenway planning and preservation entities should promote public awareness and provide technical assistance regarding greenway protection to private landowners and homeowners associations.

Resources

The *Northeastern Illinois Regional Greenways and Trails Plan*[16] was developed CMAP. CMAP provides assistance to local governments on planning and implementing local greenways.

Local Examples

As previously noted, several municipalities have taken a proactive approach to green infrastructure protection in their land use plans. Notably, the Spring Grove *Comprehensive Land Use Plan*[17] contains an Open Space and Greenway Plan. The *Woodstock Comprehensive Plan*[18] includes mapping of recommended resource conservation areas and resource conservation corridors.

Trails, Bikeways, and Water Trails

Trails are widely supported in the *2030 Plan* as a means of promoting community walkability, providing recreation, linking communities and open spaces, and connecting people to schools, jobs, and commercial centers. The Plan promotes the development of a countywide trail plan. It encourages access for a variety of users, including pedestrians, bicyclists, equestrians, and snowmobilers, where appropriate. It also supports implementation of an expanded water trails system for non-motorized watercraft.

Much like 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 county, local governments, McHenry County Division of Transportation (MCDOT), MCCD, Chicago Metropolitan Agency for Planning (CMAP), and Openlands should coordinate their efforts to plan and implement trail corridors and circuits through-

out the county to provide clear, safe connections between communities and existing and future open space areas.

- ❖ Local governments should promote the interconnection of trails between adjacent subdivisions and with local and regional trails during the subdivision approval process.

- ❖ Municipalities should encourage and plan for improved walkability throughout their communities.

- ❖ Trail planners and implementers should identify alternative sources to overcome funding constraints to the coordinated expansion of the regional trails system. Where appropriate, trail planners should seek waivers on federal projects to construct trails more affordably.

- ❖ In the identification of priority trail corridors, planners should identify multiple-use riparian (i.e., streamside) greenway opportunities to accommodate trails, wildlife corridors, and vegetative buffers.

- ❖ Local governments, park departments, and MCCD should utilize the *Northeastern Illinois Regional Water Trails Plan* (as excerpted in this document) as a guide in the development of a network of stream and river canoe access facilities.

- ❖ Coordinated efforts should be undertaken to eliminate constraints to expanded water trail access, such as to portions of the Kishwaukee River that are obstructed by debris and logjams. Where appropriate, multi-objective approaches that benefit aquatic habitat, flood relief, and paddling access should be pursued.

Resources
Many local communities have benefitted from the trail planning advice and financial assistance of IDNR's Illinois Trail Grant Programs[19]. Openlands also is a good source of information on trail planning, particularly water trails. *The Regional Water Trails Plan*[20] that it developed with the Northeastern Illinois Planning Commission and the Illinois Paddling Council provides an outstanding framework for planning and implementing local water trails.

Local Examples
As noted previously, most of the municipalities in McHenry County have developed trail plans or maps.

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Water trails have received less attention in the county. A notable exception is the Nippersink Creek water trail. The Nippersink is a high quality stream meandering through miles of restored MCCD natural lands, farms, and small towns. MCCD has completed one of the largest stream re-meandering (restoration) projects in the country, enhancing aquatic habitats and water quality. The Nippersink Creek water trail provides a quiet, enjoyable canoe experience away from noisy boat traffic, shoreline development, and potentially dangerous dams and has excellent access at four launch sites.

Landscape Retrofitting of Previously Developed Land

While much of the mapped green infrastructure network exists in rural and undeveloped areas, significant green infrastructure occurs in and adjacent to lands developed in residential, commercial, and other urban land uses. These "developed" lands often exist on existing or former wetlands, floodplains, stream corridors, or woodlands. While they may be considered degraded in an ecological sense, they often 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 via the removal invasive brush and weeds and replaced with native riparian vegetation. Rain gardens and bio-swales can be installed adjacent to wetlands, lakes, and streams. Individually, these actions may not have a substantial impact but their cumulative effect, if done over a larger area, can be quite dramatic.

Recommendations

- ❖ Local governments should identify BMP retrofit opportunities to preserve and restore natural baseflows in streams to protect their ecology and quality.

- ❖ Local governments and landowners should prioritize retrofit opportunities on sites where natural conditions have been previously altered and where there is good potential for restoration of natural ecosystem and hydrologic functions.

- ❖ Local governments should strictly limit development

and restore native vegetation in buffers adjacent to water bodies to filter out damaging pollutants, preserve aquatic habitat, and protect stream banks from erosion.

- The county and municipal governments should increase their capacities to protect, restore, and manage watershed resources with effective and consistent regulations, leadership, and public education.

Resources

Nationally there are excellent references on retrofitting techniques from organizations such as the Center for Watershed Protection[21]. In Illinois, the Environmental Protection Agency has two relevant grant programs:

Section 319 of the Clean Water Act[22] provides funds for non-point source pollution control projects.

The Illinois Green Infrastructure Grant[23] (IGIG) program provides funding for green infrastructure practices to control stormwater runoff to improve water quality.

Local Examples

Algonquin: The Village of Algonquin won a regional conservation award for its efforts to restore a detention area and woodland in a residential neighborhood near the Fox River. The Yellowstone Natural Area was an existing 4-acre turf detention basin. In spring 2007 it was retrofitted and planted with native vegetation. The basin is now a well-established prairie that infiltrates and cleans stormwater from the surrounding residential development. The adjacent 3-acre oak woodland was highly degraded. Intensive brush cutting, controlled burning, and over seeding has greatly enhanced the oak woodland. The entire project site is now a low maintenance native landscape which provides beautiful aesthetics, wildlife habitat, and overall water quality benefits.

Burnsville, Minnesota: In the City of Burnsville, Minnesota, most of the lots in a residential neighborhood were retrofitted by installing excavated rain gardens in front yards behind curb cuts. The purpose was to reduce stormwater runoff and pollutant loads in nearby Crystal Lake. In a paired watershed study, the retrofitted neighborhood and an adjacent neighborhood that was not treated were monitored for over a year. Results from the comparison were astonishing. In the neighborhood with the rain gardens, runoff volumes were reduced by almost 90 percent.

Ecological Restoration of Degraded Landscapes

The landscapes and natural areas of McHenry County have been greatly altered since the beginning of settlement by Euro/Americans in the 1840s. Notably, large areas of former wetlands have been drained, largely to facilitate agricultural production and urban development. Similarly, the county has lost over 85 percent of its original oak-hickory woodlands and savannas. Only a tiny fraction, less than 1 percent, of the original prairie grasslands have survived intact.

While these losses are a cause of concern, they also present opportunities for restoration and expansion of existing green infrastructure. With respect to wetland restoration, there have been a number of very successful projects involving the removal of subsurface drainage tiles and closing of drainage ditches in altered "hydric soils". These actions restore the hydrology, or natural water saturation and inundation conditions, thereby allowing native wetland vegetation and wildlife to return. The mapping of the green infrastructure network includes several large areas of drained organic soils in the vicinity of small, fragmented wetlands. This situation presents an ideal opportunity for the restoration of "basin marshes" and "sedge meadows" that can attract waterfowl and enhance the storage and cleansing of runoff. Similarly, the green infrastructure network identifies thousands of acres of altered floodplains and stream and wetland buffers that present an important opportunity for the reintroduction of native vegetation to cleanse water and enhance wildlife habitat.

Woodland/savanna restoration can be a more challenging task, and it can take many years to reestablish a woodland that has been cut down. Nonetheless, woodland replanting and restoration are being aggressively pursued in many locations in the county. This can have substantial benefits if undertaken in the vicinity of remnant woodlands that are in good ecological condition. For example, planting oaks in a residential neighborhood or open space that borders an oak-hickory woods can effectively expand the habitat for certain bird and mammal species that need extensive native tree cover and travel corridors between wooded remnants.

Recommendations

- MCCD, park districts, and other local governments should target opportunities for ecological restoration of degraded landscapes in their comprehensive

plans, with a particular focus on areas within the green infrastructure network and within identified greenway corridors.

- MCCD, The Land Conservancy, relevant state and federal agencies, and watershed groups should provide technical and policy assistance to local governments and land owners to identify and implement opportunities for landscape restoration.

Resources

Communities and landowners desiring to undertake ecological restoration projects should make sure they have a firm grasp of effective practices. For example, clearing invasive brush without proper attention to brush re-sprouts, herbaceous weeds, and the need to re-seed cleared areas can actually worsen the problem over time. Chicago Wilderness has developed several policy papers on ecological restoration and management, addressing the following topics conservation of woodlands[24], controlled burning[25], and deer management[26].

The Illinois Nature Preserves Commission has developed detailed management guidelines[27] for natural area restoration and stewardship, including recommended control techniques for various invasive species.

A good source of information on stream corridor restoration is *Restoring and Managing Stream Greenways: A Landowner's Handbook*[28].

There also are a number of qualified contractors that can assist in designing and conducting restoration projects. The Land Conservancy identifies local natural area contractors[29] on its website. The Natural Resources Conservation Service provides a more extensive contractor list[30] for northeastern Illinois.

There are a number of financial incentive and grant programs for ecological restoration projects[31].

Local Examples

Village of Lakewood: Greater municipal responsibility for preservation of oak woods during the development process is one of the goals of Project Quercus. Not only does the Village of Lakewood have an excellent tree preservation ordinance that requires the planting of replacement nut-producing native trees like oaks & hickories, but it also sits on the Project Quercus steering committee and was one of the pilot sites for the oak reforestation program. However, the action that drew the attention of the awards committee was the actual resolution that the Village Board passed to indicate its support for the reforestation program, and its commitment to maintain the trees that were planted on Village property for a period of at least 99 years.

The Land Conservancy: With the leadership of The Land Conservancy, a consortium of public and private groups has formed Project Quercus to begin replanting oaks throughout the county. This effort brings together residents, schools, and local governments who are engaged in the restoration of shrinking natural ecosystems and in providing a platform for coordinated restoration and environmental education programs in the future.

MCCD Wetland Restoration: Careful planning can allow the re-creation of former wetlands in areas where drained hydric soils occur and where no negative impacts to private lands will result. This requires identifying former wetland communities, protecting adequate lands to prevent undesired off site impacts and careful research to determine the ecological criteria necessary for a successful restoration effort. Lost Valley Marsh, in MCCD's Glacial Park site, is one example of such a project.

Composed of very poorly drained muck soils, this basin marsh was converted to row crop production about 1940 through the use of subsurface drain tile and conversion of a meandering headwater stream to a drainage ditch. Crop success was sporadic and early spring flooding hampered agricultural field work until late in the season. In 1993, District biologists studied the area to insure no tile lines extended off site and that the local watershed of the marsh would facilitate a return to the site's original hydrology.

In 1994, drain tiles were removed from the site, a water control structure was installed on the downstream portion of the drainage ditch and the entire area was replanted in native vegetation. Nearly two decades later, Lost Valley Marsh supports a diverse wet prairie and basin marsh wetland community. It provides an important migratory staging area for shorebirds, waterfowl and wading birds. Since 2006, portions of the eastern whooping crane flock have utilized the marsh in both spring and fall.

In this case the impacts to local agricultural interests were minor and with proper planning a rich natural community and important wildlife area was created. The area is popular with regional bird watchers and provides park users with a recreational amenity.

Farmland Protection

While this Plan is not specifically focused on the protection of farmland, it does recognize that farmland protection can be valuable to the conservation of green infrastructure and water resources. One of the core goals of the *2030 Plan* is the long-term protection of the most productive farmland in the county. A corollary policy is to encourage new development that is relatively compact and contiguous to existing infrastructure, thereby consuming less farmland and preserving natural resources.

The *2030 Plan* observes that sustainable farming operations intentionally provide wildlife habitat and natural areas within their land holdings. These areas serve a vital function in maintaining the populations of wildlife such as deer and fowl and as links between larger areas of open space that connect different wildlife populations. Agricultural areas in southwestern McHenry County that contain scattered oak savannas have been identified as critical habitat the state endangered Swainson's hawk. Agricultural areas also help protect the county's water supply and can provide recreational opportunities such as bird watching, bicycling, scenic walks and drives, hunting, snowmobiling, horseback riding, and cross-country skiing.

Two programs, operated by the US Department of Agriculture's Natural Resources Conservation Service, are particularly valuable in ensuring the protection of natural resources in agricultural areas. The Conservation Security Program (CSP) provides financial and technical assistance toward the conservation and enhancement of soil, water, air, energy, plant life, and wildlife on private working lands. The Conservation Reserve Program (CRP) is utilized by producers within the county to minimize soil erosion and reduce surface water sedimentation and contamination.

The Environmental Quality Incentives Program (EQIP) is another important program for conservation in agricultural areas. Conducted by the Natural Resources Conservation Service (NRCS), it is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland.

Recommendations

- Farmers with property within or nearby the green infrastructure network are encouraged to implement natural resource conservation and restoration programs and seek assistance from initiatives such as the USDA Conservation Security Program, Conservation Reserve Program, and the NRCS Environmental Quality Incentives Program.

- The USDA Natural Resources Conservation Service and McHenry County Soil and Water Conservation District are encouraged to continue offering educational programs regarding best soil conservation practices, habitat protection, and improving rural water quality.

- Farmers are encouraged to apply best management practices to minimize soil disturbance and compaction and to help maintain biodiversity.

Resources

In an effort to provide farmers with new options for the preservation of family farms, the McHenry County Board established the Agricultural Conservation Easement and Farmland Protection (ACE) Commission[32] in 2006. Its mission is to preserve the agricultural heritage, landscape, and economy of McHenry County through a viable farmland protection program.

ADDITIONAL STEPS: Protect Supporting Green Infrastructure

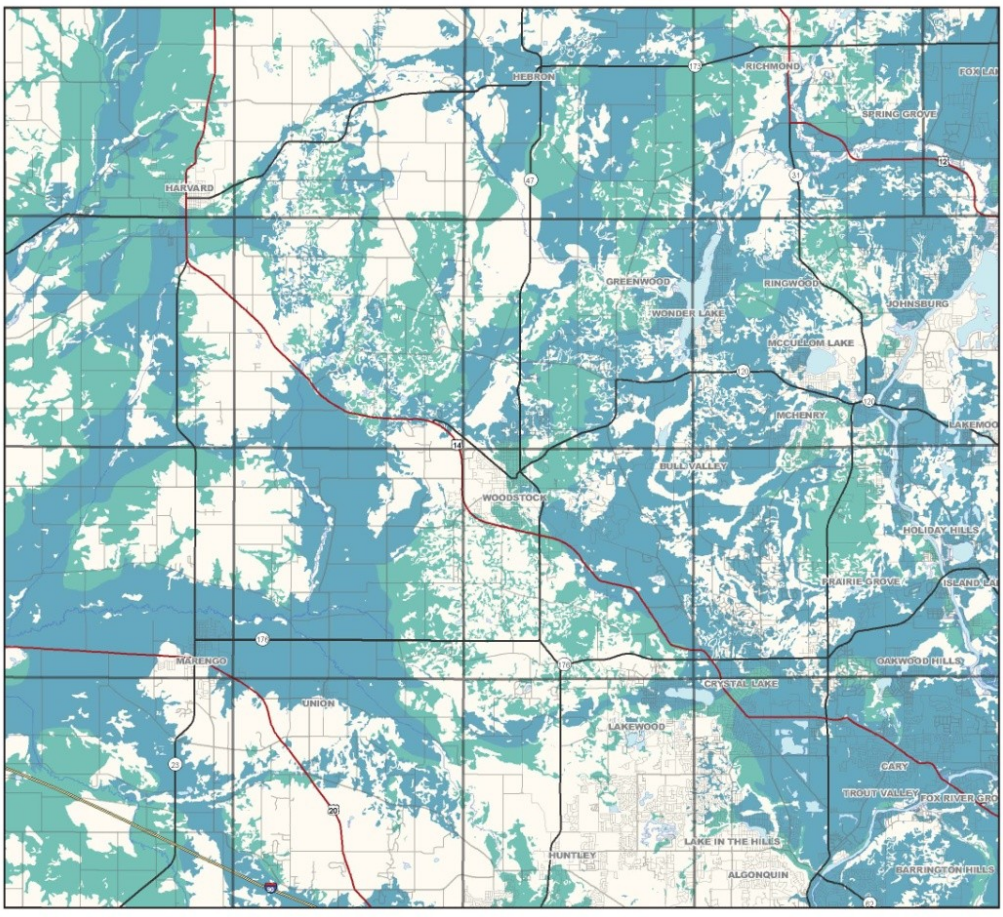
While this plan is focused primarily on the protection and stewardship of "core" green infrastructure, it is widely acknowledged that actions outside of the geographical boundaries of the mapped network can have substantial consequences – both positive and negative – on these resources. The *2030 Plan* recognized this by identifying important natural resources that underlie much of the county. These include sensitive aquifer recharge areas (SARA) and hydric soils, both of which are considered "supporting" green infrastructure in this Plan. Maps of these features were used as critical resources in the 2030 planning process in determining the appropriate locations of future land uses, such as commercial and industrial development.

Sensitive Aquifer Recharge Areas (SARA): Recharge is the process by which precipitation reaches and re-supplies the groundwater and also supplies natural base-flows to streams and wetlands. Areas that have conditions that favor rapid recharge are the main areas where the groundwater is replenished. McHenry County has developed the SARA map to depict the relative potential of aquifers within 100 feet of land surface (i.e., shallow groundwater) to become contaminated from pollution sources at or near the ground surface. Areas mapped as SARA comprise roughly 57 percent of the entire county and the *2030 Plan* has extensive recommendations encouraging the protection of recharge areas based on the SARA map. In late 2012, the County Board adopted the Water Resources Action Plan (WRAP). This plan has extensive recommendations on recharge area protection, with a specific focus on the SARA map.

Class III Special Resource Groundwater Protection Areas: The *2030 Plan* also recognizes Class III Special Resource Groundwater Protection Areas as important resource areas deserving special consideration. The Class III is an official designation that applies to demonstrably unique and irreplaceable groundwater sources suitable for application of a water quality standard more stringent than otherwise applicable. It applies to groundwater that is vital for a particularly sensitive ecological system; or groundwater contributing to an officially dedicated Illinois Nature Preserve. Class III areas are mapped as over-

Class III Groundwater Protection Areas in Bull Valley as shown on the Green Infrastructure Map.

Figure 8.
McHenry County Sensitive Aquifer Recharge Areas



Map Legend
- High Aquifer Contamination Potential
- Moderately High Acquifer Contamination Potential

The SARA map. Image taken from the 2030 Plan.

lays on the green infrastructure network map. Currently, there are mapped Class III groundwater protection areas in the county for the following natural areas: Elizabeth Lake, Boone Creek Fen, Parker Fen, and Lake in the Hills Fen.

Hydric Soils: A hydric soil is one that was formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Most drained hydric soils were formerly wetlands. In total, wetlands and hydric soils, including open water bodies, comprise 30 percent of the county's land area. Hydric soils provide important stormwater functions, acting as a sponge to temporarily store runoff. Organic soils, a subset of hydric soils, include peat and muck areas that provide prime opportunities for wetland restoration.

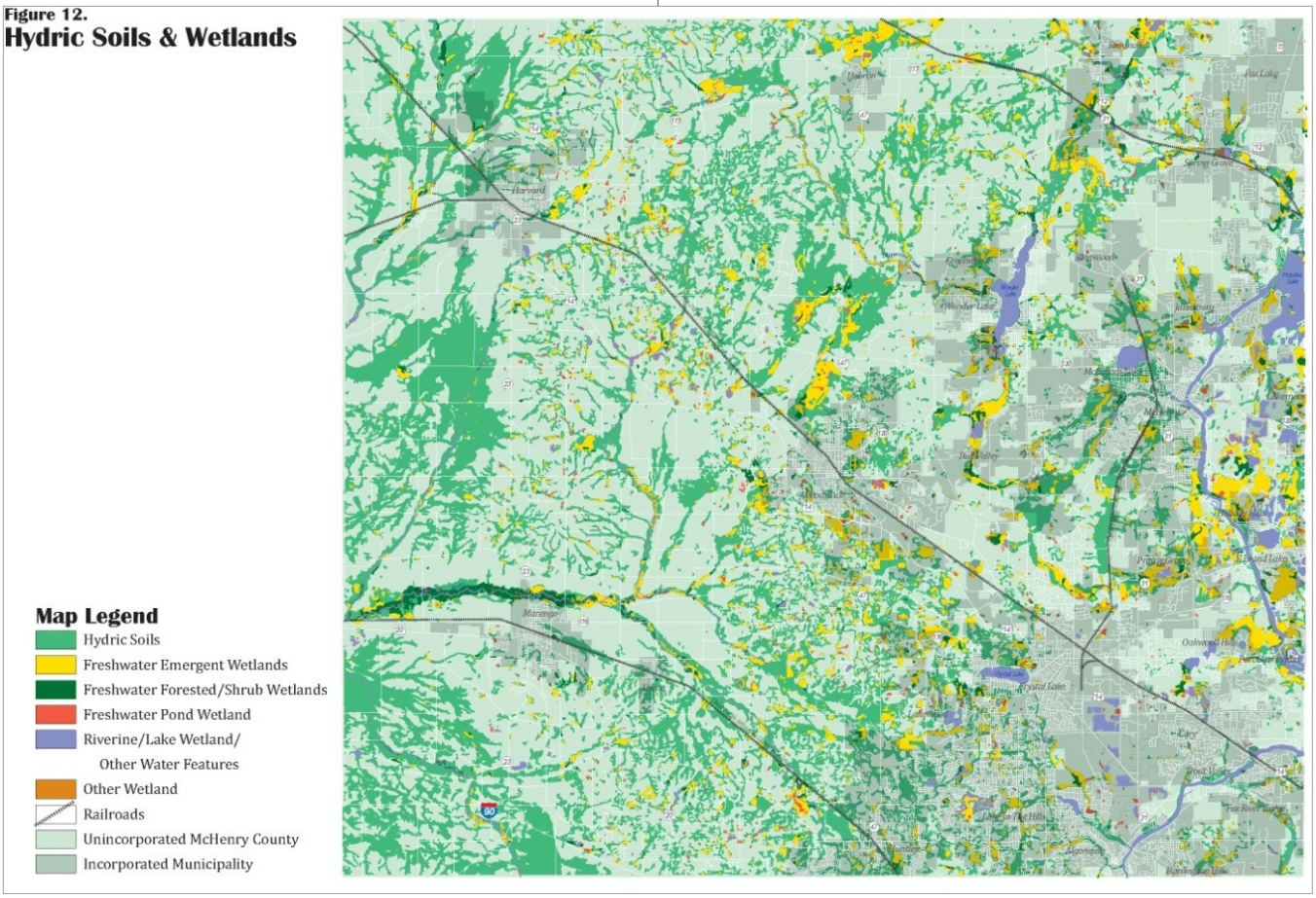
Recommendations

- ❖ Local governments should prohibit intensive uses with high-impervious surface areas or high-pollution potential, such as shopping centers, office/research/industrial facilities, and high-density housing developments, in sensitive aquifers recharge areas, including areas identified on the SARA map.

- ❖ Local governments and land developers should minimize impervious area coverage and maximize implementation of conservation design practices in sensitive aquifer recharge areas, including areas identified on the SARA map.

- ❖ Local governments should protect Class III Special Resource Groundwater Protection Areas from inappropriate development. In particular, strictly control land use and development in such areas via the following measures:
  - Preserve natural open space, including sensitive natural areas
  - Avoid commercial and high-density residential uses
  - Protect groundwater recharge functions to the maximum extent practicable
  - Minimize wastewater impacts by utilizing innovative technologies that maximize the filtering of discharged wastewater

Figure 12.
Hydric Soils & Wetlands



Hydric Soils and Wetlands map from the 2030 Plan.

- Utilize naturalized stormwater drainage and detention that maximize the treatment and infiltration of clean water
- Utilize natural landscaping in lieu of turf grass, wherever feasible
- Minimize salt use in pavement deicing and in water softening systems

❖ The county and municipalities should investigate the designation of other potential Class III Resource Groundwater Protection Areas in McHenry County.

❖ On sites that contain hydric soils, local governments and land developers should minimize development activities in hydric soil zones.

❖ Local governments should adopt and implement relevant policies and strategies of the McHenry County Water Resources Action Plan.

ADDITIONAL STEPS: Green Infrastructure at a Local Scale

Another important green infrastructure consideration is the opportunity to work with residents, landowners, and businesses – at a very local scale – to incorporate green infrastructure practices in yards, subdivisions, businesses, and school grounds. Such practices can provide water quality, flood reduction, groundwater recharge, and local habitat benefits. These green infrastructure designs also can be applied by developers at a neighborhood scale, as described previously under the topic of conservation development, or low impact development (LID).

Recommended local green infrastructure best management practices (BMPs) include:

- permeable paving instead of conventional asphalt or concrete
- green roofs
- rain barrels
- bioswales and rain gardens in lieu of costly storm sewers
- natural landscaping instead of conventional turf grass
- naturalized detention basins designed to resemble wetlands and natural lakes

Permeable paving: Permeable paver systems, or porous concrete or asphalt, are paving systems with spaces that allow water to move through the driving surface rather than running off. Runoff is temporarily stored in the underlying stone base for infiltration into the soil and/or slow release to the storm drain system. Common applications for permeable paving include parking lots and driveways.

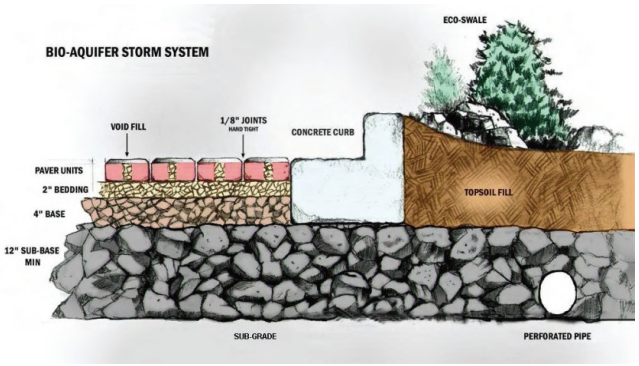


Diagram of permeable paving.

Green roofs: Green roofs are vegetated roof systems designed to retain and slow rainwater runoff from the tops of buildings. Green roofs are commonly planted with drought and wind tolerant vegetation.

Rain barrels: A rain barrel collects and stores rainwater from a roof that would otherwise be lost to runoff and diverted to storm drains and streams. Usually a rain barrel is composed of a 55 gallon drum that sits conveniently under a residential gutter down spout. Like cisterns, water stored in rain barrels can be used to irrigate lawns, gardens, and potted plants.

Bioswales and rain gardens: Bioswales and rain gardens are vegetated swale systems that have an infiltration trench designed to retain and store stormwater.

Previous page: A parking lot bioswale. Above: A rain garden.

Bioswales and rain gardens are planted with native grasses and wildflowers that enhance filtration, cooling, and cleansing of water.

Natural 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 often a component of other BMPs, such as detention basins, filter strips, bioswales, and rain gardens.

Entrance to the Sanctuary of Bull Valley featuring natural landscaping.

Naturalized detention basins: Naturalized basins utilize native wetland and prairie vegetation in basin bottoms, shorelines, and side slopes. They improve water quality, discourage nuisance Canada goose populations, and provide habitat benefits. Naturalizing also may be done as a retrofit to improve water quality functions, reduce shoreline erosion, and lower maintenance costs of existing basins.

A naturalized detention basin at Montgomery Village Hall.

Recommendations

- Local governments, through ordinances and programs, should promote the infiltration of clean runoff in developed areas utilizing techniques such as bioswales, filter strips, permeable paving, and natural landscaping.

- The county and municipalities should amend their zoning, subdivision, and landscaping ordinances to allow or encourage green infrastructure BMPs for new development and redevelopment.

- Develop, in conjunction with municipalities, a comprehensive groundwater protection ordinance, which may include zoning and subdivision provisions, for recharge area and wellhead protection.

- The county and municipalities should identify and implement measures that will provide financial incentives for green infrastructure BMPs. For example, providing credit for stormwater storage under permeable paving can reduce detention requirements and storm sewer sizing, thereby lowering development costs.

Resources

As an extension of its homeowner education and watershed protection efforts, The Conservation Foundation formed the Conservation@Home[33] program to encourage and recognize property owners that protect and/or create yards that are environmentally friendly and conserve water.

An excellent resource for conservation development best management practices is Conservation Development in Practice[34] a document produced by Chicago Wilderness.

Implementation Opportunities for the County

Making a countywide green infrastructure network a reality will be dependent upon the cooperation and collaboration of the county, municipalities, park districts, land conservation agencies, and residents. This plan has identified recommendations that can be implemented by each of these entities. However, as the creator of this plan, the county has a responsibility to take a leadership role in its implementation.

The first step is to lead by example. At the time of this plan's adoption, the county is working on a revision of many of its ordinances related to land use and development. The Unified Development Ordinance (UDO) will be the first comprehensive overhaul of the county's zoning and subdivision ordinances in decades. This is a perfect opportunity for the county to take the recommendations found in this document and use them to establish land use and design regulations that promote green infrastructure. In the coming years, the revisions to the Building Code and the Stormwater Management Ordinance will provide more opportunities to institute the recommendations in this plan.

The next step is to organize the effort. The success of this plan will depend upon its subsequent acceptance and adoption, either in whole or in part, by as many governments, agencies, and citizens as possible. This will likely entail efforts by the county to promote the plan and educate people on its goals and concepts. Furthermore, the county should consider the formation of a association consisting of those who have adopted this or their own green infrastructure plan and are working to implement green infrastructure in the county. The group can track and document the progress being made and provide periodic reports to the County Board.

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Appendix

Watershed-Specific Goals and Recommendation
Green Infrastructure Mapping Workshop, June 8, 2011

Coon Creek Watershed

Goals

1. Maintain natural portions of creek;
2. Identify opportunities to naturalize channelized segments
3. Planning for watershed should include provisions for protecting T&E species and habitat, including but not limited to the Swainson's Hawk
4. Integrity of stream corridors
5. Preserve stream buffers, special attention to oak areas, high quality ADID wetlands, organic basins

Specific Map Changes

1. Add significant areas of oak woodlands
2. Connect wetlands
3. Connect oaks and wetlands
4. Keep isolated complex focusing on high quality wetland

Main Stem Kishwaukee Watershed

Goals

1. High quality habitat; high water quality
2. MCCD macrosites (Pleasant Valley, Brookdale, Rush Creek)
3. High biological diversity
4. Rush creek is high quality
5. North Branch of Kish is major defining feature

Specific Mapping Decisions

Mud Creek subwatershed

1. no specific changes

Rush Creek subwatershed

1. Add organic soil complex
2. Add isolated woodland connection to stream corridor
3. Connect Rush creek preserves north to Brookdale preserve through Halo Hills preserve Marengo Ridge Area
4. Force oak woods connection Franklinville Area
5. Eliminate flood of record which is in farm tile
6. Add isolated oak and wetland complex
7. Add woodland complex
8. Retain if complex is at least 50 acres
9. Connect wetland
10. Connect isolated wetlands
11. Remove golf course
12. Retain isolated complex on square barn road
13. Make isolated wetland connection
14. Make isolated wetland connection
15. Retain large isolated wetland
16. Make multiple isolated wetland connections
17. Retain large isolated complex
18. Retain large isolated complex
19. Make isolated wetland connection adjacent to ComEd powerline
20. Isolated wetland connection

Nippersink Creek

Specific Map Changes

1. Do not include T&E polygon based on parcel boundary; buffer T&E pond and make connection to east.
2. Connect isolated complexes
3. Remove Shooting range
4. Retain isolated complex regardless of size
5. Isolated wetland connection
6. Delete flood of record and isolated wetlands
7. Add organic soil connect to McCollum Lake Compound
8. Add isolated wetland connection
9. Make Isolated wetland connection in both directions
10. Make isolated wetland connection
11. Make organic soil connection to isolated wetland complex
12. Make Isolated complex addition
13. Add Oak woods and make connections (actually in Boone Creek)
14. Add isolated woodland connection
15. Make isolated complex
16. Make isolated MCNAI connection
17. Retain isolated woodland/wetland complex
18. Retain isolated woodland complex
19. Connect woodlands

North Branch of Nippersink

Goals

1. Protect Water quality
2. Protect Integrity of stream corridors
3. Preserve stream buffers, special attention to high

quality ADID wetlands, organic basins and connecting oak woodlands
4. Protect headwaters

Map Changes
1. Make Isolated wetland connection
2. Delete isolated wetland

Sleepy Hollow and Silver Creek
1. Make wetland connection using organic soils
2. Remove mowed grass within townhome development
3. Remove isolated complex
4. Connect isolated wetlands to trail

Lower Upper Fox
1. Correct name to "Prairie Hill Prairie" and retain despite size
2. Add isolated grassland complex
3. Connect isolated park to golf course to natural areas

Lower Fox/ Spring Creek
1. Connect isolated woodlands
2. Connect isolated wetland/woodland to spring creek forest preserve
3. Add isolated wetland complex
4. Connect isolated wetland

Poplar Creek/Crystal Creek Subwatershed
1. Connection to Hoffman Park complex
2. Check on status of wetlands and gravel deposits (Check Class III water resource designation)
3. Make Isolate wetland connection
4. Retain isolated complex
5. Delete developed wetlands

Dutch Creek
1. Isolated woodland connection to stream

Upper Fox River
1. Cross watershed wetland connection

Boone Creek
1. Retain isolated woodland/golf course complex (correct woodland boundaries)
2. Add isolated wetland/woodland complex
3. Make woodland connection
4. Make isolated woodland/wetland connection
5. Retain isolated woodland complex