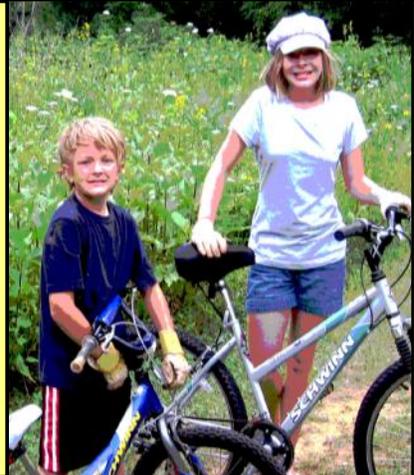


WOODSTOCK ENVIRONMENTAL PLAN

CITY OF WOODSTOCK, ILLINOIS



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CONTENTS

4 - 6	<i>Introduction- Environmental Principles</i>
7 - 16	<i>A. Land Use</i>
17 - 26	<i>B. Natural Resources</i>
27 - 35	<i>C. Water Quality & Conservation</i>
36 - 43	<i>D. Resource Conservation</i>
44 - 47	<i>E. Transportation</i>
48 - 53	<i>F. Sustainable Economic and Public Policy</i>
54 - 59	<i>G. Energy</i>
60 - 67	<i>H. Green Building</i>
68 - 69	<i>I. Community Education and Outreach</i>
70	<i>J. Implementation</i>
	<i>APPENDIX</i>
71 - 75	<i>K. Glossary</i>
76	<i>L. McHenry County Sensitive Aquifer Recharge Map (City of Woodstock Area)</i>
77 - 80	<i>M. LEED information</i>





INTRODUCTION

The City of Woodstock contains a rich diversity of natural and cultural resources that provides its residents with a high quality of life. As a commitment to preserve that quality of life for future generations, the City Council created the Environmental Commission to prepare an Environmental Plan “that looks to the present and future growth of the City”. The Environmental Commission has focused on issues relating to environmental responsibility and sustainable development in preparing the following Environmental Plan.

For the purposes of this plan, the Environmental Commission has adopted the definition of sustainable development that was described in the 1987 Bruntland Report for the United Nations as **“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”**. This is the most widely accepted definition of sustainability and it succinctly identifies the issues, the stakeholders and the need for responsible decision-making. The concept of sustainability holds the promise of long-term economic security, social equity and environmental integrity. It suggests that through increased self-sufficiency and responsibility, the production and consumption of goods and services can be maintained without harming the natural environment.

The natural environment provides natural capital such as air, water, and land resources that sustain human life and serves as a sink for our byproducts. However, the natural environment does not have a limitless capacity to produce the natural capital that benefits society or to absorb and assimilate an unlimited amount of waste. When land is developed, or goods are produced and consumed without respect for the natural environment, the ability of the environment to produce natural capital can be permanently altered, compromising future generations’ ability to derive the benefits they would otherwise have available. Therefore, to be sustainable, we must learn to live within a balanced natural budget that does not exceed nature’s ability to regenerate the resources we consume or its ability to absorb the byproducts we leave behind.

There is a growing awareness that as a society we currently are not living within a balanced natural budget. We have been able to maintain a lifestyle that exceeds our natural budget by importing more of the resources we consume from greater distances and transferring the environmental costs onto others. However, due to growing populations, economic fluctuations and changes in environmental and climatic conditions, the costs and opportunities to import resources will likely change dramatically in the near future. By moving to a more self-sufficient and sustainable lifestyle, the city will be better prepared to adapt and compete in a changing world.

While most discussions of sustainability understandably begin with environmental issues, social and economic resources must also be considered. Decisions that place too great an emphasis on one resource to the detriment of others are not sustainable. This leads to an incremental decrease in all resources, thereby diminishing the quality of life for future generations. Sustainable decision-making is achieved when all three forms of a community’s resources are enhanced. Therefore, the Environmental Plan seeks to improve and enhance the city’s environmental, social, and economic resources in ways that allow current and future generations to lead healthy, productive, and satisfying lives.

Environmental resources can be enhanced by protecting water resources, restoring natural habitats, promoting natural landscaping, expanding and connecting greenways, eliminating waste and choosing materials that are made sustainably. Social resources can be enhanced by building a sense of community, providing increased opportunities for residents to interact with others, experience the outdoors, participate in community activities and contribute to the health of the city. Economic resources can be enhanced by improving energy efficiency, reducing operating and maintenance costs, making decisions based on long-term value over short-term costs, promoting sustainable tourism, producing energy rather than exporting energy dollars and contributing to a quality of life that maintains the communities' property values.

The Environmental Plan is intended to function as both an educational resource and as a planning tool. The Plan is divided into individual chapters that provide an overview of the Plan's main topics, which include:

A) Land Use

B) Natural Resources

C) Water Resources

D) Resource Conservation

E) Transportation

F) Community Education & Outreach

G) Sustainable Economic & Public Policy

H) Energy

I) Green Building.

Each chapter is broken down into discussions on the key issues related to the main topic. The discussion of each key issue is then followed by specific goals and actions that are recommended to foster environmental responsibility and move the city toward sustainability.

The recommended actions are to be implemented by the City staff and administration, the Environmental Commission, local businesses and the residents of Woodstock. The progress of the city in implementing the actions will be evaluated in an annual progress report that will be available to the public. In addition to providing incentives and accountability in implementing the plan, the progress report will provide the opportunity for the city to recognize their accomplishments.

Although the shift toward sustainability cannot be made in a swift, sweeping change, the decisions we make today can have a profound effect upon future generations. Therefore, there should be a sense of urgency in moving toward sustainable development. The successful implementation of this plan will not only enhance the city's environmental, social and economic resources for future generations, but will also promote environmentally responsible investment from individuals and businesses seeking to share the unique quality of life that Woodstock has to offer.

ENVIRONMENTAL PRINCIPLES

Goal: The City of Woodstock will protect and enhance the health of our community and the quality of our environment, will support a stable, diverse and equitable economy, and will minimize human impacts on local and worldwide ecosystems to promote a sustainable future.

The City staff and elected officials will:

- 1. Incorporate the concept of sustainability within City policy.** Include long-term and cumulative impacts in decision-making. Promote a sustainable future that meets today's needs without compromising the ability of future generations to meet their needs.
- 2. Encourage and develop connections between environmental quality and economic vitality.** Promote development that reduces adverse effects on natural resources and supports sustainable economic opportunities for our citizens.
- 3. Ensure environmental quality.** Understand environmental linkages when decisions are made regarding growth, land use, natural areas, transportation, energy, water, housing, air quality and economic development.
- 4. Ensure a commitment to equity with City policy.** Ensure that inequitable burdens are not placed on any one geographic or socioeconomic sector and that the benefits of a sustainable community are accessible to all members of the City.
- 5. Use resources efficiently.** Reduce the demand for natural resources and reduce the ecological footprint of the City.
- 6. Prevent additional pollution.** Plan proactive measures to prevent pollution rather than only corrective action.
- 7. Educate citizens and businesses about environmental responsibility.** Promote education and awareness of environmental resources. Foster citizen participation in City policy decisions. Encourage the community at large to take responsibility for their actions.
- 8. Act locally to reduce adverse global environmental impacts.**
- 9. Purchase products that are environmentally responsible.** Choose products based on long-term environmental and operating costs. Include environmental and social costs in purchasing decisions. Purchase products that are local, durable, reusable, made of recycled materials and non-toxic.
- 10. Promote and monitor the continued environmental progress toward becoming a sustainable city.** Prepare an annual report of the City's environmental progress.

A. LAND USE

1. **Agriculture & the Food System**
2. **Conservation Design**
3. **Greenways**
4. **Natural Landscaping**
5. **Reinvestments in the Built Environment**
6. **Transit & Pedestrian-Oriented Development**

Woodstock's early history was shaped by its location on a major rail line and the surrounding prime agricultural lands. In adopting a sustainable land use policy, agriculture and transportation still are key elements of this plan. Preserving our agricultural heritage, emphasizing our proximity to public transportation, promoting conservation design and greenways, and adding natural landscaping elements to the built environment are strategies that conserve land resources for future generations and enhance the quality of life for current and future residents.

1. **Agriculture & the Food System**

The City of Woodstock has a rich history as an agricultural center in McHenry County. The farmlands surrounding Woodstock contribute to its identity as a unique community rather than a continuation of indistinguishable suburban subdivisions.

Agricultural lands provide many public benefits including a supply of food (both locally grown and commodity crops), provide cover for wildlife and buffer important natural areas, control flooding and protect water recharge areas, provide open space and recreational opportunities, and establish the foundation for a vital rural economy. Farmland around Woodstock has the potential to provide the security of a local food system and otherwise enhance the quality of life. The designation of agricultural buffer zones around the City of Woodstock would bolster the effectiveness of the proposed Environmental Plan. The buffer would preserve the agricultural land to provide food for the community, protect groundwater recharge areas, and to contribute to the positive and unique character of Woodstock.

Myriad benefits to the City could be derived from encouraging the continuation of agricultural activities through appropriate zoning and comprehensive land use planning, purchase and transfer of development rights programs and encouraging agri-tourism and other market support of local farm products as well as continued support of the City's Farmer's Market. Some communities have established local food policy councils to advocate for the establishment of a local food system. The council can research and support local farmers, local food transportation and distribution systems, encourage local business development of food processing centers and support local food marketing efforts.



GOAL	ACTION
A1.1 Protect farmland and agricultural use of land for local farming operations.	Review and revise existing ordinances to ensure that provisions exist to encourage this protection.
	Designate Agricultural Buffer Zones around the City.
	Explore creation of Transfer of Development Rights and Purchase of Development Rights programs where farmers incorporate agricultural Best Management Practices.
A1.2 Maintain/redevelop Woodstock as a center of agricultural commerce.	Encourage the creation and sustainability of agricultural businesses in the economic development plan.
A1.3 Maintain the unique character of Woodstock's agricultural heritage.	Establish community garden sites.
	Continue and enhance support of the agricultural events and venues such as farmer's market and harvest fest.
	Consider amending local ordinances to allow for agricultural use of lands in housing developments.
A1.4 Strengthen the local food system.	Establish a Woodstock Food Policy Council.
	Prepare a Local Food System Plan (by the Food Policy Council)
A1.5 Support additional venues for the production, marketing and sale of local foods.	Include local food production in the economic development plan
	Explore establishing an indoor year-round farmer's market.



2. Conservation Design



Conservation Design takes into account the natural landscape and ecology of a site, and utilizes best management practices to maintain the land’s most valuable natural features and functions. Building sites can be located to permanently preserve a large percentage of the land as open space, including natural vegetation or local food production. Conservation Design can also involve the reestablishment of natural communities such as prairies, woodlands, and wetlands.

The four main principles for Conservation Design are: flexibility in site design and lot size; protection and management of natural areas and other features; reduction of impervious surface areas; and use of sustainable stormwater management practices. Conservation Design can be allowed by right as the preferred option, or be implemented through a planned unit development process.

Conservation Design calls for reductions in impervious surface areas, such as parking lots, roads and driveways, and limitations on mass grading and soil compaction to substantially improve on-site stormwater management and water quality and to increase infiltration. The development of standards for alternative construction and vegetated swales, instead of curb and gutter edging, is encouraged, and should support the use permeable materials and landscape systems to allow water filtration and infiltration.

In the City’s Unified Development Ordinance, Woodstock clearly indicates that conservation design is the preferred development choice when environmentally sensitive features are on the proposed site. The ordinance gives good incentives for using conservation design techniques such as open space protection, narrow streets, stormwater management and natural landscaping. The stage has been set for creating ordinances which encourage conservation design for commercial and industrial developments. It also opens the door to encouraging stronger specifications and maintenance requirements for open space and natural areas in conservation developments in the city.

GOAL	ACTION
A2.1 Enable conservation design by right in zoning districts to eliminate time delay, special approval or variances that discourage conservation design development.	Review Woodstock’s ordinances and make the necessary revisions.
	Identify what criteria trigger Conservation Design requirements.
A2.2 Clarify use of Conservation Design measures beyond residential development.	Add provisions for Commercial/ Industrial Conservation Design to Woodstock UDO.
A2.3 Ensure long-term maintenance and management of protected natural areas within Conservation Design developments.	Review and improve maintenance performance standards.
	Identify responsible party to provide funding and long-term maintenance, including detailed management plans which clearly define the roles of the developer, property owner and local unit of government or qualified third party.

3. Greenways

Green infrastructure brings together a network of open spaces, waterways and natural areas to provide wildlife habitat, support diversity of plant and animal species and provide recreational opportunities. It is important for Woodstock to identify these networks in its community vision, comprehensive plan and intergovernmental agreements with neighboring jurisdictions. Green infrastructure stretches across municipal boundaries and in its ideal form creates a regional framework that links key natural areas and forms a web of natural connections.

Greenways are a subset of green infrastructure. Greenways are linear open spaces or corridors including land and water trail networks that can serve a number of different roles. Streams and hiking and biking trails preserve and expand habitat for flora and fauna, store, cleanse and absorb stormwater, and provide recreational opportunities for all age groups and levels of physical ability. Neighborhood parks can also be part of green infrastructure and can provide both a recreational opportunity for residents and a way to connect natural areas within a community. Parks can provide venues with both active and passive recreation activities. In addition to offering athletic fields and playgrounds, they can integrate natural landscaping, trails for hiking and biking and protection of habitat close to where people live.

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

Woodstock currently has limited hiking and biking trails and lacks connections to other trail networks. Short trails exist within several areas (Ryders Woods, Westwood Park, soon at Kishwaukee Headwaters and Dufield Pond) and the parks (Emricson Park). Plans are being discussed for a McHenry County Conservation District bike trail that will connect Woodstock and Crystal Lake. This trail extension would greatly enhance the green infrastructure value between communities.

GOAL	ACTION
A3.1 Identify, protect and enhance environmental features within Woodstock's green infrastructure.	Conduct a public green infrastructure visioning and planning process. (EC)
	Define green infrastructure and identify in Woodstock's comprehensive plan and zoning documents.
	Create a Woodstock green infrastructure map which identifies the important elements and creates buffers around them.
A3.2 Create bike and hiking trails and protect linking corridors.	Create a greenways plan.
	Pursue cooperative agreements with other entities to create these trails.

4. Natural Landscaping

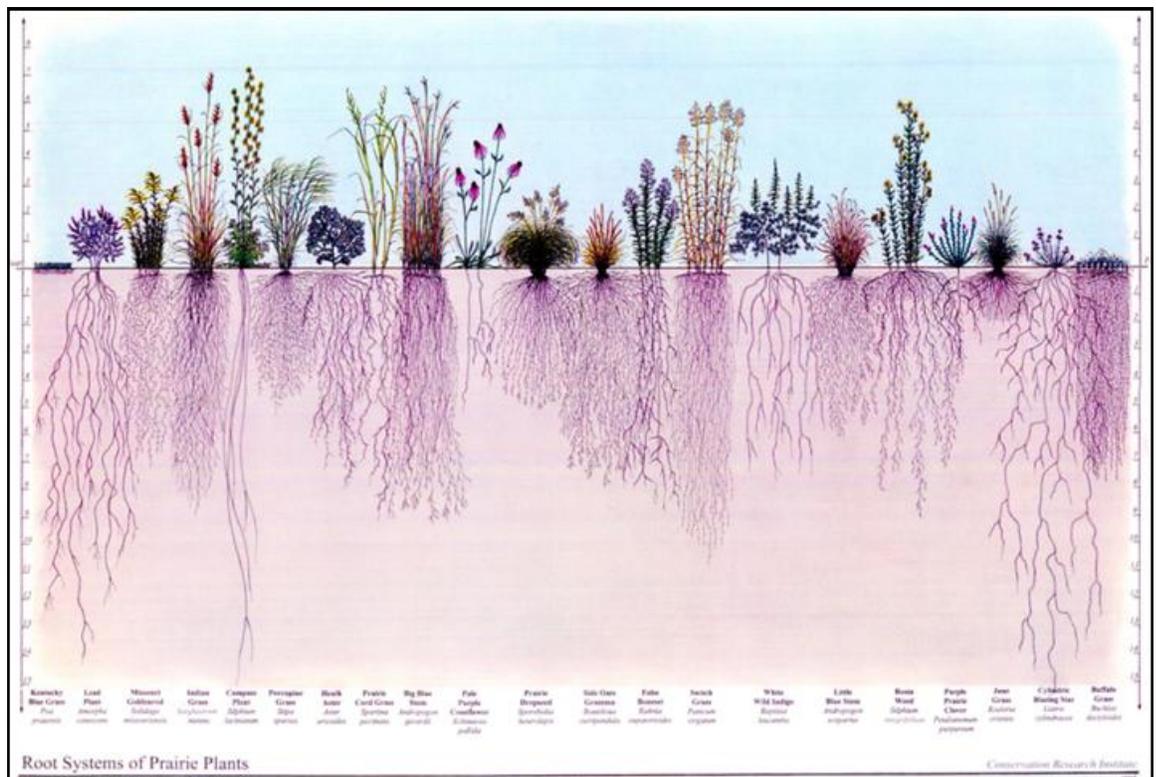
As Woodstock moves towards greater environmental responsibility and sustainability, it will be important to encourage the use of natural landscaping in residential, commercial and municipal settings. Natural landscapes incorporate the principles of naturalistic design and the use of native plants that are adapted to the local climate and soils. The resulting landscapes require less maintenance than conventional lawns, build soil fertility, reduce environmental harm, create seasonal interest, provide wildlife habitat and promote biodiversity. Natural landscapes may be installed for new projects or can be restored or “retrofitted” for existing properties. There are appropriate plants for every type of site, including those that are too wet, too dry or too shady for successful lawn plantings. Plants for natural landscaping include a wide range of trees, shrubs, vines and perennials. The natural landscaping movement has been gaining acceptance nationwide as a cost effective alternative to conventional turf grass lawns.

Conventional turf grass landscapes are extremely energy and maintenance-intensive. Its roots extend only a few inches into the soil, causing them to dry out quickly and to require significant supplemental watering which stresses limited groundwater supplies. Beyond water, many lawns are heavily fertilized and regularly treated with applications of chemicals to control weed and insect problems. Because turf grass is able to absorb only ten percent of the rainfall compared to what a forested area can absorb, lawns contribute to run off problems during storms. This run off may be polluted with residues from fertilizers and pesticides, and in an area such as Woodstock with shallow aquifers and recharge areas, this can degrade the quality of our water supply. Finally, turf grass requires regular mowing, most often through the use of power equipment that creates additional air, noise and water pollution.

On the other hand, properly sited, established native plantings require little or no supplemental watering or synthetic pesticides and fertilizers. Native plants tend to be drought resistant with deep root systems that absorb and retain rainfall, minimize runoff and provide opportunities for groundwater recharge. While there is certainly a place for conventional lawns, they should not be the dominant feature in a healthy and sustainable environment. Overall, natural landscaping contributes to the environmental health of the community, while highly maintained conventional lawns have adverse effects on the health of people, animals, and the overall environment.



GOAL	ACTION
A4.1. Encourage the use of natural landscaping and native plants.	Review existing weed control ordinances to ensure that there is no conflict between those ordinances and the goal of encouraging natural landscapes.
	Review subdivision and other development ordinances to ensure they allow and/or encourage the use of native vegetation including within the public right-of-way.
	Educate and encourage property and homeowner associations to allow the use of natural landscaping under their covenants and restrictions.
A4.2. Educate the general public as to the benefits of natural landscaping.	Establish demonstration sites on public property.
	Develop written direction and guidelines on natural landscaping so that the goal of lowered maintenance can be attained.
	Explain the benefit of natural landscaping in the <i>Woodstock City Scene</i> .
A4.3. Assist landowners in creating natural landscaping.	Provide resources such as source lists for native plants or local landscapers offering natural landscaping services. The City website should include a page of links to website resources for natural landscaping.



5. Reinvestment in Built Environments - Brownfield, Infill and Grayfield Developments

Priority should be given to redeveloping brownfield, infill and grayfield sites over greenfield properties. Vacant buildings and lots represent challenges which affect both the psychological well-being and economic health of a community. Specific to Woodstock, sites such as the former Guardian Electric (northwest corner of Lake Avenue and Route 47), Hornsby's/Alco (southeast corner of South Street and Route 47) and the former Farm & Fleet (southwest corner of Route 14 and Route 47) are visually unappealing and a drain on property values and, in turn property taxes.

Redevelopment and adaptive reuse involves taking a previously developed property to a higher, more productive use. Redevelopment occurs when there is an opportunity to transform a property into one with a greater value and/or economic benefit to the local economy. The sub-optimal use often results from obsolescence, or a loss of utility of a property, which results in lower land values. There are a variety of factors that lead to obsolescence, including physical deterioration, functional obsolescence and external or market pressures.

Generally, redevelopment site opportunities can be classified as one of three categories:

Brownfields

Defined as abandoned, idled or underutilized commercial and industrial properties where expansion or redevelopment is complicated by actual or perceived contamination. A recent example of this in Woodstock is the former Woodstock Die Casting site, now Woodstock Station, where significant site remediation was required prior to redevelopment occurring.

Grayfields

Defined as typically larger, retail spaces located along commercial corridors vacated due to market pressures and/or relocation to larger facilities. The most prominent example of a grayfield site in Woodstock is the former Farm & Fleet site at IL Route 47 and US Route 14.

Infill Sites

Defined as parcels that have been left vacant during the development of the community or as previously developed parcels which have been cleared and are ready for redevelopment. Examples of infill sites in Woodstock include the former Guardian Electric site at Lake Avenue and IL Route 47 and the former Hornsby's/Alco site on IL Route 47.

Redevelopment occurs all the time and developers are constantly "redeveloping" properties that have a potentially higher future value than their current developed value. For the purpose of this plan, redevelopment refers to publicly supported redevelopment. The term "public supported redevelopment refers to projects where there is an identified need to improve the general welfare of a neighborhood or the community as a whole and where private redevelopment can or will not occur without public assistance. Public supported redevelopment is used in areas when there is a need for redevelopment but the market does not support that need.

While Woodstock is able to claim success in facilitating the redevelopment of significant brownfield sites (Woodstock Die Casting, now Woodstock Station) and grayfield sites (Morton Salt/Rohm & Haas, now Wal-Mart) there are still a number of sites which remain vacant due to a combination of physical deterioration, functional obsolescence and/or external/market conditions. Most notably, these include the former Hornsby's/Alco, former Guardian Electric and the former Farm & Fleet. While there are certainly others, these are the most significant in Woodstock as of the writing of this text.

GOAL	ACTION
A5.1 Redevelop underutilized or contaminated properties.	Provide assistance to developers through streamlined development approval procedures and/or specific economic incentives which are revenue-neutral to the community. <i>Examples of streamlined development procedures include up-to-date and clear building codes, pre-development informational/organizational meetings, timely response to development submittals and prioritizing redevelopment projects. Examples of revenue-neutral economic incentives include the municipal sponsoring of Industrial Revenue Bonds, Special Assessments to finance infrastructure improvements, and the establishment of other special tax districts.</i>
A5.2 Revitalize neighborhoods and downtowns.	Create building coalitions focused on redevelopment efforts to specific areas. <i>Examples in Woodstock include the Historic Preservation Commission and Woodstock Downtown Business Association, both of which deal with the redevelopment of properties the downtown business district.</i>
	Support community efforts through education. <i>Examples include efforts undertaken by the Historic Preservation Commission and Woodstock Downtown Business Association to provide pamphlets and marketing information regarding the significance of downtown historic buildings.</i>
A5.3 Encourage economic development of community brownfields.	Continuously seek access to funding for State and Federal brownfield mitigation programs and implementation/remediation strategies.

6. Transit & Pedestrian-oriented Development

Transit-oriented development (TOD) creates mixed-use, higher density communities that encourage people to live near transit services and decrease their dependence on driving. This type of development typically includes the following elements:

- A mix of land uses around and near transit stations including residential, commercial and retail.
- Moderate to high residential densities surrounding transit stations.
- Easy and nearby access and walking routes to transit stations.

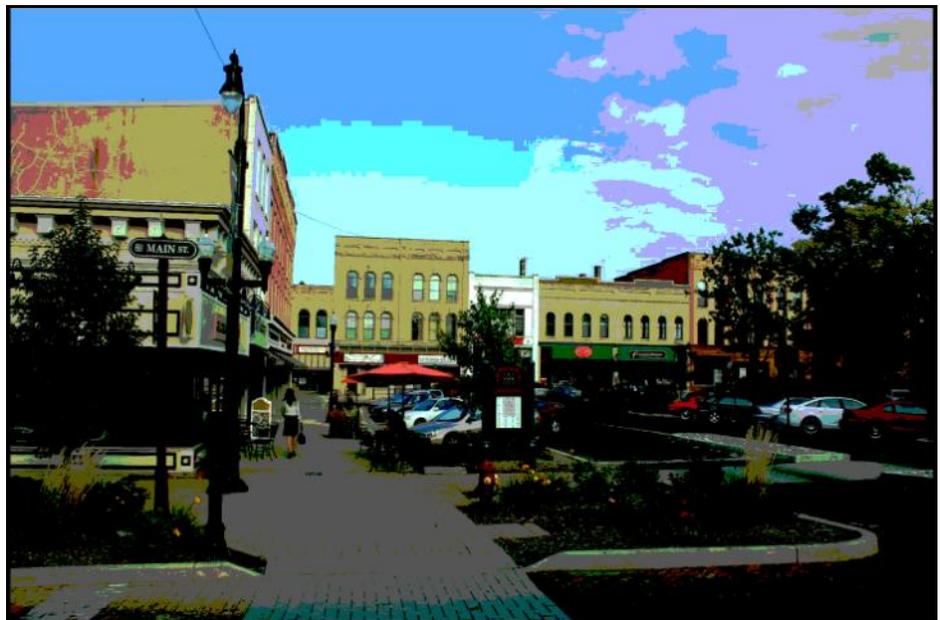
Transit-oriented development increases pedestrian activity around transit stations, which increases the customer base of local businesses and results in additional tax revenues. Local property values also rise near transit centers, as residents are willing to pay a premium to have easy access to alternatives to automobile traffic congestion. Transit systems benefit from an increased number of local workers, commuters, shoppers and residents while residents benefit from easy access and convenience to jobs, retail uses, schools and other destinations.

Locating residential and retail land uses near existing transit infrastructure relieves pressure on congested roadways and decreases air pollution associated with automobile travel. Transit oriented development revitalizes older communities by bringing people back into neighborhoods where housing, shopping and transportation to other destinations are available, thereby reducing pressure for developing in more remote locations. These types of developments cluster growth in already developed areas, thereby reducing sprawl.

In Woodstock the best location for transit oriented development is near the metra train station. This location has the added benefit of being in walking distance from the Square and many local retail establishments. The planned buildout of the Woodstock Station on the former Woodstock Die Casting property incorporates many transit-oriented development ideas as well as a pedestrian link to the downtown square. The inclusion of a link to bus and shuttle service to other destinations would provide additional community benefits.



GOAL	ACTION
<p>A6.1 Promote pedestrian and bicycle traffic near transit stations and throughout the community</p>	<p>Require sidewalks and pedestrian trails in proximity to transit stations to provide connectivity between transit stations and other land uses.</p>
	<p>Continue sidewalk maintenance efforts.</p>
	<p>Address seasonal sidewalk issues such as snow and ice removal.</p>
<p>A6.2 Encourage mixed use areas including residential, commercial, retail land uses, as well as amenities near and in proximity to transit stations.</p>	<p>Review and revise applicable ordinances.</p>
<p>A6.3 Enhance station area safety and aesthetics to make it an attractive destination.</p>	<p>Coordinate station design and appearance improvements with Metra and other transit agencies.</p>
	<p>Continue security patrolling of transit areas.</p>
<p>A6.4 Explore public / private partnerships to achieve transit-oriented development projects.</p>	<p>Explore providing financial incentives / overlay districts.</p>



B. Natural Resources

1. Biodiversity

2. Prairies

3. Wetlands

4. Woodlands

5. Urban Trees

6. Locally Significant Natural Resource Sites

This chapter deals with natural resources which the city still retains in the form of relic wetlands, prairies and woodlands, as well as the biodiversity of plants and animals that live in these natural areas. Studies have shown that cities with vibrant landscapes which include natural areas that residents can identify with are more desirable destinations than cities without such natural amenities. People like living in cities that foster a healthy natural environment.

In addition to making Woodstock a more interesting place to live, our natural areas provide important biological and functional values. For example, wetlands enhance the quality of stormwater runoff, provide important habitat to native wildlife, and can help reduce flooding. Our prairies and oak woodlands provide refuge for rare and unusual plants and animals while providing import groundwater recharge functions. These natural systems also help clean the air we breathe.

Cities which do not recognize the import functional and biological values of their natural areas often pay a high price. This can be seen in costly retro-fit projects aimed at dealing with damaging stormwater runoff due to a lack of sufficient natural wetlands and riparian zones. It is also evident as a result of poor development planning which can diminish property values due to an unappealing and even unhealthy natural environment.

Protecting the natural resources of Woodstock is as important to our standard of living as is clean drinking water or good schools. A city is measured, in large part, by the bold actions it takes to separate itself from other municipalities. As such, the City of Woodstock should adopt a comprehensive strategy to protect its relict prairies, wetlands, and woodlands and to ensure a clean, healthy, and satisfying environment for all its residents and visitors.

The “Natural” Setting

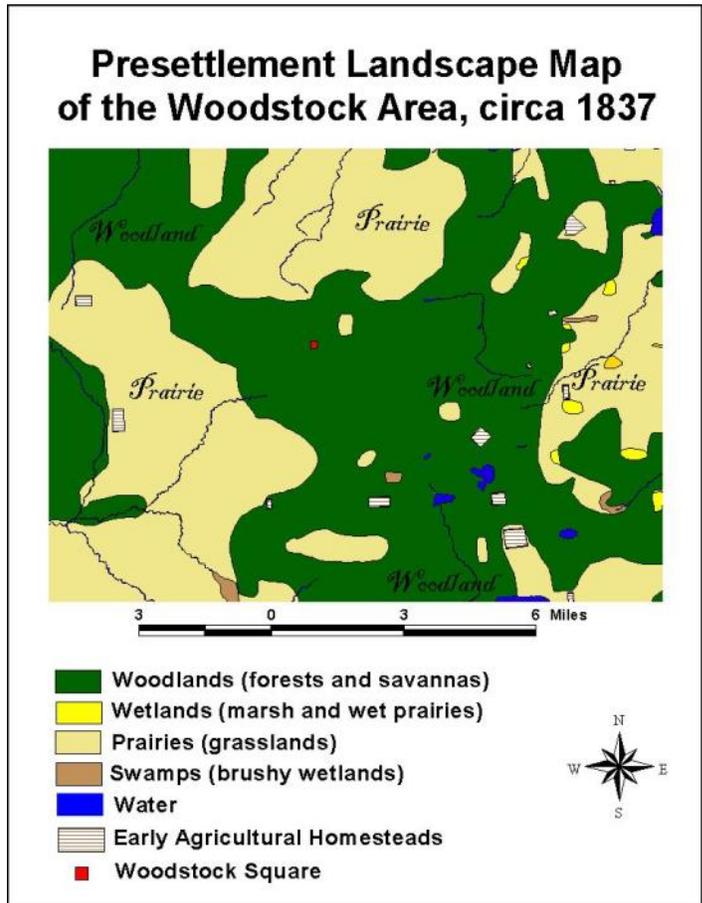
In 1837, surveyors of the U.S. General Land Office mapped the area in and around the modern City of Woodstock. Their mapping efforts preceded large-scale landscape alterations that would soon follow as increased settlement of the region cleared lands for agriculture. The result of the surveyors’ mapping effort is illustrated below, along with the modern boundary of the city and its primary road and rail system.



Woodstock was established atop a gently rolling glacial moraine which today bears its name. Early settlers were undoubtedly attracted to this location due to the abundance of prairies and open woodlands, as well as the clear flowing waters that emerged from hillside seeps and springs. Very large prairies, several thousand acres in size, were found around the city on the relatively level terrain at the base of the Woodstock Moraine. These prairies formed over a period of several thousand years upon the glacial outwash areas that were deposited as the Wisconsin ice sheet melted and retreated northward. These prairies were a mosaic of community types that varied across subtle soil and moisture gradients. Indeed, these prairies supported a great diversity of plant, insect, and animal life – many of which we can still see today in relict natural areas such as West Woodstock Prairie.

Trees did not grow in the open prairies, except along the margins of streams, lakes, and marshlands. However, trees were abundant on the gently rolling uplands. In general, the early City of Woodstock was established within an open oak woodland. This landscape was dominated by bur oak, white oak, red oak, and hickory trees. The understory flora was much more diverse than the canopy trees. Some areas, with widely scattered oak trees, supported a prairie-like plant community of grasses and wildflowers. These were the oak savannas. In other areas, where trees were closer together, the understory consisted of a wide variety of spring wild flowers. These were the oak woodlands. A relict example of this community is found in Emricson Park. Of course, many other natural communities were found in and around the city of Woodstock in 1837, but most of these were too hard to find and too small to map at the time. These communities included fens, sedge meadows, dry prairies, and marshlands.

Today, the landscape in and around Woodstock is vastly different from that of 180 years ago. However, there is much to celebrate - and much to be done. Woodstock is fortunate to have remaining within its city limits and nearby several natural communities that serve as refuge for many of the plants and animals that once graced this landscape. Some are becoming exceedingly rare, such as the oak woodlands which are dying out across McHenry County. Also becoming exceedingly rare are the fens and wet prairies which still survive at West Woodstock Prairie. By protecting these natural areas and others, as well as the system of streams and groundwater recharge areas that sustain them, we can help ensure a diverse environment for ourselves and for the posterity of Woodstock.



Presettlement (1837) landcover map of the City of Woodstock and vicinity. The dominant community types mapped were prairie and timber (woodland). Other community types mapped were wet-prairies (yellow), water (blue), sloughs (light brown),



1. Biodiversity

The term biodiversity can be defined as the total number of plant and animal species in a given area. Biodiversity is often used as a measure of the health of a particular biological system of which we are all a part.

When it comes to applying the term biodiversity to a city like Woodstock – the concept may be difficult to grasp. This can be because the image of a city in most people’s minds is of an artificial place created by people and for people. Hence, a city is often perceived to be separate from nature and thus biodiversity may be considered irrelevant. There might be some level of truth to this image if one only focused on the buildings, houses, streets, lawns, and other hard infrastructure within a city. In reality a city is much more. It is part of a larger living ecosystem that includes the land, water, native communities of plants and animals and people. Any city that values its biodiversity will be more exciting, more interesting, healthier, and more

sustainable in the long-term than a city that does not recognize the value of its biodiversity.

What exactly is the biodiversity of Woodstock? This is a difficult question since we do not have a comprehensive list of all the various parts of this complex system. It is safe to say that the biodiversity of Woodstock is very good compared to most cities in our region. The City is fortunate to have remaining relict natural communities that serve as refuge for many of the native plants and animals that once dominated this landscape when European-American settlers arrived here in the early 1830s. While many cities have essentially destroyed their natural features, Woodstock has significant prairies, woodlands and wetlands that can be protected and managed to maintain and even restore native biodiversity. Since Woodstock is a growing city with much open-space land that has yet to be developed, the city can also re-construct some of its lost natural communities through conservation design planning.

Woodstock can continue to be a city with high native biodiversity by protecting and managing its last remaining natural areas, as well as the system of streams and groundwater recharge areas that connect and sustain them. Biodiversity can be further enhanced by adopting sound conservation design principles for new developments near sensitive natural resource areas.

GOAL	ACTION
B1.1 Identify Woodstock’s biodiversity.	Compile data from existing bird, frog, and butterfly counts.
	Conduct a survey (bioblitz) of species inhabiting Woodstock.
B1.2 Enhance Woodstock’s biodiversity.	Identify formerly existing native species which can be reintroduced.
	Take appropriate measures to enhance those areas which provide habitat for native species.
B1.3 Acquire lands to protect or enhance Woodstock’s biodiversity.	Develop a land acquisition strategy.

2. Prairies

Prairies are grasslands dominated by various grasses or grass-like plants called sedges and various flowering plants. However, one type of plant a prairie is always found to be lacking in a prairie is trees. Prairie types vary along subtle moisture gradients. Some prairies are termed “wet-prairies” because they are wet throughout much of the year and grow on rich black organic soils. Conversely, “dry-prairies”, are found in the driest of places where soils tend to be thin and/or sandy and nutrient poor. In between these extremes, prairie communities vary in size and space across the natural landscape to form a diverse mosaic of unique prairie communities.



It was only 200 years ago that prairies dominated the landscape of the midwest United States. For thousands of years, the short grass prairies of the Great Plains comprised one of the largest grasslands on earth extending from southern Texas to northern Canada. A very large portion of this vast grassland, termed the prairie peninsula, was a tall grass prairie type that extended eastward into central and northern Illinois. Ironically, Illinois is known as the “Prairie State” despite the fact that 99.9 percent of the original tall grass prairie has been destroyed.

Prairies once covered a large portion of McHenry County. In 1837, it is estimated that 55 percent of McHenry County consisted of prairies and wetlands. Today, wetlands are still somewhat common, but few prairies remain. Some of these are tiny remnants associated with pioneer cemeteries, often only $\frac{1}{4}$ acre or less in size. Others are protected on sites owned and managed by the McHenry County Conservation District. Still others are owned by private individuals some of which are protected as Illinois Nature Preserves.

In Woodstock, two large relict prairies remain. One is the Prairie Ridge Fen which is owned by the City of Woodstock and managed by The Land Conservancy of McHenry County. The other is West Woodstock Prairie. This prairie is identified on the Illinois Natural Areas Inventory as a Category I High Quality Natural Community. As such, the West Woodstock Prairie is considered by ecologists to be of state-wide significance and an irreplaceable natural resource. Currently, the City owns 60 acres of the site and another 40 acres is owned by The Land Conservancy.

New prairies are being re-created in Woodstock. Good examples of these are the emerging prairies at the Kishwaukee Headwaters site owned and managed by the McHenry County Conservation District and the prairies at the Sanctuary of Bull Valley residential development. While, compared to natural relict prairies, re-created prairies offer much lower diversity in plants and animals, they can nonetheless be important open space areas that provide wildlife habitat, protect groundwater recharge, provide buffers for wetlands and streams, and offer passive recreational opportunities. Maintenance of re-created prairies requires much less resources in the way of fossil fuels, machines, and labor than conventional open space areas such as turf grass fields, parks, and dry bottom detention basins.

GOAL	ACTION
B2.1. Protect West Woodstock Prairie.	Expand the size of the existing 60 acres when available through fee simple acquisition or easements.
	Provide permanent protection to this site, e.g., dedication of an Illinois Nature Preserve.
	Adopt protective land use practices in the upland recharge areas as depicted in the Comprehensive Plan's Resource Conservation Corridor.
B2.2. Educate City staff on prairie vegetation.	Sponsor training sessions for Parks Department Personnel in prairie restoration and maintenance techniques.

3. Wetlands

Wetlands are places where hydrology has profound influence over soil development and plant establishment. Some wetlands, such as marshlands which are dominated by cattails and other emergent vegetation, are inundated throughout most of the year and have soils that are highly organic. Other wetlands, such as sedge meadows, have standing water at the surface for only a portion of the year – usually in the spring. In sedge meadow wetlands, soils are usually peat, a highly organic soil that remains saturated throughout the year. All wetlands support plant communities uniquely adapted to survive in an aquatic environment – whether temporary or year-long. Because healthy wetland systems naturally clean and convey water, they perform important biological and functional values.

Natural wetlands located in and around Woodstock are extremely important to the environmental quality and economic prosperity of the city, especially since our population is experiencing rapid growth. Proper planning based upon sound sustainable development practices will insure that both the habitat and functional values of Woodstock's wetland system will be maintained and enhanced as the city continues to grow. Protection and enhancement of Woodstock's natural wetland system should be considered as equally important as the maintenance and capital improvements within the city such as roads, sewers, water supply and waste-water treatment. Without such prioritization, our natural wetland system will suffer and the recovery of lost benefits to our community and to downstream residents will be very costly.

Woodstock's wetland system is significant in scale and contains several different types of wetlands. The most obvious wetland type is perhaps the stream corridor network associated with the headwater tributaries of the Kishwaukee River and Nippersink Creek watersheds. These riparian stream corridors convey stormwater runoff from the heavily developed areas of the city and then flow downstream branching outward through less developed areas and agricultural lands surrounding Woodstock. Most of these stream corridors are degraded due to channelization and increased flows due to stormwater runoff. As such, many stream segments could arguably be improved with new developments that incorporate best management practices to enhance in-stream habitats and that restore riparian wetlands.

Along some stream segments there are large wetland complexes consisting of marshes, sedge meadows, wet-prairies, and open water habitats. In addition to providing diverse wildlife habitat, recreational opportunities, and aesthetic values, these wetland complexes slow and store floodwaters and enhance water quality. These wetland complexes can be viewed as the “natural water processing plants” vital to the integrity of the entire wetland system. Great care should be exercised in the planning and development of land in and around these larger wetland complexes. Proper planning will protect and enhance the biological and functional values of these larger wetland complexes.

Another important wetland type present is termed an “isolated wetland”. These wetlands have no external surface drainage and are now extremely rare due to past filling and drainage activities. However, those isolated wetlands that remain often play a critical role in flood reduction and groundwater recharge, as well as provide habitat for amphibians that are in decline within the region.

Woodstock’s comprehensive plan and land use map documents delineate the wetland system described above. In addition, the comprehensive plan provides resource conservation corridors to protect Woodstock’s wetland system as new developments occur within the planning area. Adoption and enforcement of comprehensive conservation design principles and best management practices are recommended to ensure the long term protection and enhancement of Woodstock’s wetland system.

GOAL	ACTION
B3.1. Protect Woodstock’s remaining wetland resources.	Develop and adopt a comprehensive strategy to protect and enhance Woodstock’s wetland system. <i>Excellent example is - “Restoring and Managing Stream Greenways” - Northeast Illinois Planning Commission.</i>
	Require the location of natural resources within the watershed be provided when reviewing proposed new developments.
	Review existing ordinances and revise to require new developments in proximity to Woodstock’s wetland system to address specific on-site wetland needs.
	Explore how to provide adequate naturalized buffer zones within all new developments located along Woodstock’s wetland system.
	Provide long-term maintenance of Woodstock’s wetland system.
B3.2. Educate the public and City staff on tvalue of wetlands and use of <u>best management practices</u> for wetland enhancement and protection.	Include trails, where environmentally sound, along stream corridors to enhance public use and education.
	Provide City personnel with training opportunities.



4. Woodlands

At the time of European-American settlement (Ca. 1837), oak woodlands were estimated to have covered nearly 45 percent of McHenry County. These original oak woodlands were dominated by bur oak, white oak, and red oak, along with various hickories and other less numerous tree species. The understory of the oak woodlands was generally “open” and consisted of native shrubs and a wide variety of native grasses, sedges, and spring wild flowers. This description is in stark contrast to most modern oak woodlands in McHenry County which are dominated by an impenetrable thicket of invasive woody vegetation.

Emricson Park

Pre-settlement oak woodlands provided early settlers with the building materials, fuel, and pasture lands necessary to establish homesteads, towns, and to build the foundation of a thriving economy based on dairy farming. Today, oak woodlands have been reduced to an area covering only 4 percent of the county. To further complicate matters, these surviving oak woodlands are in serious jeopardy of dying out in the near future due to old age, invasive species, and poor oak regeneration.

The dramatic reduction in oak woodland acreage in and around Woodstock is similar to the trend documented for McHenry County as a whole. Likewise, the remaining oak woodlands in Woodstock will not regenerate unless action is taken to protect and manage these woodland systems. While the situation may appear bleak, the City can take steps that will help insure that beautiful oak woodlands will still grace its landscape long into the future.

Trees, in general, are also an important component of a healthy and aesthetically pleasing community. Trees “soften” the otherwise artificial appearance of a city and can help provide an important element of nature within it. They can also reduce home energy costs by providing shade and cooling effects in the summer, while allowing solar heating benefits in the winter.

GOAL	ACTION
B4.1. Protect existing woodland resources through the development process.	Review and revise ordinances as needed to preserve relic oak woodlands within new developments. Woodland protection should include management and restoration
	Develop a comprehensive city tree preservation
	Encourage the use of native tree species in new
B4.2 Prepare for invasive species such as the Emerald Ash Borer.	Discourage planting of vulnerable species such as ash trees as replacement trees or as trees in new developments.

5. Urban Trees

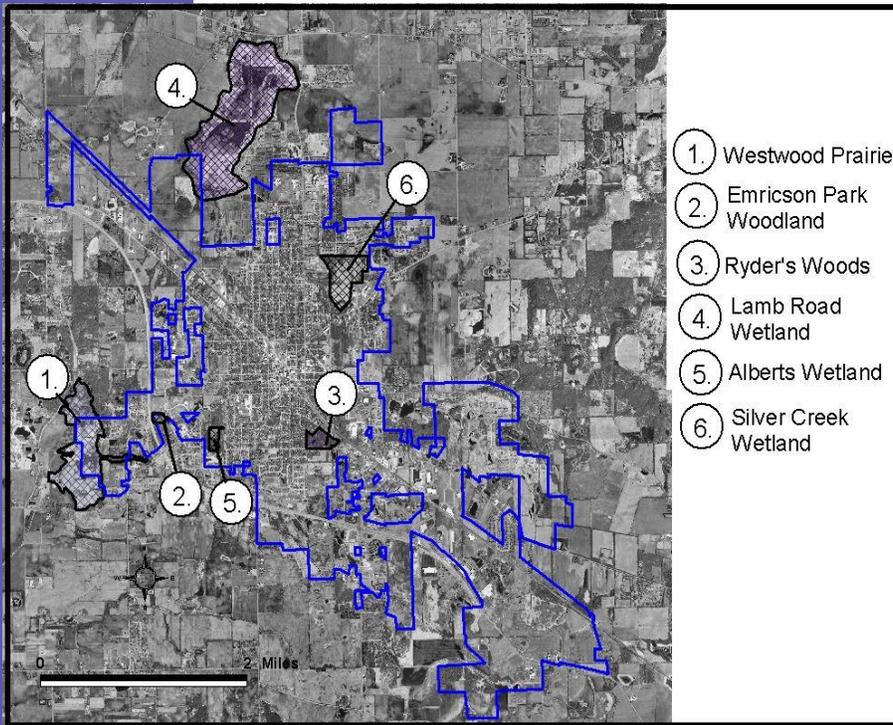
The presence of trees along our streetscapes, within public areas and on private property plays a vital role in the aesthetic image and environmental quality of life within the City of Woodstock. Trees are a capital asset, because they are continually working to improve our environment. They add beauty and create feelings of relaxation and well being. They provide privacy and a sense of solitude and security, as well as reduce noise.



There are many benefits of trees that can be obtained on a local scale. In addition to providing an aesthetic enhancement, trees filter air, water, and sunlight. They provide habitat to insects, birds and mammals and recreational areas for people. They help moderate the local climate by lowering air temperature, slowing wind and stormwater runoff, and shading homes and businesses to conserve energy. They are critical in cooling the urban heat island effect. Urban trees also help reduce glare and reflection. Trees within the City have economic sustainability and they increase property values.

Maintaining urban trees includes planning, protection, regular service, and care of existing trees. Existing healthy trees should be retained, including areas of forest cover within potential new developments. In addition, maintaining a healthy urban tree environment includes the development of long-term on-going tree planting ordinance, including tree re-planting incentives as well as removal policies.

GOAL	ACTION
D5.1. Promote maintenance of existing urban trees and the planting of native trees throughout the City.	Perform an inventory of existing urban trees.
	Develop a Comprehensive Tree Ordinance or Urban Tree Renewal Plan, including tree removal policies and invasive species mitigation.
	Establish a Tree Planting Program.
	Provide education materials for residents regarding native trees recommended for urban planting.
	Develop a “Champion Tree” Recognition Placard program to encourage appreciation of urban trees within the City.
	Enroll and/or update the City of Woodstock as a Tree City USA member.



6. Locally Significant Natural Resource Sites

Woodstock's natural sites within the city limits that have been identified to be worthy of protection, restoration, and management are illustrated on the map below. These sites are referred to as "Locally Significant Sites". The City owns five of the six sites identified: Emricson Park Woodland, Ryders Woods, Alberts Meadow, West Woodstock Prairie, and the Silver Creek Headwaters. The sixth site, which is privately owned, is the Lamb Road Wetland complex.

- 1.) Westwood Prairie - This area is identified on the City's comprehensive plan as Westwood Park and Conservation Area. It is one of the largest intact examples of a diverse prairie and wetland complex remaining in McHenry County. The site is also identified on the Illinois Natural Areas Inventory as a high quality wet-mesic prairie. It is a relict natural community of state-wide significance and automatically qualifies for dedication as an Illinois Nature Preserve - the highest level of legal protection status of any land within the state. The City already owns a significant portion of this wetland complex. A protection strategy for this site has been presented to the Environmental Commission by the McHenry County Aquatic Task Force.
- 2.) Emricson Park Woodland - The woodland located in the southwest corner of Emricson Park is a high quality example of the native woodlands that first greeted the earliest settlers to the Woodstock area. Unlike most woodlands of the region, which have been over-run by exotic invasive species, this woodland exhibits a high diversity of native plants, especially in the understory which provides an outstanding display of spring ephemeral wildflowers. Although relatively small, this woodland probably serves as the best surviving example of a healthy native woodland within the city limits. The site should be named, protected, and managed as a significant natural area.
- 3.) Ryders Woods - This native woodland suffers from lack of management, but offers great potential for restoration and wildlife habitat. The site consists of towering oaks and ephemeral ponds important for a variety of reptiles and amphibians. A restoration and management plan for the site should be developed and implemented.
- 4.) Lamb Road Wetland - This wetland complex is the largest wetland feature within the city's planning area. While it is severely degraded, the site could someday be much more than a municipal stormwater basin. Opportunities exist for large scale wetland restoration, waterfowl habitat management, water quality enhancement and perhaps even groundwater recharge.
- 5.) Alberts Meadow - This former sedge meadow wetland suffers primarily due to invasion by reed canary grass, an aggressive non-native grass introduced from Asia. Reed canary grass forms a monoculture over native wetlands, and once established, is

difficult to control. However, given the small size of this site, the potential for a successful restoration effort is relatively high. A restoration plan should be developed and implemented. An interpretive trail and boardwalk into Alberts Meadow should be established for use by residents and students of nearby Woodstock High School. Teachers and students should be actively involved in ecological restoration efforts at this site.

6.) Silver Creek Wetland - This wetland is located just downstream of Dufield Pond, which is the headwaters to Silver Creek, a tributary to Nippersink Creek. The large size and location near-headwater of this wetland make it an ideal site for an environmental demonstration area as it would have multiple downstream benefits. These benefits include improved wildlife habitat, improved water quality, and reduced flooding. However, the hydrology of this wetland is highly altered due to stream channelization and the likely presence of an underground tile system. Fortunately, many wetlands such this have been successfully restored via environmental engineering techniques. A re-meander of Silver Creek through bio-engineered swales and wetlands should be investigated. A recreational trail system could connect this environmental demonstration area to Bates Park and Marian Central High School.

GOAL	ACTION
B6.1. Provide long-term protection for Woodstock’s six Locally Significant Natural Resource sites.	Develop and implement a restoration-management plan for each site currently owned by the city (West Woodstock Prairie, Emricson Park Woodland, Ryders Woods, Silver Creek, and Alberts Meadow). Each plan should include management needs as a priority, as well as identifying user needs such as trails, benches and interpretive signs or displays.
	Identify a long-term protection strategy for the Lamb Road wetland.
	Apply for state and federal grants to promote acquisition, restoration, recreation, and management activities.
B6.2. Identify and protect other high quality natural communities within Woodstock.	Develop a GIS-based inventory of existing Locally Significant Natural Resource sites remaining within the City.
	Continue to work with conservation agencies and land trusts to manage Locally Significant Natural Resource sites*
B6.3. Educate the public about the remaining high quality natural communities.	Promote Woodstock’s Locally Significant Natural Resource sites in articles on the City’s website and in newsletters.
B6.4 Promote local volunteer stewardship as part of natural areas management.	Promote volunteer actions through the City’s website and in newsletters.
	Provide free refreshments to local volunteers.

C. Water Quality & Conservation

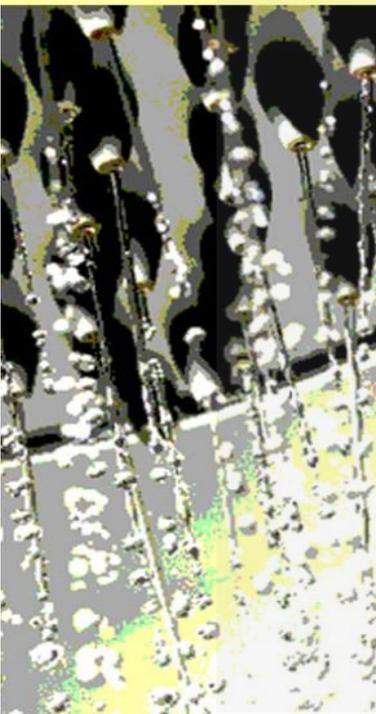
- 1. Groundwater**
- 2. Stormwater Management**
- 3. Wastewater Management**
- 4. Water Conservation**
- 5. Rain Gardens**

The City's residents and its flora and fauna all depend on water. Woodstock is fortunate to have had a renewable source of safe and reliable drinking water for generations. One of the earliest attractions was the "Spring House" that was built on the Woodstock Square in 1873. The Spring House drew visitors from around the region to obtain the legendary medicinal properties from our groundwater. Although several generations of residents have benefited from a consistent water supply, our groundwater resources must not be taken for granted if future generations hope to have the same benefits. Without careful planning and protection, increased population growth and development can adversely impact the quality and quantity of our water resources.

Fresh water comprises only 2.5% of the world's water and less than 1% of this is accessible for direct human use. Although Lake Michigan lies approximately 45 miles to the east, it is unavailable to Woodstock as a water source. Woodstock is fortunate to have access to freshwater through a shallow groundwater supply that is naturally recharged by rainfall and snowmelt. Our groundwater resources can be sustainably utilized for generations to come as long as precipitation levels remain consistent, the amount of water drawn from the ground does not exceed the recharge capacity of the soil, the recharge capacity of the soil is not diminished, and the groundwater remains unpolluted.

The headwaters of two of McHenry County's most important and environmentally sensitive waterways are located in Woodstock. The Kishwaukee River headwater is located on the southwest side of Woodstock and the headwater for Silver Creek, which flows into Nippersink Creek, is located on the northeast side of Woodstock. Land use decisions we make today can have a profound effect on the water quality and environmental health of these natural resources.

In the past, knowledge of natural resources was not well understood. Potential impacts to water resources were not considered when making land use decisions. As they developed, many cities around the country relied on non-renewable water resources or built beyond the sustainable capacity of their water supply. This has created a scarcity of water resources that we are just beginning to understand. Water resource planning is now absolutely necessary for cities to meet the needs of today's generation without compromising the ability of future generations to meet their own needs. The following sections will discuss water resources in greater detail and ways to protect and conserve Woodstock's most valuable natural resource.





1. Groundwater

McHenry County relies entirely upon groundwater resources for its drinking water. Groundwater is found in aquifers located at various depths below the earth's surface. The underground aquifers consist of saturated soils or porous rocks that are naturally replenished from precipitation that infiltrates downward through the soil. Groundwater can be a renewable resource if it remains free from contamination and the amount of water removed does not exceed the recharge rate of the groundwater. The two main sources of drinking water in McHenry County are found in deep sandstone aquifers that are located more than 1100 feet underground and shallow sand and gravel aquifers that are typically within 200 feet of the surface.

Due to their depth and the geologic materials above them, it can take thousands of years for surface water to recharge deep aquifers. Deep aquifers have historically provided high quality drinking water for many parts of McHenry County. However, the amount of groundwater being removed from the deep aquifers already exceeds the recharge rate so any

increased groundwater use in the County will have to rely on shallow groundwater resources. The shallow aquifers tend to recharge quickly due to the presence of permeable sand and gravel soils in much of McHenry County. The recharge rate of shallow aquifers will vary depending on the content of the sand and gravel in the soil but can be recharged in months or years rather than millennia. The porosity of these soils also makes shallow aquifers susceptible to groundwater contamination. Shallow aquifers also tend to have higher iron content than the deep aquifers and are more vulnerable to drought and the loss of recharge capacity from urbanization.

Woodstock relies solely on shallow groundwater drawn from wells that extend down between 90 and 200 feet into sand and gravel aquifers. Currently the shallow aquifers provide an adequate supply of drinking water, but groundwater resources in Woodstock and throughout the county are facing growing pressure from increased urban development. Urban development can have a combined impact on groundwater supply through the increased removal of groundwater to meet the demands of a growing population, the loss of recharge capacity from soil compaction, the increased use of impervious surfaces and the contamination of groundwater from pollutants.

The natural recharge of the groundwater table is also critical for protecting and enhancing Woodstock's wildlife and natural resources. While some rainfall flows from the land surface directly into our wetlands, lakes and streams, much of the rainfall percolates slowly through the soil into the shallow groundwater table. Slow moving groundwater seeps out over time providing a cool, clean and consistent supply of water to our wetlands and waterways that is necessary for a healthy habitat. The loss of groundwater recharge degrades the water chemistry in the natural areas and causes extreme conditions of flooding and drought between rain events. Since native plants and wildlife are not adapted to these extremes, invasive species thrive, resulting in degraded habitat and the loss of the variety of plants and animals native to this area.

For instance, much of the recharge area for the Boone Creek Fen, an Illinois Nature Preserve that contains demonstrably unique and irreplaceable high quality habitat, is located in Woodstock's planning area. Since it plays an ecologically vital role in maintaining water quality and quantity to the preserve, the groundwater recharge area

for the Boone Creek Fen has been designated as a Class III Special Resource Groundwater that receives special protections under the Illinois Groundwater Protection Act. The Class III groundwater recharge area for the Boone Creek Fen is shown on the Sensitive Aquifer Recharge Areas (SARA) map that is included as Appendix A. The SARA map was developed by McHenry County to: 1) identify areas with potential for aquifer contamination and recharge and 2) identify the most sensitive preserve and protect the recharge of our shallow aquifers to ensure sustainable yields for current and future generations.

In the past, issues such as recharge capacity or susceptibility for groundwater contamination were not considered when making land use decisions. With the City of Woodstock’s 2008 Comprehensive Plan and the Unified Development Ordinance (UDO), positive steps have been taken to protect the recharge capacity of the soil by minimizing soil compaction, protecting natural resources, increasing infiltration capacity, preserving open space and promoting smart growth and conservation design. However, there is much more that must be done today to ensure that groundwater resources will continue to be a reliable renewable resource for future generations.

GOAL	ACTION
C1.1 Protect groundwater quality and quantity for use by current and future generations as well as natural systems.	Adopt the McHenry County Sensitive Aquifer Recharge (SARA) map as a planning tool and include as a map unit in the Comprehensive Plan.
	Coordinate with current efforts of McHenry County to map and model the groundwater recharge areas within Woodstock’s planning area.
	Establish Wellhead Protection Areas (WHPA) under the <i>Illinois Groundwater Protection Act</i> which gives local governments the authority to protect groundwater recharge areas and community wellhead zones via ordinances and zoning controls.
	Explore the viability of adopting a Regulated Recharge Areas and develop a Recharge Area Suitability Assessment policy (<i>under Section 617.125 of Title 35: Environmental Protection, Subtitle F: Public Water Supplies, Chapter I: Pollution Control Board, Part 617, Regulated Recharge Areas</i>). A regulated recharge area is an area that needs extra protection to prevent groundwater and public well water contamination. The recharge area suitability assessment is a process to assess potential environmental impacts that a new facility would have on the regulated recharge area.

2. Stormwater Management

Stormwater runoff is water from rain or melting snow that “runs off” across the land instead of seeping into the ground. Runoff usually flows to lower areas making its way to the nearest water bodies such as wetlands, streams, creeks, rivers or lakes. Woodstock is fortunate to contain numerous wetland areas and the headwaters of two major water bodies, the Kishwaukee River and Silver Creek (which flows into Nippersink Creek). Urban development increases the amount of roofs, roads, parking lots, sidewalks on the land. These surfaces are impervious and do not allow rainfall to infiltrate into the soil surface, so more of the rainfall becomes stormwater runoff. The increased volume of water running over impervious surfaces can lead to flooding, erosion, and water quality problems.

As stormwater flows over urban land, pollutants such as sediment, nutrients, road salts, heavy metals, pathogenic bacteria and petroleum hydrocarbons are carried into the receiving water body. Contaminated or polluted stormwater can lead to significant water quality problems including:

Sediment clouds the water—making it difficult for aquatic plants to grow and destroying aquatic habitats.

Excess nutrients cause algae blooms that deplete oxygen levels. Fish and other aquatic organisms can't live when oxygen levels decrease.

Bacteria and other pathogens create health hazards.

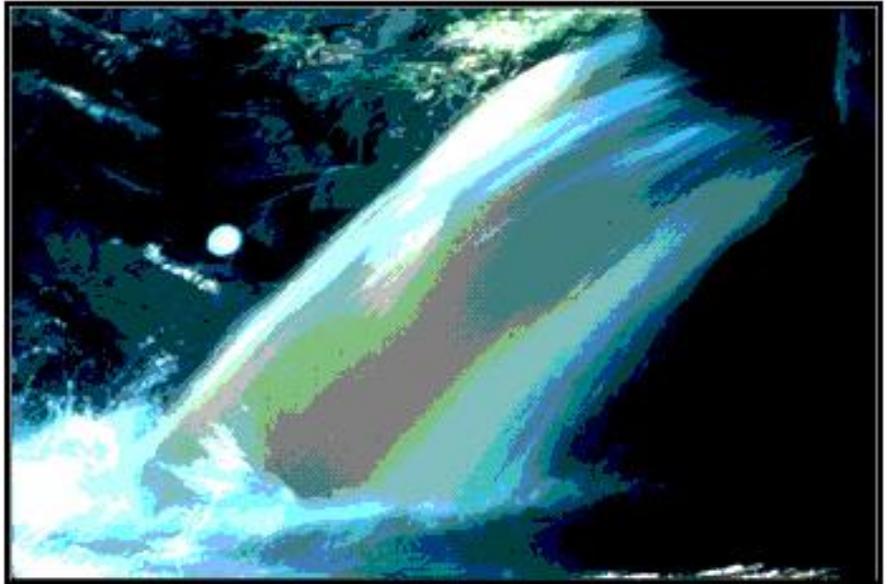
Debris washed into the water can choke, suffocate or disable aquatic life (ducks, fish, turtles and birds).

Household hazardous wastes (insecticides, pesticides, paint, and auto fluids) can poison aquatic life.

Polluted stormwater often affects drinking water sources—human health is at risk and water treatment costs rise.

Woodstock has taken initial steps to prevent water pollution, protect waterways and manage stormwater by adopting the McHenry County Stormwater Management Ordinance. The ordinance promotes the use of Best Management Practices (BMPs) and requires protective buffers around wetland areas. BMPs are management standards and techniques used to control stormwater runoff, protect water bodies and prevent soil erosion and water pollution. The actions Woodstock has taken are good first steps but to protect our quality of life from increased urbanization the City must continue to improve and enforce its stormwater management standards. There also many actions the residents of Woodstock can take to manage stormwater on their own properties.





WATER QUALITY & CONSERVATION

GOAL	ACTION
<p>C2.1 Limit surface water runoff and reduce water runoff pollution.</p>	<p>Adopt the Kishwaukee River Watershed Plan – 2008 Subwatershed Plan.</p>
	<p>Adopt the Nippersink Creek Watershed Plan.</p>
	<p>Strengthen the Stormwater Management Ordinance to require the use of constructed wetland detention basins with native vegetation on all projects that require detention. Examine additional incentives/options to promote the use of natural drainage Best Management Practices (BMPs) and distributed small scale controls, including, but not limited to: naturalized landscaping, bio-swales and rain gardens. Explore options to improve wetland protection by limiting “buffer averaging” and the installation of detention basins within the wetland buffer.</p>
	<p>Promote the retrofit of existing conventional stormwater systems with naturalized BMPs.</p>
	<p>Install/identify demonstration sites on public or private property within the city (raingardens, rainbarrels, BMPs etc.).</p>
	<p>Provide educational programs and materials on stormwater pollution prevention practices.</p>
	<p>Encourage property owners, thru City developed handout/ brochure to practice rainwater harvesting, use natural drainage areas, replace impervious surfaces with natural, permeable surfaces and use natural conveying of stormwater runoff. Include recommendations as part of building permit process.</p>

3. Wastewater Management

Sewage treatment is the process of removing regulated contaminants from wastewater. It includes physical, chemical and biological processes to remove contaminants. Its objective is to produce a waste stream (or treated effluent) and solid waste or sludge also suitable for discharge or reuse back into the environment. The final effluent can be discharged into a stream, river, lagoon or wetland, or it can be used for the irrigation of a golf course, green way or park. If it is sufficiently clean, it can also be used for groundwater recharge.

In Woodstock, our sewage starts out as clean groundwater that is pumped from our shallow aquifers, treated to drinking water standards and then used by our residences, institutions, and commercial and industrial establishments. The used water is then pumped to one of our two wastewater treatment plants and treated to legally acceptable standards before the effluent is discharged as a waste product into the headwaters of either the Kishwaukee River or Silver Creek. After the investment of an enormous amount of Woodstocks economic, social and environmental capital, the water resource we have used is treated and is flushed downstream where it becomes someone else's problem. As water resources become scarce, many communities view wastewater as a resource rather than a waste product.

While improvements have been made in updating the municipal treatment plant technology and the quality of the wastewater effluent that is discharged, to move toward sustainability the City should investigate innovative ways of recapturing energy from the wastewater, removing more pollutants from the waste stream and to returning the water to its source.

GOAL	ACTION
C3.1 Utilize treated effluent as a valuable water resource.	Examine water reuse options and alternative wastewater technologies such as land application, irrigation and industrial reuse to promote the reuse/infiltration of water.
	Explore additional and cost-effective options for use of sludge.
C3.2 Promote the recapture of nutrients and energy from centralized wastewater treatment facilities.	Investigate use of bio-gas recapture or other renewable energy sources (solar, solar thermal, wind, etc.) to improve efficiency and operating costs.
C3.3 Improve water quality of effluent.	Explore the use of a constructed wetland for effluent polishing at the north plant.
	Explore methods to monitor and treat for non-regulated pollutants.
	Educate public on proper disposal of pharmaceuticals and hazardous materials. Explore opportunities to co-sponsor hazardous household waste drop-off programs.
	Publish a list of household items that contaminate the domestic wastewater stream.

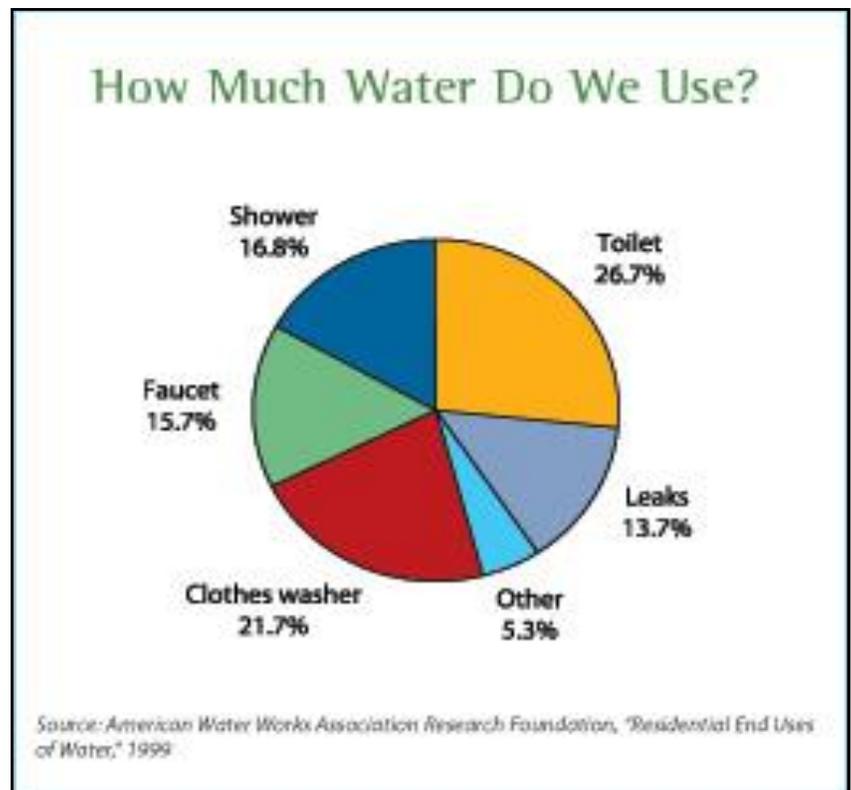
4. Water Conservation

The City currently has adequate groundwater resources available to meet its needs. However, water resources are limited, our population is growing and the shallow groundwater we rely on is particularly sensitive to drought and pollution. Over pumping of the groundwater table can increase the potential for contamination and permanently reduce the aquifers capacity to hold water. To ensure that can meet our current needs and provide for future growth, conservation efforts must be implemented.

According to the Environmental Protection Agency, the average American family of four can use up to 400 gallons of water per day. Most of that water is used indoors and the bathroom is the largest consumer of indoor water. Toilet use alone can account for up to 27 percent of household water. It is also estimated that almost 40 percent of all of the water we currently use is for watering lawns and washing cars. There are tremendous opportunities for Woodstock to implement water conservation efforts and reduce water consumption. Water conservation is the most cost-effective and environmentally sound way to reduce our demand for water. Conservation efforts stretch the supply of water and allow an increasing population to use less water. For instance, Los Angeles has increased its population by over a million people since 1970 but through conservation efforts is using the same amount of water today.

There are many effective ways that the City and its residents can implement water conservation efforts. The starting point should be to conduct a water audit of home or businesses to calculate water use and identify what conservation measures can be most effective.

Water conservation is a sustainable strategy that allows for both population and economic growth while meeting the increased demands for water. As competition for water increases in McHenry County and supply becomes more uncertain, implementing conservation measures will help ensure the City of Woodstock's economic viability in the decades to come while preserving its environment.



WATER QUALITY & CONSERVATION



GOAL	ACTION
<p>C4. Promote water conservation. Develop and provide necessary resources to aid individual and collective water conservation efforts.</p>	<p>Conduct a water audit on municipal facilities.</p>
	<p>Prioritize repairs and retrofits based upon the findings of the audit.</p>
	<p>Establish a baseline of water use data and use to set targets for water use reduction.</p>
	<p>Provide incentives to promote the use of natural landscaping and rain barrels.</p>
	<p>Incorporate stronger water efficiency standards into the building code.</p>
	<p>Encourage and provide incentives regarding the use of high efficiency water fixtures in residential, commercial and industrial buildings.</p>
	<p>Work with schools to promote educational programs and materials on water conservation including the EPA Water Sense program.</p>
	<p>Work with local retailers to promote the EPA Water Sense program and products.</p>
	<p>Explore the use of a tiered rate structure or conservation pricing strategies for municipal water.</p>
	<p>Continue to publish water conservation tips on a regular basis within the City Scene, on the City's Environmental Webpage and other publications.</p>
<p>Evaluate the need for creating outside water use policy.</p>	

5. Rain Gardens

Rain gardens are low-maintenance landscaped areas specially designed to contain, filter and soak up stormwater runoff from rooftops, patios, driveways or basement sump pumps. Rain gardens are most often planted in shallow depressions and are located where they can capture the outflow from a downspout or a sump pump discharge.



Native plants are best suited for rain garden plantings because their deep roots help to sustain the plants through periods of limited rainfall. Using native plants in these gardens also increases wildlife habitat.

There are many benefits to creating and maintaining rain gardens. Capturing and treating stormwater on site through natural infiltration decreases the volume of water that must be handled through the storm

sewer system and can minimize flooding from heavy rainfall all while boosting groundwater levels. Because the water captured by rain gardens infiltrates into the ground in a day or so, the opportunity for mosquito breeding is minimized.

The City has begun a program to plant rain garden demonstration sites which serve as a source of inspiration to all residents who discover them and encourages the public in developing rain gardens.

GOAL	ACTION
C5.1 Educate the general public on the benefits of rain gardens.	Use demonstration sites, post articles in the Woodstock City Scene, and conduct classes at the library or other venues.
C5.2 Encourage the development and utilization of rain gardens by making material resources widely accessible.	Ensure that the demonstration sites are properly maintained.
	Post source lists for native plants or local landscapers offering natural landscaping services on the City website.
	Partner with the McHenry County Soil and Water Conservation District (SWCD) to sell rain garden kits to residents through the SWCD's annual plant sale.
C5.3 Increase the number of rain gardens.	Establish recommended performance standards for rain gardens.
	Create construction codes based on those evaluations which encourage the creation of rain gardens in new construction.

D. Resource Conservation

- 1. Ecological Footprint**
- 2. Climate Change**
- 3. Solid Waste Reduction**
- 4. Household Hazardous Wastes**
- 5. Air Quality**

Not long ago it was thought that the easiest way to get rid of wastes was to simply dump them into the most convenient place, whether that was the air, the ground or perhaps a body of water. Today, we realize that the atmosphere we depend on for life is not an inexhaustible resource, that landfills and reckless growth can be a serious threat to our county's drinking water supply, and that other resources may be conserved through reuse or recycling for the benefit of future generations.

Nature uses a circular flow of resources where all the parts of the resource stream are in balance; raw materials are consumed at rates that allow for their recharge or replacement, and the waste products of one creature are used as the building blocks of another. We currently use a more linear flow of resources where raw materials are extracted and transformed into products whose ultimate destination is a landfill, the air or the water. In a natural circular system, growth and development replenishes, restores and nourishes the world while our current linear system relies on the progressive degradation of resources. There is growing recognition that a circular flow of resources can be incorporated into our industrial and economic models, ultimately leading to a system that enriches nature's ecosystem services while maintaining a healthy standard of living.

Woodstock has the opportunity to change behaviors that degrade the earth's resources and adopt new ones that enrich the world. As individuals and a community we can determine new ways to improve existing recycling systems, assess where waste and pollution could be reduced or eliminated, and to identify potential resources that are currently being discarded. To be a sustainable community, Woodstock should look at innovative ways to help its citizens not only reduce and properly dispose of their waste but create incentives for economic development which capitalizes on the reuse of waste into something new and beneficial for the community and the environment.





1. **Ecological Footprint**

The Ecological Footprint is an economic planning tool that measures the use of natural resources within a specific population group compared to the earth’s ability to regenerate them. The Ecological Footprint is widely used to evaluate the impact of groups such as countries, cities, individuals and businesses. The population’s Footprint is the area of biologically productive land, fresh water and marine habitat required to produce the resources (food, energy, fiber and materials) that the population consumes and to absorb the wastes that the population produces, over the course of a year. When our Footprint is within the annual regenerative abilities of nature, our Footprint is sustainable. The consumption of resources beyond regeneration rates is called “overshoot” and is not ecologically sustainable.

It is estimated that the Earth has 26.7 billion acres of biologically productive space or 4.5 acres per person. To maintain the earth’s regenerative capacity and global biodiversity many experts recommend that at least 50% of this area be set aside for wildlife and natural area, providing a total available Footprint of 2.25 acres per person. Currently, the global average footprint is 5.4 acres per person and the average Footprint in the U.S. is 24.3 acres per person. We maintain this overshoot by liquidating the planet’s resources. By liquidating our ecological assets the earth’s natural capital is drawn down, leaving progressively less natural resources for future generations of all life. A principal goal of the Ecological Footprint tool is to provide a high quality of life within Earth’s limits by measuring a population’s consumption rates, identifying where improvements can be made, and tracking the population’s progress.

The Ecological Footprint provides a compelling way to analyze numerous environmental impacts within the context of ecological sustainability. The Footprint can be used in Woodstock to explore the sustainability of issues such as land use, energy consumption, waste/recycling, food production, transportation and housing. The data can then be used to measure and manage resources within the city. When considering our Footprint it is worthwhile to examine it within the context of global sustainability. Is the city’s Footprint above or below the world average? If everyone on the planet had the same Footprint as the average Woodstock resident, would this be sustainable? Is our footprint getting bigger or smaller? Where can the greatest progress be made? The Ecological Footprint can help answer these questions and provide Woodstock’s officials and residents with the information needed to reduce our Footprint and live sustainably.

GOAL	ACTION
D1.1 Identify the Ecological Footprint for the city of Woodstock and the per capita Ecological Footprint.	Conduct, with appropriate partners, a study of the City’s Ecological Footprint. Ideally, this would be a grant-funded study.
	Make the study available to the public via the City’s website, City Scene and other appropriate publications.
D1.2 Reduce the Ecological Footprint for the City of Woodstock.	Educate the community on reducing their Ecological Footprint.
	Utilize the Ecological Footprint model to identify methods of reducing the Footprint.
	Conduct a follow-up study to evaluate City’s progress.

2. Climate Change

Greenhouse gases are part of a natural biogeochemical system which relate directly to the characteristics of our atmosphere and consequently to global and regional climates. Greenhouse gases are gases in the atmosphere that trap energy from the sun and thereby heat the atmosphere.

Greenhouse gases originate from both natural and human sources and include water vapor, carbon dioxide (CO₂) from the burning of fossil fuels, methane from agricultural sources, and nitrous oxide from industrial sources. Concentrations of greenhouse gases have fluctuated in the past. Human activity since the start of the industrial revolution has increasingly released greenhouse gases into the atmosphere. Increasing rates of deforestation and development have also produced growing amounts of carbon dioxide. In the last 50 years, levels of CO₂ in the atmosphere have risen 25 percent and levels of methane have more than doubled.

Global and regional climates have historically fluctuated over time. It is possible human-induced influences are having a global effect on our natural systems with a potential for accelerated climate change. The potential effects of accelerated climate change may be substantial and will vary throughout the world. Some predictions indicate the potential for climate change in the upper Midwest portion of United States may result in more frequent and intense heat waves as well as increased storm intensity and greater periods of drought.

There has been and continues to be research performed in an effort to predict potential climate change impacts and to determine the potential causes and effects of climate change. As the implications of an accelerated change in our climate may be severe, evaluating human-induced parameters and potential mitigation of human-induced parameters has been incorporated into the environmental plan of various cities, states and countries throughout the world.



There is a desire to evaluate how to take action to reduce or mitigate the potential effect of a human-induced influence and to develop a plan for how to respond or adapt to potential changes. By changing the way we consume energy resources we have the ability to reduce greenhouse gas emissions. Several states, including Illinois, are supporting programs to cap greenhouse gas emissions. Companies have found ways to reduce their energy use, reuse industrial byproducts and switch to renewable energy sources. Individuals are making consumer choices such as improving the energy efficiency of their homes, purchasing energy efficient appliances, switching to energy-saving light bulbs and opting for more fuel-efficient cars.

Much of Woodstock's greenhouse gas emissions come from buildings or from the energy production needed to serve them. Another main source comes from transportation and the burning of fossil fuels to operate cars, trucks, buses, and trains. Most of the remaining greenhouse gas emissions come from agricultural activity, solid waste and wastewater treatment and industrial pollution.

One method of determining greenhouse gas emissions is to determine the carbon footprint of an individual, a city or a regional area. Carbon footprint is defined as the total amount of greenhouse gases produced to support human activity and is

usually expressed in tons of carbon dioxide emitted per year. The calculation includes methane and ozone emissions which are converted to carbon dioxide. After determining the carbon footprint of an area, it is possible to evaluate methods of reducing greenhouse gas emissions and lowering the carbon being generated.

Many of the topics discussed throughout this Plan will aid in the reduction of greenhouse gases. These include natural landscaping, best management practices, greenways, rain gardens, water conservation, solid waste reduction, energy efficiency, renewable and alternative energy, encouraging green building technologies, increasing mass transit options, the Urban Tree Renewal Plan and bike/pedestrian transportation.

GOAL	ACTION
D2.1. Reduce greenhouse gas emissions and lower the carbon footprint of the City.	Conduct a detailed energy audit for all municipal buildings to identify areas to reduce greenhouse gases.
	Calculate the carbon footprint of the City.
	Conduct educational sessions with citizens on ways to reduce their carbon footprint.
	Develop a Climate Action Plan for the City.

4. Solid Waste Reduction

Solid waste is an important issue for all residents of Woodstock. Because there are no solid waste landfills in McHenry County, all solid waste that is generated by our residents must be transported by truck to locations outside the county. This transportation creates air pollution through truck emissions, the costs of transportation continue to rise, and our ability to dispose of our waste is dependent upon the ability and willingness of neighboring counties to accept such wastes. For all of these reasons, it is extremely important that all residents and businesses take steps to reduce the amount of waste that they create.

The three fundamental approaches to reducing waste are 1) to avoid creating waste ;2) to recycle or compost as much waste as possible; and 3) to purchase more products made from recycled materials in order to strengthen commodities markets for recovered materials.

There are many approaches to avoiding the creation of waste. One concept known as zero waste has gained increasing acceptance of late. The guiding principles of zero

waste are managing resources instead of waste, conserving natural resources through waste prevention and recycling, turning discarded resources into jobs and new products instead of trash, promoting products and materials that are durable and recyclable, and discouraging products and materials that can only become trash after their use. The City of Woodstock, as a sustainable city, can be ultimately responsible for establishing criteria needed to eliminate waste, for creating the economic and regulatory environment in which to achieve it, and for leading by example.



Taking examples from others can help the city get started.

Residential curbside composting programs for food and landscape

waste have been implemented in large cities like San Francisco as well as small cities like Perth, Ontario. The city of Geneva, IL creates incentives by charging by the bag for garbage disposal, but takes away recyclables for no charge.

Construction is another area which creates a large amount of solid waste. One estimate puts the amount of waste from constructing a typical 2,000-square-foot house at 8,000 pounds. Materials such as packaging, new material scraps, old materials and debris constitute potentially recoverable items. In renovation, appliances, masonry materials, doors and windows all offer recoverable potential.

By expanding the use of recycling at construction/remodeling sites, the community benefits in several ways. Although initial recycling may command an additional cost, some, if not all, of the cost may be recouped either in direct or indirect ways. Reduction in landfill use and direct sale of wastes are the most prevalent and direct ways to offset

costs. Indirect benefits range from the reduction of some raw materials/usage to reduction of prices in the secondary market for used products.

Even though direct values of recycling materials may be difficult to assess, no doubt can be given as to the value of preserving and revising our dwindling natural resources.

GOAL	ACTION
<p>D4.1 Reduce amount of waste generated to minimize transportation costs, air pollution, and dependence on external disposal.</p>	<p>Explore adopting a zero waste ordinance by evaluating the program in Boulder, CO.</p>
	<p>Evaluate the adoption of an ordinance banning or taxing single-use plastic grocery bags.</p>
	<p>Discourage the use of plastic water bottles and promote reusable or compostable materials at city-sponsored meetings and other functions.</p>
	<p>Educate residents to be more sustainable consumers by linking to the Green Guide on the City website.</p>
	<p>Evaluate the feasibility of adopting municipal composting to reduce the amount of household waste sent to landfills.</p>
<p>D4.2 Increase recycling and reuse of goods, construction materials, and yard waste.</p>	<p>Expand the current curbside recycling program to cover other recyclables, small business and multifamily housing.</p>
	<p>Sponsor periodic specialty recycling drives, including electronics.</p>
	<p>Create a used appliance pick-up service and use them in City renovation projects.</p>
	<p>Develop incentives for large businesses & builders to increase and maintain their own recycling.</p>
	<p>Encourage homeowners to compost on a home scale through education and publicity.</p>



5. Household Hazardous Wastes

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be household hazardous waste. Everyday products, such as paints, cleaners, oils, batteries, and pesticides, that contain potentially hazardous ingredients require special care when you dispose of them.

Improper disposal of household hazardous wastes can include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash. The dangers of such disposal methods might not be immediately obvious, but improper disposal of these wastes can pollute the environment, contaminate groundwater, damage septic systems or wastewater treatment plants, and pose a threat to human health.

The Environmental Protection Agency (EPA) recommends the following hierarchy for handling household hazardous wastes:

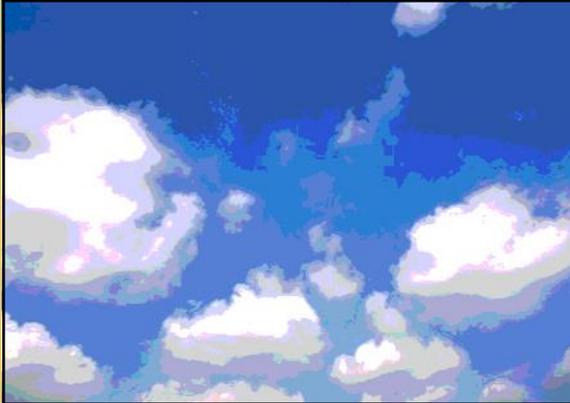
1. **Reduction and recycling** of household hazardous wastes conserves resources and energy that would be expended in the production of more products.
2. **Reuse** of hazardous household products can save money and reduce the need for generating hazardous substances.
3. **Proper disposal** prevents pollution that could endanger human health and the environment.

Since household hazardous wastes can be difficult to properly dispose of for the typical homeowner, as well as the low level of awareness of the need for proper disposal results in household hazardous wastes discarded with regular garbage or poured down drains or storm sewers. This puts waste collection and sewage treatment plant workers at risk of exposure, and allows toxic materials to enter our streams and rivers. Many communities throughout the country have started special collection days or developed permanent collection sites to handle household hazardous wastes. To reduce risks to workers and environmental contamination, the City should explore options to educate residents and provide improved handling of household hazardous wastes including more frequent special collections or regular pickup of household hazardous wastes at curbside and for producer responsibility initiatives such as depots for used batteries at retail outlets.

GOAL	ACTION
D5.1 Reduce risk of hazardous waste exposure to sanitation workers and environmental contamination.	Educate residents on the dangers of household hazardous wastes and methods to reduce, reuse, recycle and properly dispose of materials.
	Provide improved handling of household hazardous wastes including more frequent special collections or regular pickup of household hazardous wastes.

6. Air Quality

Achieving and maintaining good air quality is crucial to the public health and economic vitality of Woodstock. The surrounding air, both outdoors and indoors, has the potential to affect human health, attitudes, productivity, and people’s ability to enjoy their lives. It is important to maintain the quality of the outdoor air since all life forms depend on it, and since the quality of indoor air is dependent on that of the outdoors.



To protect air quality, it is important to promote practices that reduce air pollution from mobile sources such as automobiles and lawn mowers, and promote transportation alternatives. The American Lung Association’s State of the Air: 2007 graded McHenry County’s air quality as C for both ozone and particle pollution. The amount of pollution emitted by a lawnmower operating for one hour is equivalent to the amount of pollution emitted by a car driven for approximately 20 miles. The City should implement development alternatives that protect air quality, provide adequate transportation options and alternatives to automobiles, participate in state clean air programs and host local clean air events.

GOAL	ACTION
D6.1 Curb air-polluting emissions by providing alternatives to and/or reducing automobile travel and other gasoline-powered motor use.	Revise ordinances to encourage compact, mixed-use, transit and pedestrian-oriented development.
	Explore program’s such as the Clean Air Counts Lawn-Care Buyback grant program to replace gas-powered lawnmowers.
	Encourage natural landscaping in lieu of turf grass lawns to reduce the need for mowing.
	Evaluate and implement, where feasible, telecommuting options, rideshare and transit reimbursement programs, compressed workweeks, and flexible schedules for city workers.
D6.2 Reduce existing airborne pollutants.	Plant trees and protect / increase green space to improve air quality.
	Become a Clean Air Counts community.
D6.3 Deter further pollution from carcinogenic compounds like VOCs (methane, benzene, formaldehyde, toluene and	Provide information/educational materials to residents on contaminants and indoor air quality.
	Maintain and enforce ordinance banning leaf and landscape debris burning.

E. Transportation

- 1. Bike and Pedestrian Transportation**
- 2. Mass / Public Transit**
- 3. Vehicle Trip Reduction**

Transportation systems form the circulatory system of Woodstock and define how we connect to the outside world. While the private automobile is the overwhelming transportation mode of choice, increased motor vehicle traffic has led to congestion and a decline in our region's air quality. Sustainable transportation policies seek to reduce dependence on fossil fuels and single-occupancy motor vehicles. A preferred approach is to promote a broader range of transportation options including self-propelled transportation, public transit, ride-sharing and car-pooling, and clean powered vehicles.



1. Bike and Pedestrian Transportation

The importance of developing an attractive and inviting bicycle and pedestrian system is a key element in preserving Woodstock as a place where people want to live, work, and visit. The increased use of bicycling and walking for both local transportation and recreation can create a more sustainable environment by reducing traffic congestion, vehicle exhaust emissions, noise, and energy consumption. Residents who replace local motor vehicle trips with human powered transportation, whether on foot, bike or stroller, also experience improved health benefits that may result in lowered health care costs. The economic benefits from reduced fuel costs, vehicle maintenance costs and health care costs provide additional opportunities for residents to build savings, purchase local goods and services or reinvest in their communities.

The critical elements in developing a safe and inviting bicycle and pedestrian transportation system include education, enforcement, engineering and funding. Education must be targeted not only towards the bicyclist and pedestrian but also towards the motorist regarding the rights and responsibilities of the bicyclist, pedestrian and automobile driver.

Enforcement of traffic laws for motorists, bicyclists, and pedestrians is necessary to discourage dangerous actions and promote safe driving behavior. Engineering includes the planning and development for bike and pedestrian-routing and infrastructure including:

1. On-road facilities (expanded shoulders, bicycle lanes, bicycle routes, line striping, signs, traffic calming).
2. Off-road facilities (multi-use paths, rail trails, bicycle parking).
3. Pedestrian facilities (sidewalks, cross walks, paths, pedestrian amenities).

A strategy for obtaining grants and other funding sources must also be implemented to realize the necessary physical and programmatic improvements.

GOAL	ACTION
E1.1 Create more opportunities for safe and inviting bicycle and pedestrian transit.	Create a Bicycle Transportation Plan for the city.
	Offer pamphlets via the web and in bike shops, train stations and gas stations to educate travelers regarding the rights, risks and responsibilities of each travel mode.
	Increase the availability of bike racks and “rest area” type amenities around the city.
	Investigate grants and develop partnerships for building pedestrian bridges, bike lanes, and trails/sidewalks.
	Identify and connect existing pedestrian pathways.
E1.2 Promote benefits and intrinsic value of using alternate modes of transportation.	Sponsor City events that actively engage people in experiencing the benefits and enjoyment of human-powered transit.



2. Mass / Public Transit

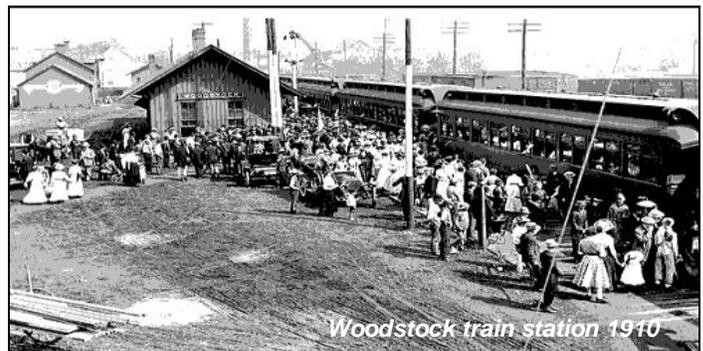
Public transportation is an important element of any sustainable community. Convenient and well-planned public transit can serve to reduce the number of private car trips and thereby reduce air pollution, congestion, wear and tear on roadways, and our dependence on oil. Providing transportation options enhances the quality of life for residents and visitors.

Woodstock has a major public transit asset - the Metra rail service to Chicago - and the anticipated expansion of this service will be a boon. Pace offers limited service to other communities, and a Dial-A-Ride program is funded by the city.

The City should continue to support the expansion of Metra train service, and should look for opportunities to increase bus service where possible. For example, shuttle service from the train station to major industrial parks and retail centers would encourage employees of those companies to commute by train.

The City also should investigate ways to strengthen bus service within the City to areas such as local parks, the Square and other retail areas.

GOAL	ACTION
E2.1 Support expansion of mass-transit options.	Identify high-congestion and/or densely-populated areas in need of services.
	Identify gaps in existing public-transit chains. Example: train to bus to trails/sidewalks.
	Work with PACE to explore expanded service and provide signage and route information.
	Work with Metra to increase train service.
E2.2 Aid efficiency of existing mass-transit options.	Create ride –share parking areas.
	Create bus drop-off and pickup/pullover areas.
E2.3 Create / Promote Mass-Transit options and benefits.	Publicize environmental and economic benefit of mass transit.
	Maintain webpage with links to local mass-transit services.



Woodstock train station 1910



3. Vehicle Trip Reduction

Woodstock should take steps to encourage a reduction in the number of vehicular trips within the city and its immediate area. Reducing vehicle trips leads to a reduction in emissions, reduces wear and tear on the roadways and reduces congestion on city streets. Vehicle trips can be reduced through car share programs, ride share programs and through the efficient planning of vehicle trips.

GOAL	ACTION
E3.1. Encourage carshare programs such as Zipcar.	Offer preferential parking at the commuter station and at key locations such as the Square for carshare vehicles.
E3.2 Encourage rideshare programs.	Offer preferential parking at the commuter station and at key locations such as the Square for rideshare vehicles.
	Consider providing a space on the City's website to promote rideshare programs and allow residents to interact.
E3.3 Reduce unnecessary vehicle trips through better planning.	Use the City Scene and the website to educate citizens on the benefits of combining errands and other trips.
	Encourage the school district to consider alternate bus schedules for before and after school activities to reduce the number of students who must be picked up from school.

F. Sustainable Economic & Public Policy

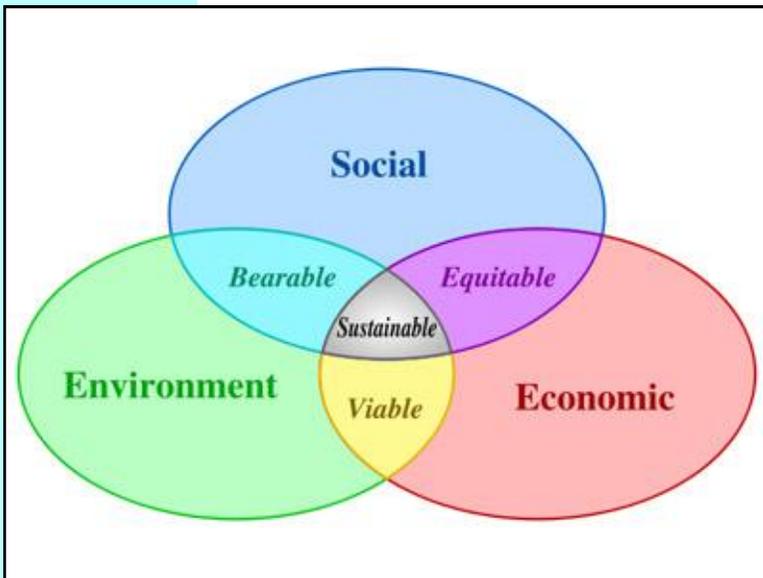
- 1. Triple Bottom Line**
- 2. Environmentally Preferred Purchasing**
- 3. Green Jobs**
- 4. Agri-tourism and Ecotourism**

For the first time in history the majority of the world's population now lives in cities. Approximately 80 percent of the world's products and materials are consumed in these expanding cities. As they grow in size their impact on both the local and global environment can also increase significantly. A city's policies and practices can dramatically influence how the community uses resources. By implementing environmentally responsible public policies cities can promote sustainable economic development while reducing negative impacts on natural resources.

Between 1980 and 2007, the City grew 110 percent, from a population of 11,725 to 24,658, and will likely continue to experience rapid growth in the future. Such population growth presents both challenges and opportunities for the long-term health and sustainability of a city. For Woodstock to be sustainable the residents, businesses, government and workers must strive to balance their environmental, social and economic needs to ensure a safe healthy and productive environment for all members of the community for generations to come.

Economic growth cannot be conducted at the expense of environmental health, and that economic growth and environmental sustainability are intimately related. The City has already taken actions toward sustainability by enacting the Conservation Design standards in the City's Unified Development Ordinance (UDO) and the creation of the Woodstock Environmental Commission that has prepared this Plan. By implementing the following sustainable policies and practices Woodstock can further enhance the communities economic, social and environmental capital by reducing impacts on natural resources, expanding green businesses, attracting green jobs, and increasing demand for environmentally responsible products and services.





1. Triple Bottom Line

The City of Woodstock is composed of many interconnected attributes including its buildings, parks, schools, businesses, environment, labor force, natural areas and transportation options. These are forms of community capital that can be broken down into three broad categories: Environmental, Social and Economic. Decisions that impact any of these forms of capital can either enhance or diminish the overall health of the City and the quality of life for its current and future residents.

A decision that diminishes a community's environmental or social capital for short term

economic gain may detract from a community's quality of life and will also likely require future economic investment to compensate for the lost resources, ultimately creating a loss of all forms of capital. For instance, a decision to allow a development to pave over a groundwater recharge zone may provide short-term economic gains. However, economic capital will likely be required in the future to compensate for the lost groundwater recharge capacity thereby creating a net loss in a community's environmental and economic capital as well as diverting resources that otherwise could have been used to enhance their social resources. These unaccounted for losses can be described as external costs – they were not included in the original factoring for the cost to society.

Instead of making decisions based solely on the financial bottom line, the Triple Bottom Line (TBL) approach is used in decision-making which considers the impact a decision may have on three bottom lines: environmental, social and economic. The TBL has been adopted by many businesses, governments and organizations that seek to simultaneously improve the quality of life for all members of their community, to promote a healthier environment, and to operate profitably. For this reason the TBL approach is sometimes referred to as the three P's of People, Planet, and Profit.

Like the "Planning Model" discussed in the Woodstock Comprehensive Plan (Chapter 11), the TBL approach seeks a balance between the environmental, social and economic forms of capital. These approaches are not intended to restrict growth but to encourage sustainable development that not only protects but also enhances each form of capital. Sustainable development may occur when all three forms of capital are in balance. To be effective, the TBL approach must be integrated into the decision making process. For Woodstock, the TBL approach can provide a framework for the City Council and City staff to make decisions that promote sustainability by considering the social, environmental and economic impacts of actions in all City business. This includes City decisions and actions taken in planning, policies, services, operations and approvals.

A variety of approaches have been developed by the businesses and governments that have adopted the TBL. Perhaps the simplest and most useful approach for the City is the development of a series of standard questions aimed at identifying potential positive or negative impacts to the cities Environmental, Social and Economic capital. The questions can be incorporated into a checklist that can be used to evaluate the TBL of a particular action or decision.

GOALS	ACTION ITEMS
F1.1 Incorporate the Triple Bottom Line into the City’s corporate policies, actions, reporting and implementation procedures.	Using TBL principles, establish a set of “Guiding Questions”.
	Develop a means to measure and evaluate the social, environmental, and economic impacts of decisions on the community.
	State that the goal of the TBL Policy is to protect and enhance the Cities social capital, environmental capital, and economic capital for both current and future generations.

2. Environmentally Preferable Purchasing

Environmentally Preferable Purchasing (EPP) is the purchase of products and services that have a lesser or reduced effect on human health and the environment when compared to competing products that serve the same purpose. Environmentally preferred products and services impact the environment less than competing products, taking into account raw materials, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and disposal of the product.

By basing purchasing decisions on an evaluation of environmental criteria, along with product performance, price, and availability, EPP seeks to find the “best value” rather than just the “lowest price”. Decisions based solely on lowest price typically do not account for the true costs over the life of a product. For instance, savings such as reduced operating costs or additional disposal costs may not be identified unless the life-cycle of a product is considered. The purchase and use of environmentally preferable products can have a profound impact not only in protecting the environment but also improving worker safety and increasing budget savings. Purchasing environmentally responsible products has a number of additional tangible benefits including:

- Buying less-hazardous products can reduce regulatory liability, improve worker safety, and lower costs associated with waste management, disposal, and cleanup.
- Using energy-efficient and water-conserving products can save money.
- Products that are reusable, refillable, more durable, or repairable create less waste and are more cost-effective in the long run than disposable or single-use products.
- Buying recycled products supports recycling programs going and saves natural resources.
- Implementing EPP can help develop markets for environmentally responsible products and promote a sustainable economy.

Governments and businesses around the country are adopting EPP standards into their purchasing policies. The U.S. Environmental Protection Agency has developed EPP guidelines and requirements for Federal purchasing. The state of Minnesota became

an early leader in with the creation of their EPP Guide <http://www.rethinkrecycling.com/government/eppg/why-buy-intro-eppg>. There are also a growing number of organizations providing standard certification for environmentally preferable products including Energy Star and Green Seal which can help simplify EPP decisions and help purchasers avoid misleading claims on products which are often referred to as “greenwashing”. Although there is no single standard that is used, most EPP policies ask the following questions before purchasing a product:

- Is the product less hazardous?
- Is it reusable or more durable?
- Is it made from recycled materials?
- What happens to the product at the end of its life? Can it be recycled? Will the manufacturer take the product back? Will it need special disposal?
- Does it conserve energy or water?
- Is it made from plant-based or otherwise renewable raw materials?

While Woodstock cannot change the current system on its own, the combined purchasing power of local, state and Federal governments can have a profound influence on industry practices. By adopting EPP policies, the City can take a leadership role in McHenry County while increasing the value of the goods and services it purchases, improving the health and safety of its employees and protecting the environment.

GOAL	ACTION
F2.1 Increase the amount of Environmentally Preferred Products purchased by the City.	Provide EPP training to key City staff responsible for purchasing.
	Develop and implement an Environmentally Preferred Purchasing (EPP) policy.
	Encourage the use of EPP by neighboring municipalities, local businesses and individuals.



3. Green Jobs



Cities around the country see the emerging green movement as a new engine for economic growth and job creation. In an effort to attract green technology and green jobs cities are looking to improve the “livability” of their communities by investing in open space, revitalizing city centers and improving access to public transportation. Many of the livable qualities other cities must invest in, the residents of Woodstock already enjoy. Cities that share the core values with the emerging green industries will have a competitive advantage over cities that either maintain the status quo or simply engage in “greenwashing”. With the passage and implementation of the city’s Environmental Plan, Woodstock has demonstrated its commitment to environmental responsibility and sustainable development.

While there is no single definition, green jobs typically revolve around carbon reduction, energy efficiency, renewable energy, transportation, material reuse/recycling, and sustainable products. Green jobs tend to be career-based with good wages and benefits that can include all sectors of business including manufacturing, science, design, engineering, architecture, construction and sales. Many of the early green employment opportunities will be the result of construction trades moving to energy efficiency improvement and renewable energy production. These are jobs that cannot be outsourced and will drive economic development from the contractors who install the green materials, to the retailers who sell the green supplies to the manufacturers who design and create the green products.

Woodstock has a rich history as a center for business and light industry. From the early 1900’s when half of the world’s typewriters were manufactured in Woodstock to the more recent activity with tool and die manufacturing, Woodstock has consistently provided businesses with a reliable workforce and opportunities for healthy economic growth. With our current capacity to expand environmentally friendly industries Woodstock can meet the needs of green businesses while providing a desirable quality of life.

GOAL	ACTION
F3.1 Increase, encourage and support the number of green businesses in Woodstock.	Provide training on green business development to key City staff responsible for economic and community development.
	Strengthen our city’s economic development tools to include the green “industries of the future”.
	Develop and implement a leadership-driven marketing plan to promote Woodstock as a “green city” and attract green industries.
F3.2 Advocate the development of a competitive “green” workforce.	Create educational and training opportunities by collaborating with local businesses, educational institutions, non-profit organizations and public agencies.

4. Agritourism and Ecotourism

Agritourism is defined as: “The act of visiting a working farm or any agricultural, horticultural or agribusiness operation for the purpose of enjoyment, education, or active involvement in the activities of the farm or operation.” Agritourism may be conducted as a means of supplementing income as well as a way to educate the public about agriculture. As the urban area of Woodstock encroaches upon the surrounding agricultural areas, agritourism may be a means of reinforcing the need to maintain prime agricultural lands close to our city. Also, agritourism may provide additional income for local farmers and food producers to offset the higher costs of farming in an urbanized area.

Ecotourism is defined in part as, “Environmentally responsible travel to natural areas, in order to enjoy and appreciate nature and accompanying cultural features, both past and present, that promote conservation, have a low visitor impact, and provide for beneficially active socio-economic involvement of local people.” As this definition implies, ecotourism often includes the involvement of volunteers. While one often thinks of ecotourism in terms of major trips visiting exotic locations, there are many local opportunities for ecotourism at the numerous parks and conservation areas in and around Woodstock including the West Woodstock Prairie, Duffield Pond and Pleasant Valley. Ecologically responsible tourism can provide continued revenue sources and volunteer opportunities to maintain Woodstock’s natural resources.

Woodstock is well located to be a tourism destination since it is the County seat of McHenry County and has a variety of transportation options including commuter rail and major roads such as Illinois Route 14 and Illinois Route 47. The historical charm of Woodstock has provided tourists with a unique destination for many years. By developing its agritourism and ecotourism opportunities the City can provide visitors with additional cultural experiences and natural beauty close to home while promoting sustainable practices in the community.

GOALS	ACTION ITEMS
F4.1 Develop an agritourism and ecotourism strategy for the City.	Identify destinations that currently provide agritourism and ecotourism opportunities.
	Identify future destinations that would be suited to this purpose.
	Develop partnerships with key tourism agencies and organizations.
	Review City ordinances to ensure that they encourage agritourism and ecotourism.
F4.2 Market agritourism and ecotourism opportunities.	Use the City web site and other publications as an information source for potential agritourism and ecotourism activities and resources.
	Promote existing farmer’s markets and other opportunities.
	Coordinate with farmer’s market to act as information clearinghouses to match the needs of agritourism providers with available city resources.

G. Energy

1. **Wind Energy**
2. **Geothermal Energy**
3. **Solar Energy**

As the country begins to shift away from its reliance on fossil fuels, cost-effective alternate sources of energy are increasingly available for adoption by consumers, businesses and governmental entities. Distributed energy production helps buffer end users against supply disruptions and cost-swings. Alternative energy systems can be promoted for use in ways that enhance Woodstock's quality of life and strengthen energy independence.

1. Wind Energy

Wind is among the most cost-effective sources of renewable energy. Electrical energy from wind displaces demand from fossil fuel generating systems, and thereby contributes to the respiratory health of the public, reduces fossil fuel dependency and carbon emissions, and helps lock in energy costs in an era of rising energy prices.

Electrical energy is derived from the wind by coupling electrical generators to airfoils that move with the wind. Familiar wind generators resemble windmills with airplane-like propellers, though a variety of other configurations like semi-cylinders, helixes, and spherical bands have arrived on the market to fit a variety of needs.

Wind energy growth is economically positive. Following the installation of wind systems, dollars not spent on purchased energy are kept in the community. Additionally, Commonwealth Edison buys surplus electricity fed back into the power grid from wind plants, and homeowner installation costs can be offset by Illinois Department of Commerce and Economic Opportunity (DCEO) grants and Federal tax credits. Job creation follows the demand for wind systems sales, installation and service.

In the past, wind energy has been adopted in McHenry County by individuals, typically on sites of at least an acre where propeller-type generators are mounted on towers well above the tree line, and with equal clearance on the ground should the tower fall. These mid-scale plants may produce up to 15 kilowatts of electricity, enough to completely power a home. When located near neighbors, wind generators of this scale and larger have been criticized as a nuisance for noise levels and disturbing visual effects. Propeller wind turbines have been implicated in the death of birds and bats, though this danger is more evident with very large turbines.

Smaller, less expensive wind generators of both non-propeller and propeller designs marketed for urban residential use are more quiet, mountable at lower heights (some on the roof) and produce supplemental amounts of electricity for a home.



GOAL	ACTION
G1.1 Implement the use of wind energy as a power source for City operations.	Identify the departments that could benefit from mid-scale sized wind systems, especially for energy-intensive functions like water and sewage treatment.
	Evaluate the feasibility of installing wind energy systems.
G1.2 Promote benefits and encourage the use of wind energy sources.	Identify and promote the use of rebates (IL DCEO) and federal tax incentives for the installation of wind systems on public and private properties.
	Provide information highlighting the benefits of converting from fossil to wind power on the City's website.
	Consider installing a highly-visible wind generator at a public venue like Emricson Park, or one or more roof-mountable small machines on a municipal buildings, should site-surveys warrant.
	DCED should encourage wind system installation and startup businesses.
	Amend zoning ordinances to define "small wind energy systems", listing components and maximum rating capacity and specifically designating small wind energy systems as a permitted use. Include appropriate height restrictions (which may vary as a function of property size), minimum set-back, maximum noise levels and compliance with various standards such as the Uniform Building Code, FAA regulations, and the electric code.
Encourage inclusion of wind power when permitting development.	

2. Geothermal Energy

Heating and cooling with geothermal heat pumps requires only small amounts of electricity and reduces fossil fuel demand, contributing to the respiratory health of the public and reducing carbon emissions. The constancy of the ground temperature makes heat pump operating costs predictable and annual home energy bills less subject to market energy price swings. When comparing a geothermal system to a conventional one, a homeowner can save anywhere from 30 percent to 70 percent annually on utilities. Even with the high initial costs of purchasing a geothermal system, the payback period is relatively short, sometimes as soon as five years.

Geothermal energy is heat produced deep within the earth. The most common use of geothermal energy is to heat and cool buildings through the use of ground source heat pumps, which tap the nearly constant temperatures of the upper portion of the earth's crust, usually between 50 and 60 degrees Fahrenheit. During the heating season, the system concentrates heat obtained from fluids circulated through sealed pipes in the ground (called a Closed Loop system) and releases it into the building at higher

temperature. In the summer, heat from the building is carried back into the ground. The heating and cooling may be distributed via forced air, or for heat-only using under-floor or standing radiators. Some systems also heat water for domestic use.

An urban installation on a small lot may use the Vertical Closed Loop field, consisting of pairs of looped pipe sunk up to 200 feet in the ground. The pipes contain a heat-exchanging fluid and are usually jacketed in a bentonite grout for best heat transfer with the earth.

For rural or large suburban lots, the less-expensive Horizontal Closed Loop field employs long looped pipes similar to the vertical system, but placed horizontally by bore or excavation below the frost line.

Other conventional systems include the space-saving Horizontal Closed “slinky” Loop of overlapping coils of pipe below the frost line, the Pond Loop using slinky coils in farm or fire ponds, and the Open-loop Standing Column Well, which circulates ground water directly through pipe.

One low-tech approach to geothermal heating and cooling is the earth tube, a buried tile through which ground-temperature air is circulated back into a building. Another recent innovation leverages the constant temperature of pumped municipal well water to help heat and cool public buildings.

GOAL	ACTION
G2.1 Promote geothermal energy use.	Evaluate suitability of geothermal ground source heating and cooling for existing municipal buildings.
	Consider inclusion of geothermal ground source heating and cooling into new municipal construction.
	Publish in the city bulletin and on the website information about installation, rebates and tax credits, such as those provided for homeowner and commercial installations in the Energy Improvement and Extension Act of 2008.
G2.2 Maintain groundwater integrity in geothermal applications.	Mandate use of non-toxic and biodegradable heat exchanging fluids such as food-grade propylene glycol for closed loop installations.
	Given the City's dependence on groundwater, determine if and where open-loop vertical standing well heat pump systems should be permitted.
	Consider regulating placement of closed loop ground source heat pumps. Vertical bores and excavations should not be permitted within setback zones of municipal wells. Conduct a study to determine if potential for contamination should preclude bores into critical aquifers. Limit placement of all closed loop systems to within the boundaries of lots serviced by them.
Require that installations be done by IGSHPA-certified installers. For vertical bores, require use of licensed well drillers.	

3. Solar Energy

Sunlight is the most pervasive source of renewable energy. Solar energy can be put to use cost-effectively as a heat source. Improvements in solar energy technology to use it for electrical generation are bringing more opportunities to incorporate it into homes and businesses. As with wind power, solar energy contributes to the respiratory health of the public by displacing demand for fossil fuels, reducing carbon emissions and helping stabilize energy costs.

The use of solar energy is economically positive for both the user and the community. Following the installation of solar heating and electrical systems, dollars not spent to purchase energy are kept in the community. Additionally, Commonwealth Edison buys surplus electricity fed back into the power grid from solar electrical generating systems, and homeowner installation costs can be offset by Illinois DCEO grants and Federal tax credits. Job creation follows the demand for solar systems sales, installation and service.

There are three main forms of solar energy: passive solar, solar thermal and photovoltaic. The first two are related because both represent technologies to harvest heat. The last, as the name implies, produces electricity from sunlight.

Passive Solar

Passive solar is the name given to the collection and distribution of solar energy accomplished mostly without the use of powered machinery. Passive solar includes some means of water heating, space heating and cooling, cooking and natural lighting.

The greenhouse is the most familiar example of passive solar heating, where solar radiation enters a building through panes of glass and heats the air faster than heat is lost. With proper design the same concept can be used to heat homes and buildings by orienting them to capture the low winter sun and the high summer sun. By also providing heat-absorbing materials called solar mass to soak up this heat and release it back slowly, a building can be warmed overnight. Passive solar heating is best incorporated at design time. In some instances, investment in passive solar heating can pay back 25 times sooner than systems to generate a building's electricity from sunlight.

Passive solar furnaces are appliances that can be fitted on existing buildings to heat the air inside. Solar furnaces are most often used in buildings where air must be completely replaced frequently, such as vehicle maintenance facilities, restaurants and hospitals. Passive solar cooling can be as simple as deflecting or shielding a building from solar radiation, such as by use of reflective, light colored "cool" roofs or vegetated "green" roofs. Window overhangs may be placed to shield a room from sunlight in the summer, yet admit light in the winter. Solar ventilation chimney stacks are similar to "vertical greenhouses" that vent solar heated air out the top, drawing cooler air into the building from the ground below.

Lighting with ambient sunlight can be considered a form of passive solar energy. Electrical lighting can account for 20% of a building's energy cost. Recently, light guides made with fiber optical technology or hollow tubes with reflective interiors have been incorporated into buildings as a way of bringing full-spectrum natural light deep inside, permitting a reduction in the number of electric lights and their hours of operation.

Solar Thermal

Like Passive Solar, Solar Thermal energy is heat derived from sunlight, but is collected and put to use through mechanical means. Solar Thermal systems can be used for many purposes including steam generation to drive turbines, but is most often used to provide hot water or space heating for homes and businesses.

Domestic solar hot water systems use the sun's energy to heat water through collector panels that are typically mounted on a roof. Domestic solar hot water systems store heated water either in a natural gas water heater or an adjacent tank. When a thermostat determines the water isn't as warm enough (such as at night or when overcast), the natural gas heater makes up the difference. Because of the great reduction in burned natural gas, a solar thermal hot water system with a 15-year life expectancy can pay for itself in 6 to 8 years or sooner when state rebates and federal tax deductions are applied. The relatively-low installation cost and payback interval puts solar hot water among the most attractive energy retrofits for an existing home or commercial building.

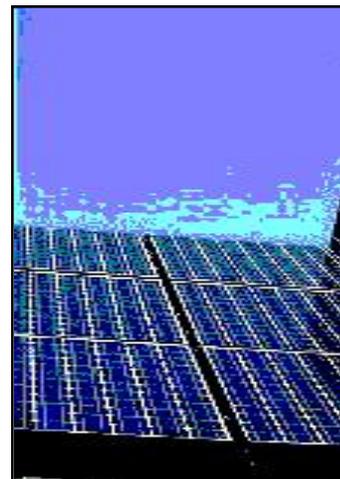
Solar Thermal space heating captures the sun's energy to provide heat within a home or building. A Solar Thermal space heating appliance circulates a liquid to carry heat to the interior of a building, sometimes distributing it through a baseboard heater, pipes in a radiant floor, or in some cases, a forced air duct. Since the piping and heating systems need to be integrated into the building, Solar Thermal space heating is most often incorporated in new construction.

Solar Photovoltaic

Solar photovoltaic energy (PV) is electricity generated when light falls on devices called solar cells, usually made of silicon wafers mounted on a panel. Flexible silicon PV material is now found in solar roofing shingles and PV window glass made with an almost transparent PV coating is being incorporated into commercial office buildings.

Although rural PV systems may store energy in batteries for use later, urban PV systems mainly send electricity directly into house wiring through a device called a grid inter-tie inverter. Through what's called a 'net-metering' arrangement, the power company purchases surplus electricity, often appearing as a credit on the electric bill. Net metering plans may differ over what rate is paid for purchased electricity. Commonwealth Edison, for instance, pays less than the consumer rate for received energy credit, while Madison, Wisconsin's city utility pays more than the retail rate as an incentive to increase the number of PV rooftops in their city.

Emerging startup companies allow homeowners to lease, rather than buy PV equipment, providing for upgrade to more efficient PV systems as technology improves and costs drop. Independent PV "power companies" sell commercial quantities of electricity to utility companies, or directly to businesses whose rooftop space they may lease for their PV panel arrays (often big-box stores or industrial buildings). Commercial electricity produced this way is in demand among purchasers required to diversify their energy portfolio to include renewables.



GOAL	ACTION
<p>G3.1 Incorporate solar energy into municipal operations.</p>	<p>Where site-practical, install solar hot water systems on high visibility municipal buildings such as fire stations, city hall, and public works, and at the time of replacement of existing hot water heaters.</p>
	<p>Consider installation of at least one solar PV generating system on or at a high visibility municipal building.</p>
	<p>Require incorporation of passive solar heating into new municipal construction.</p>
	<p>Consider retrofit with zoned solar thermal furnaces in facilities such as fleet garages.</p>
<p>G3.2 Promote public adoption of solar energy in Woodstock.</p>	<p>Publish in the city newsletter and website information about existing state DCEO and federal solar thermal rebates and tax deductions and possibly provide a homeowner/business owner implementation checklist. Consider referring citizens to an unendorsed list of American Solar Energy Society-listed regional</p>
	<p>Consider amending ordinances to regulate by setback shading of the solar aspect of adjacent properties by new construction in areas designated as solar access overlays, perhaps where building height may already be regulated.</p>
	<p>Review historic district regulations for possible constraints on use of passive solar heating/lighting and solar thermal heating/hot water.</p>
	<p>Require that new residential units include wiring for solar PV and plumbing specifically designed to allow the later installation of a system which utilizes solar energy as the primary means of heating domestic potable water.</p>
<p>G3.3 Promote solar energy-related job creation.</p>	<p>The City should encourage and recruit solar thermal and PV sales, installation, maintenance and leasing start-up businesses, as well as the commercial rooftop PV generating industry.</p>

H. Green Building

- 1. Green Building Practices**
- 2. Green Building Materials**
- 3. Energy Efficiency**
- 4. Affordable Green Housing**

The built environment has a vast impact on the natural environment, human health, and the economy. Buildings in the U.S. currently consume 39 percent of the total energy, 68 percent of the electricity, and 12 percent of potable water. Buildings in the U.S. also produce 46 percent of sulfur dioxide emissions, 40 percent of the solid waste stream and 38 percent of the carbon dioxide emissions. Americans spend approximately 90 percent of their time indoors where pollutant levels on average can be 2-5 times greater than outdoors. The potential for buildings to negatively affect human health and productivity is therefore significant. It is estimated that U.S. businesses lose \$60-\$400 billion annually as a result of building related illnesses. Sustainable or “green” building practices can reduce the tremendous impact that buildings have on both people and nature.

Green building practices go beyond energy and water conservation to incorporate environmentally sensitive site planning, resource efficient building materials and superior indoor environmental quality. Green construction methods can be integrated into buildings at any stage, from design and construction, to renovation and deconstruction. However, the most significant benefits can be obtained if the design and construction team takes an integrated approach from the earliest stages of a building project. Potential benefits of green building can include:

Environmental benefits

- Enhance and protect biodiversity and ecosystems
- Improve air and water quality
- Reduce waste streams
- Conserve and restore natural resources

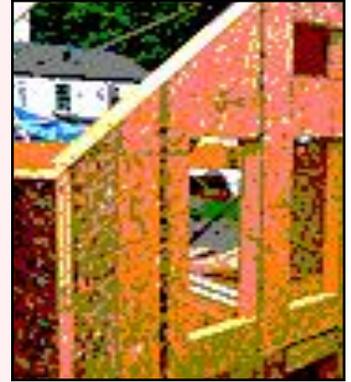
Economic benefits

- Reduce operating costs
- Create, expand, and shape markets for green product and services
- Improve occupant productivity
- Optimize life-cycle economic performance



Social benefits

- Enhance occupant comfort, health and productivity
- Heighten aesthetic qualities
- Minimize strain on local infrastructure
- Improve overall quality of life



By adopting green building strategies, Woodstock can maximize both economic and environmental performance. The following chapters will discuss green building practices and benefits in greater detail.

1. Green Building Practices

Green buildings are structures that are designed, built, operated and disposed of in a resource-efficient manner using ecologically sound and cost-effective approaches. The green building approach seeks to reduce the human impact on the environment while fostering healthy, comfortable and sustainable communities.

Many programs have been developed in recent years to promote green building methods. The main organization that has set the standards in the United States is the U.S. Green Building Council (USGBC), which has created a measurable framework for sustainable development through a program called Leadership in Energy and Environmental Design (LEED). *A LEED Fact Sheet providing greater detail on the program is included as Appendix B.* Other programs include the EPA's Energy Star program, the National Home Builders Association's Green Building Program, and the Green Communities Program developed by Enterprise Community Partners, Inc.

Although there is no single standard, green building practices generally revolve around the following criteria that can be adapted to meet the needs of each particular project:

Site Selection: Focuses on the use of environmentally sensitive siting and design to minimize negative impacts from the development and construction process, maintain natural groundwater recharge, reduce stormwater runoff, protect wildlife habitat, maintain open space and improve previously developed or contaminated sites.

Water Resources: Focuses on protecting water resources through the use of naturalized landscaping, innovative wastewater technologies, and water conservation.

Energy Efficiency: Focuses on how to reduce energy use, and to encourage the use of alternative energy sources. Taking advantage of natural resources such as sunlight and wind for heating, cooling, lighting, and other functions.

Resource Conservation: Focuses on the use and reuse of buildings and materials, promoting the use of low-impact, recycled/recyclable, non-toxic, rapidly renewable, locally produced and ecologically sustainable products.

Indoor Environmental Quality: Focuses on providing a safe, healthy, and productive human environment.

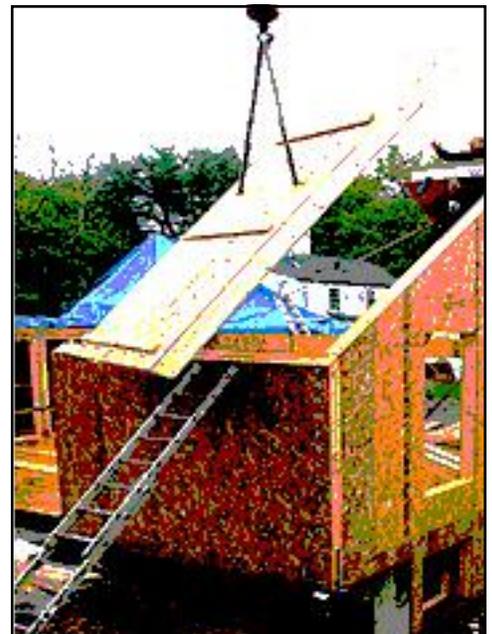
GREEN BUILDING

The direct financial benefits of green buildings come from lower energy and water bills and the reduced need for maintenance and infrastructure. The indirect benefits include improved health of residents, increased productivity of employees and higher property values in the community. The regional and global benefits include the protection of natural resources and the mitigation of climate change. Studies have shown that companies with green buildings have employees with lower turnover rates, fewer sick days and higher productivity. Green schools have also demonstrated higher test scores, lower absenteeism, and heightened academic enthusiasm among students.

It is a common misconception that green buildings cost significantly more than conventional buildings. The increased up-front cost for green buildings is typically 5 percent, depending on the features, building type and location. These up-front costs are typically offset by the savings in operational costs, especially when viewed against the lifecycle of the product or building. Another misconception is that green buildings require exotic, hard to find products. While this was a valid concern in the early days of green building, building material manufacturers have responded to the rapidly growing demand by offering new green products and improving the environmental performance of existing product lines.

The design of green homes utilizes cost-effective strategies to reduce material consumption by focusing on the quality of design and construction over square footage. Simple framing methods can use less lumber while providing increased insulating values. The use of Insulated Concrete Forms (ICF) provides higher insulating values with less concrete. The smaller homes and higher insulating values require smaller furnaces and air conditioners resulting in lower operating costs. The result is well built, energy efficient homes with a low ecological footprint providing comfort and value for generations to come.

As awareness of environmental issues continues to grow, being a good steward of the environment can play a major role in attracting new businesses and residents to our community. The first privately funded LEED building in McHenry County was built in Woodstock by a local business called Other World Computing (OWC). By successfully incorporating a variety of green building methods and materials the OWC building earned a LEED Gold rating and OWC has received broad recognition for its accomplishments. Establishing and promoting green building standards allows Woodstock to showcase its environmental leadership and demonstrate that it is contributing to larger efforts to reduce resource consumption and waste generation, improve air and water quality, preserve natural resources, and create sustainable communities.



GOAL	ACTION
<p>H1.1 Take a leadership role in promoting green building practices.</p>	<p>Adopt the Leadership in Energy and Environmental Design (LEED) principles as community policy and become a member of the US Green Building Council (USGBC).</p>
	<p>City staff should be trained in green building methods and key personnel should seek LEED accreditation.</p>
	<p>New municipal buildings should seek LEED New Construction (NC) certification, with Silver certification as a desired goal. Municipal buildings with major renovations should seek LEED Existing Buildings (EB) certification.</p>
	<p>Incorporate and demonstrate green design elements at municipal locations.</p>
	<p>Where possible, revise and adopt zoning, subdivision, and building codes and regulations to allow and encourage energy efficiency and green design techniques for buildings and appliances.</p>
	<p>Develop incentives to encourage architects, builders, developers and homeowners in the community to use green design strategies.</p>
<p>H1.2 Reduce the amount of construction waste generated in</p>	<p>Coordinate with waste management companies, McHenry County and neighboring municipalities to develop a construction waste recycling program.</p>

2. Green Building Materials

The building industry consumes approximately 3 billion tons of raw materials every year. The harvesting, mining, and processing of materials for building products pollutes the air and water, degrades natural habitats and threatens wildlife. We also spend upwards of 90 percent of our time indoors in this country, and the quality of air in our buildings has been proven to have significant negative health impacts. The choice of building materials can have significant impacts on the natural environment and human health and we can reduce those impacts through the materials and products we select.

The growing field of green building products provides greater opportunities to reduce negative impacts caused from the extraction, processing and use of materials and move toward more sustainable options to meet our building needs. Green building products reduce impacts on natural resources, provide health benefits from improved indoor air quality and reduce operating costs through improved energy efficiency. The following criteria may be used to determine the amount of impact a particular product may have:

- **Resource efficiency** – Products containing salvaged, post-consumer recycled, or rapidly renewable material content. Can this product itself be recycled? Does the product have durability? Is it locally manufactured to save transportation

resources? Will the manufacturer take the product back at the end of its life-cycle? Is the wood product certified through the Forest Stewardship Council (FSC)?

- **Indoor air quality** - Product has non-toxic/low chemical emissions. Has low or no volatile organic compounds (VOC's). Is easily cleanable with simple cleaning methods. Moisture resistance to help restrict mold and other biological contaminates.
- **Energy efficiency** - Materials, components and systems that help reduce energy consumption.
- **Water conservation** - Products and systems that help reduce water consumption in buildings *and* conserve water in landscaped areas.
- **Affordability** – Affordability can be considered when building product life-cycle costs are comparable to conventional materials or, as a whole, are within a project-defined percentage of the overall budget.

These, along with other dynamic criteria, can be used to determine how “green” a product may be. The marketplace is adapting quickly to the growing demand for environmentally responsible building products. One common misconception is that green also means high cost. With the rapid evolution that is taking place, many green products are cost competitive with conventional building products, especially when savings from reduced energy and water consumption, as well as increased productivity and quality of life from improved health are taken into consideration.

GOAL	ACTION
H2.1 Increase the use and availability of environmentally responsible building products and materials in the local marketplace.	Educate city personnel on the health, environmental and economic benefits of green building materials and cleaning products.
	Incorporate green building materials into the City’s Environmentally Preferred Purchasing (EPP) policy.
	Work with local retailers and suppliers to raise awareness and availability of green building products.
H2.2 Promote benefits and encourage the use of green building materials in existing building renovation and new construction.	Explore options for incentives to promote the use of green building products and materials.
	Provide information about green building practices and products to building permit applicants.
	Provide educational information about green building products on City website.

3. Energy Efficiency

Approximately 70-80 percent of every dollar spent on energy leaves the community and provides no return on the investment. Since most of Woodstock's energy is imported, local energy conservation and production can be an effective way to keep more money in the community and promote greater energy security. With its abundance of historical homes and buildings, Woodstock has the distinction of retaining much of its cultural heritage. However these buildings, and most of their more modern cousins, were constructed long before the need for energy efficiency was understood or modern green building methods were available. Energy efficiency and conservation are the cornerstones of any green building, whether it is the remodeling of an existing home or building or new construction.

Green building and energy efficiency do not necessarily require expensive or high tech solutions. Simple weatherization methods, including weather stripping around doors and windows, can provide very effective low cost energy savings. Preserving or planting deciduous trees, especially on the south and west sides of a building, can significantly reduce summer cooling costs. More intensive options include adding insulation to the walls, attic or foundation and replacing outdated windows using modern windows with high efficiency insulated glass. The costs from the added materials can be paid back through savings in energy costs, often within a few years and into the future.

An energy audit is the most effective way to assess how much energy a home or building consumes and to evaluate what measures can be taken to make it more energy efficient. Anyone can perform a simple energy audit, however, it is most effective to have a professional energy auditor carry out a more thorough audit. A professional auditor uses a variety of techniques and equipment to determine the energy efficiency of a structure. Based upon the findings of the audit, the most beneficial and cost effective options can then be selected to improve the energy efficiency of the building.

America's demand for energy has grown and is likely to continue, along with our increasing population and our demand for energy consuming devices. Appliances such as dishwashers, microwave ovens, washers, dryers, television sets, and other electrical appliances account for up to half of a homes energy use. Conservation is the least expensive option for meeting our energy needs, especially compared to the cost of building new electrical generating facilities. The simplest solutions include conserving energy by turning off unused lights or appliances and replacing incandescent bulbs with high efficiency Compact Fluorescent Lights (CFLs).



The average U.S. household produces about 150 pounds of carbon dioxide (CO₂) a day through routine activities like turning on the air conditioning or driving to the store. That is more than twice the European average and almost five times the global average. Homes and buildings account for approximately 40 percent of the nations CO₂ emissions. Using less energy through energy conservation and reducing energy waste through improved energy efficiency provides the most cost effective way for Woodstock to meet its energy needs while promoting sustainable economic development and reducing its ecological footprint.

GREEN BUILDING

GOAL	ACTION
H3.1 Improve the energy efficiency in new and existing buildings.	Conduct energy audits on municipal buildings and calculate potential cost savings and reduction of carbon emissions.
	Explore options to provide Energy Efficiency Audits for private structures.
	Set a timeline for adopting higher energy efficiency standards into the City's building codes. Provide training and actively market the standards and timeline to contractors, builders and architects.
	Provide information to residents on Federal/State and local tax incentives for energy efficient home improvements and purchase of energy efficient appliances (City Scene, City website, Department of Community and Economic Development, and special promotions).
	Adopt energy saving standards into purchasing policy.
	Examine options for energy efficient exterior public lighting considering the lifecycle costs of the options.
	Pursue Federal/State/private grant funding for energy efficiency programming or improvements.
	When making a new purchase, choose appliances with the highest "Energy Star" rating possible.



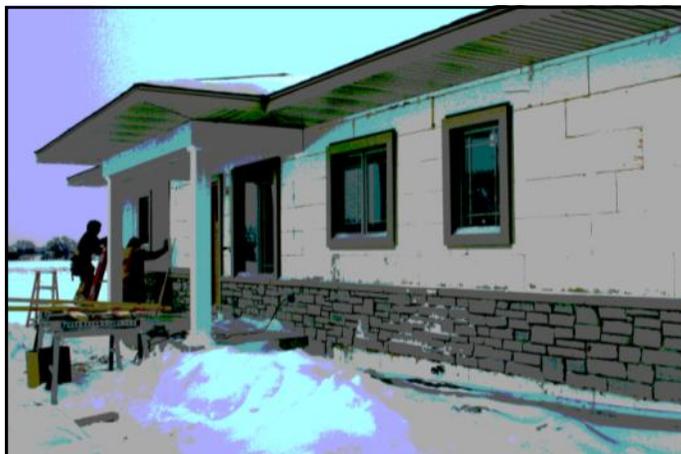
4. Affordable Green Housing

A healthy community must maintain a variety of affordable housing opportunities to meet the diverse needs of its citizens and businesses. The entire community benefits when residents, from young adults to retirees, have housing options that allow them to remain in the City through the job and life changes experienced during their lifespan. A range of housing types and costs provides both a market and an employee source for community businesses and contributes to the diversity of our neighborhoods. Families who have healthy, affordable housing are more stable, are better able to be self-sufficient and require fewer public services. Setting green housing standards provides an opportunity for communities to ensure that housing is both healthy and affordable.

Factors affecting the affordability of housing include location, energy efficiency and indoor air quality. Housing located within walking distance to community amenities can reduce the percentage of income a resident must spend on transportation. Energy efficient housing requires less energy than conventional housing, making it more affordable. Healthy indoor air quality can reduce health costs, loss of income due to illness and the need for public aid. Healthy, energy-efficient housing that blends seamlessly into a community and is located near transportation, employment, and service centers are best practices that benefit all of Woodstock’s residents.

Green building methods provide safe, healthy homes with lower energy and transportation costs for the residents and contribute to the long-term stability of the community. While the City of Woodstock has made commendable efforts in providing affordable housing opportunities in the past, the City should provide additional leadership in developing and implementing effective green affordable housing standards.

GOAL	ACTION
H4.1 Provide healthy, energy-efficient, pedestrian-friendly affordable housing in the City of Woodstock.	Explore options for incentives to promote the use of green building products and materials in existing affordable housing.
	Require green housing practices for new affordable housing.
	Assist/pursue grant acquisition to incorporate green practices in affordable housing.



I. Community Education & Outreach

Achieving and maintaining a healthy and sustainable Woodstock requires the continued education of its citizens, city staff and the economic community. The extent of education and environmental awareness of our population has a profound effect on the environmental choices, behaviors and practices of individuals, city government and the business sector. Prior to adopting more environmentally sustainable behavior, it is essential to continually encourage and foster individual awareness of environmental issues affecting sustainability.

The Woodstock Environmental Plan provides a base of environmental educational information enabling the community to understand environmental issues involved in achieving a sustainable community and making lifestyle choices that will promote sustainability. The continued education of our citizens and the promotion of the guidelines and actions set forth in the Woodstock Environmental Plan is the responsibility of our city government, local government agencies, local non-governmental agencies, school boards, library boards, business and media.

In order to promote environmental education and community-based programs, the full force of media options should be utilized. Existing media systems, including the City Scene, would offer the easiest avenue by which to connect to the largest percentage of the population. Additional community outreach systems including the schools and the library should also be utilized as a means of providing environmental education and developing a sustainable system.

The development of a Woodstock environmental web site would provide an easily accessible information network for residents regarding environmental issues, upcoming environmental seminars, community-based programs and volunteer opportunities for individuals and larger neighborhood groups. This web site should be incorporated within the City of Woodstock webpage and would allow for easy access by residents to the details of the Woodstock Environmental Plan.

In addition to existing media and the web site, the City of Woodstock Annual Environmental Progress Report being prepared by the Environmental Commission should be distributed to the public.



COMMUNITY EDUCATION & OUTREACH

GOAL	ACTION
<p>I1.1. Develop and provide a wide variety of accessible, pertinent and understandable environmental resources for the public.</p>	<p>Develop and maintain an environmental page on the City's web site.</p>
	<p>Utilize the <i>City Scene</i> and other publications to promote information regarding sustainable environmental practices, issues or seminars, as applicable.</p>
	<p>Establish and maintain an information area within the library which will provide information on the Woodstock Environmental Plan.</p>
	<p>Distribute the City of Woodstock Annual Environmental Progress Report prepared by the Environmental Commission providing a review of Woodstock's implementation of the WEP.</p>
<p>I1.2. Explore development of programs to provide environmental educational outreach.</p>	<p>Develop a program of environmental education forums with other organizations open to the community.</p>
	<p>Coordinate with the parks department, Chicago Wilderness and/or other organizations to explore programs such as No Child Left Inside.</p>



J. Implementation

Each section of the Woodstock Environmental Plan contains a set of Actions that are recommended to help move the city toward the goal of sustainability. The Actions are intended to be performed or adopted by either the City, community businesses and organizations, the citizens of Woodstock, the Woodstock Environmental Commission or by the community as a whole.

The Actions that are undertaken will be selected and prioritized based on input from the City Council, City staff and the Environmental Commission. The Environmental Commission will meet with the City Council at least quarterly to identify priorities and establish specific Actions to pursue.

In order to highlight the city's accomplishments and evaluate the effectiveness of the Plan, an Annual Progress Report will be prepared by the Environmental Commission with input from the City staff and City Council. The report will provide an opportunity to describe the Actions undertaken and discuss future goals.

Preparation of the Annual Progress Report will allow for a continuous, yearly opportunity to revitalize issues identified within the Plan and invigorate the City to maintain a leadership role on environmental issues within our community.



K. Glossary

adaptive reuse - Adaptive reuse is the process of adapting old structures for purposes other than those initially intended. Adaptive reuse, along with brownfield reclamation, is seen by many as a key factor in land conservation and reducing the amount of sprawl.

agri-tourism - Activities, events and services related to agriculture that take place on or off the farm or ranch, and that connect consumers with the heritage, natural resource or culinary experience they value.

agricultural buffer zone - An area to separate urban uses (particularly residential) from lands designated for agriculture and serve to minimize disturbance of agricultural operations from nearby urban or suburban uses.

aquifer - An underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt, or clay) from which groundwater can be usefully extracted using a water well.

biodiversity - The variation of life forms within a given ecosystem, biome, or for the entire Earth. Biologists most often define biodiversity as the "totality of genes, species, and ecosystems of a region".

brownfield - Abandoned or underused industrial and commercial facilities available for re-use. The land may be contaminated by low concentrations of hazardous waste or pollution, and has the potential to be reused once it is cleaned up.

carbon footprint - The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO₂).

champion tree - A tree that is judged to be the largest of its species according to a standard measuring formula. To be eligible, a tree must be native to or naturalized in the continental United States, including Alaska (Not Hawaii). Hybrids and minor varieties are excluded.

community garden - Publicly or privately owned land whose use ranges from "victory gardens" where people grow small plots of vegetables, to large "greening" projects to preserve natural areas, to tiny street beautification planters on urban street corners.

conservation design - A controlled-growth land use development that allows limited sustainable development while protecting the area's natural environmental features in perpetuity, including preserving open space landscape and vista, protecting farmland or natural habitats for wildlife, and maintaining the character of rural communities.

ecological footprint - A measure of human demand on the Earth's ecosystems, representing the amount of biologically productive land and sea area needed to regenerate the resources a human population consumes and to absorb and render harmless the corresponding waste.

ecosystem services - The benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life on Earth.

ecotourism - Travel to natural destinations that minimizes impact, builds environmental awareness, provides direct financial benefits for conservation, and provides financial benefits and empowerment for local people.

Energy Star - A program created by the United States Environmental Protection Agency to identify and promote energy efficient products in an attempt to reduce energy consumption and greenhouse gas emission by power plants.

K. Glossary

environmentally preferred purchasing (EPP) - Selection of products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. EPP may apply to raw materials, manufacturing, packaging, distribution, use, reuse, operation, maintenance, and disposal.

FSC certification - Acknowledgement by the Forest Stewardship Council that a timber product was produced in an environmentally responsible, socially beneficial, and economically viable way.

geothermal energy - Heat energy originating from the original formation of the planet, from radioactive decay of minerals, and from solar energy absorbed at the surface. It has been used for bathing since Paleolithic times, for space heating since ancient Roman times, and more recently for generating electricity.

grayfield - Economically obsolesced, failing, moribund and/or underutilized real estate assets or land. The term has historically been applied to formerly viable retail and commercial shopping sites (such as regional malls and strip centers) that suffer from lack of reinvestment.

green building - The practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and deconstruction.

green design - To "eliminate negative environmental impact through skillful, sensitive design. Manifestations require no non-renewable resources, impact the environment minimally, and to relate people with the natural environment.

green infrastructure - The life support functions provided by a network of natural ecosystems, including clean water, healthy soils, recreation, shade and shelter. The US EPA uses the term to refer to the interconnected network of open spaces and natural areas, such as greenways, wetlands, parks, forest preserves and native plant vegetation, that naturally manages stormwater, reduces flooding risk and improves water quality.

green job - Also called a green-collar job. Work in agricultural, manufacturing, research and development, administrative, and service activities that contribute to preserving or restoring environmental quality. Green jobs may include those that help protect ecosystems and biodiversity, reduce energy demand, materials, and water consumption through high efficiency strategies, de-carbonize the economy, and minimize or avoid generation of waste and pollution.

green roof - Roof of a building that is partially or completely covered with vegetation and soil, or a growing medium, planted over a waterproofing membrane. Green roofs serve to absorb rainwater, provide insulation, create a habitat for wildlife, and help to lower urban air temperatures.

Green Seal - A non-profit, third-party ecolabeling organization whose certification demonstrates that a product has undergone a stringent process to show that it has less impact on the environment and human health. The Green Seal means that the product has passed the tests, that it works as well as or better than others in its class, and that it has been evaluated without bias or conflict of interest.

greenhouse gas - Gases in the atmosphere that absorb and emit radiation within the thermal infrared range. Greenhouse gases have been a cause for concern by scientists who believe increasing concentrations in the atmosphere from human activity are contributing to an unprecedented rise in global temperatures, with potentially harmful consequences for the environment and human health.

groundwater - Groundwater is water that exists in the pore spaces and fractures in rock and sediment beneath the Earth's surface. Groundwater often originates as rainfall or snow that moves through the soil.

K. Glossary

groundwater recharge area - A groundwater recharge area is a surface land area where water that eventually enters an aquifer is first absorbed into the ground.

heat pump - A mechanical device used for heating and cooling, which operates by pumping heat from a cooler to a warmer location. Heat pumps can extract heat from air, water or the earth. They are classified as either air-source or geothermal units.

horizontal closed loop field - A geothermal heat pump's heat-exchanging tubing buried or bored parallel to the surface at a shallow depth.

Illinois Natural Area Inventory (INAI) - Survey that provides a set of information about high quality natural areas, habitats of endangered species, and other significant natural features used to guide and support land acquisition and protection programs by all levels of government as well as by private landowners and conservation organizations.

infill - The use of land within a built-up area for further construction, especially as part of a community redevelopment or growth management program or as part of smart growth. It focuses on the reuse and repositioning of obsolete or underutilized buildings and sites.

ICF (insulated concrete form) - Formwork for concrete that stays in place as permanent building insulation for energy-efficient, cast-in-place, reinforced concrete walls, floors, and roofs. The forms are interlocking modular units that are dry-stacked (without mortar) and filled with concrete.

LEED (Leadership in Energy and Environmental Design) - Green Building Rating System developed by the U.S. Green Building Council (USGBC), provides a suite of standards for environmentally sustainable construction. LEED's process is intended to be open and transparent, with technical criteria proposed by LEED committees being publicly reviewed for approval by the more than 10,000 membership organizations that currently constitute the USGBC.

local food system - A more locally based food economy in which sustainable food production, processing, distribution, and consumption is integrated to enhance the economic, environmental and social health of a particular place and provide a measure of security from larger supply chain disruptions.

natural capital - The extension of the economic notion of capital (manufactured means of production) to environmental goods and services and is thus the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services into the future. For example, a stock of trees or fish provides a flow of new trees or fish, a flow which can be sustainable indefinitely.

natural landscaping - Also called native gardening, is the use of native plants, including trees, shrubs, groundcover, and grasses which are indigenous to the geographic area and refers to a wide array of techniques that help retain natural landscape features, including prairies, wetlands, woodlands and natural drainage features.

net metering - A method of metering the energy consumed and produced at a home or business that has its own renewable energy generator (such as a wind turbine). Excess electricity produced by the generator will spin the electricity meter backwards, effectively banking the electricity until it is needed by the customer.

No Child Left Inside - a movement to introduce more children to nature and the outdoors to counter, for example, the trend of declining levels of outdoor play, the number of National Park visits and increasing consumption of electronic media by children.

open loop standing column well - A system in which water is drawn from the bottom of a deep rock well, passed through a geothermal heat pump, and returned to the top of the well, where traveling downwards it exchanges heat with the surrounding bedrock.

K. Glossary

passive solar energy - A means of using sunlight for useful energy without use of active mechanical systems. Such technologies convert sunlight into usable heat (water, air, thermal mass), cause air-movement for ventilating, or future use, with little use of other energy sources. A common example is a solarium on the equator-side of a building. Passive cooling is the use of the same design principles to reduce summer cooling requirements

photovoltaic (PV) energy - Renewable energy from arrays of cells containing a material that converts solar radiation into direct current electricity.

prairie - A type of grassland dominated by herbaceous plants and where trees are either absent or only widely scattered on the landscape.

purchase of development rights - A transaction in which a landowner voluntarily sells his/her rights to develop a parcel of land to a public agency or qualified conservation organization. The landowner retains all other ownership rights attached to the land, and a conservation easement is placed on the land and recorded on the title.

rain garden - A planted depression that allows rainwater runoff from impervious urban areas like roofs, driveways, walkways, and compacted lawns the opportunity to soak into the ground instead of flowing into storm drains and surface waters.

rapidly renewable content - Natural, non-petroleum-based building materials that have harvest cycles under 10 years. Such materials include bamboo, straw, cork, natural linoleum products (such as Marmoleum), wool, wheatboard, strawboard, etc.

regulated recharge area - A designated area defined by the Illinois Groundwater Protection Act of 1987 as "a compact geographic area, as determined by the Illinois Pollution Control Board, the geology of which renders a potable resource groundwater particularly susceptible to contamination".

riparian corridor - The corridor along the bank or shore of a body of water, often referring to a unique plant community consisting of the vegetation growing near a river, stream, lake, lagoon or other natural body of water.

sedge meadow - Open wetlands of moist to saturated soils, with only seasonal flooding or inundation and dominated by sedges (genus *Carex*).

Sensitive Aquifer Recharge Area (SARA) - Map developed by the recharge areas subcommittee of the Groundwater Protection Program Task Force and the County of McHenry Water Resources. The primary purpose of this map is to: spatially identify areas throughout McHenry County with respect to their potential for aquifer contamination and recharge, and to identify the most sensitive areas within McHenry County that can effectively preserve and protect the recharge of our groundwater shallow aquifers to ensure sustainable yields for current and future generations.

solar thermal energy - A technology for harnessing solar energy for thermal energy (heat) for the purposes of water and space heating, cooling, cooking, drying, distillation, and steam turbine electricity generation.

sustainable development - A pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations. The term was used by the Brundtland Commission which coined the definition as "development that "meets the needs of the present without compromising the ability of future generations to meet their own needs."

K. Glossary

transit-oriented development - A mixed-use residential or commercial area designed to maximize access to public transport, and often incorporates features to encourage transit ridership. Transit-oriented development is sometimes distinguished from "transit-proximate development" because it contains specific features that differentiate the development from urban sprawl.

triple bottom line (TBL) - a framework designed to measure a company's or institution's performance in three areas: social impact, environmental impact and profitability.

vertical closed loop field - A looped pair of pipes sunk between 75 and 500 feet into the ground to circulate a heat-exchanging fluid for a geothermal heat pump.

VOC (volatile organic compound) - Organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere. Although ubiquitous in nature and modern industrial society, they may also be harmful or toxic.

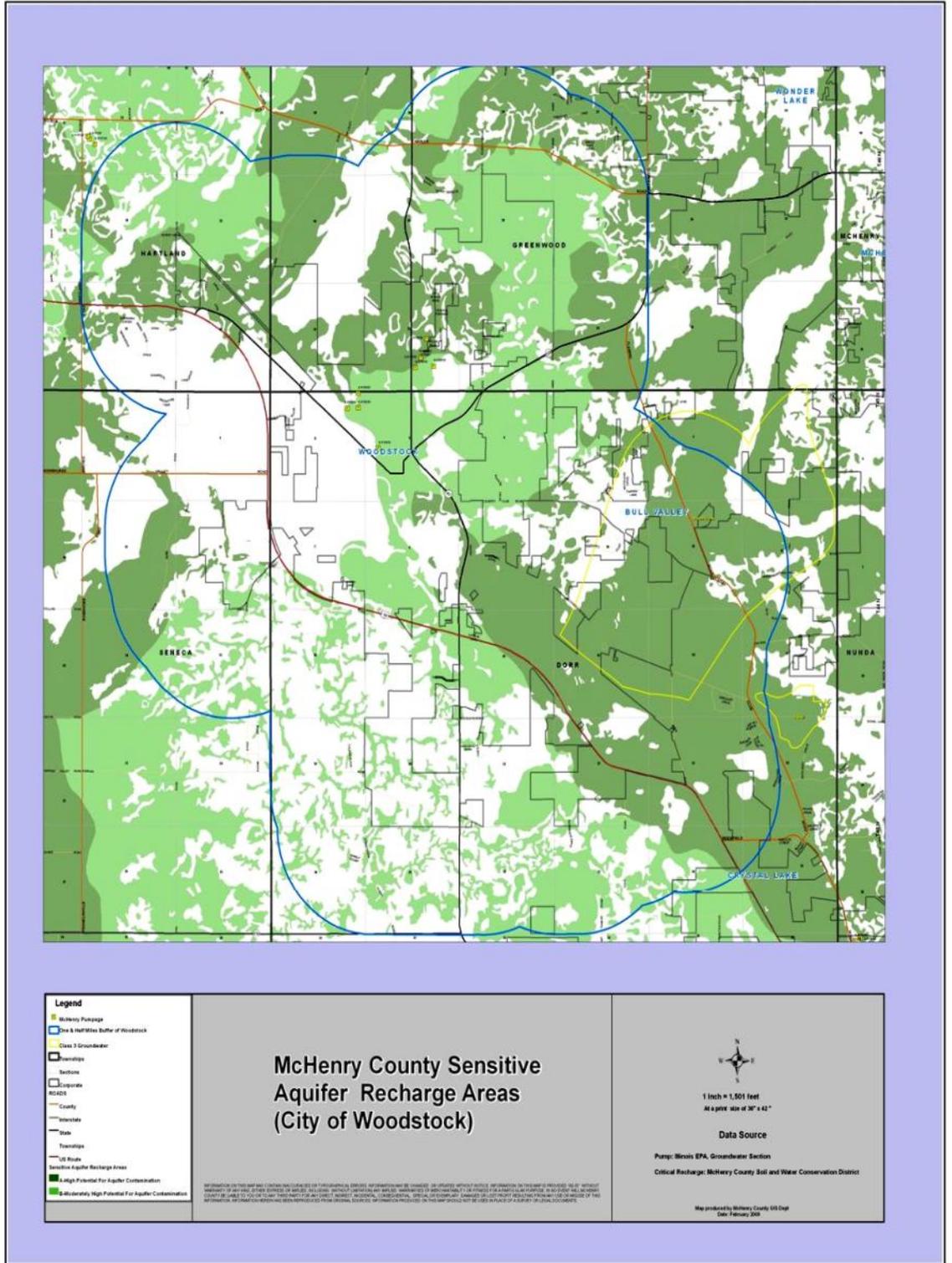
wetland - An area where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Water saturation largely determines how the soil develops and the types of plant and animal communities living in and on the soil.

woodland - A low-density forest forming open habitats with plenty of sunlight and limited shade. Woodlands may support an understory of shrubs and herbaceous plants including grasses.

zero waste - A philosophy that encourages the redesign of resource life cycles so that all products are reused. Any trash sent to landfills is minimal. The process recommended is one similar to the way that resources are reused in nature.

L. McHenry County Sensitive Aquifer Map - Woodstock

APPENDIX



LEED Fact Sheet

(based on LEED NC 2.2)

What is LEED certification?

In the United States and in a number of other countries around the world, Leadership in Energy and Environmental Design (LEED) certification is the recognized standard for measuring building sustainability. Achieving LEED certification is the best way for you to demonstrate that your building project is truly "green."

The LEED green building rating system -- developed and administered by the U.S. Green Building Council (USGBC), a nonprofit coalition of building industry leaders -- is designed to promote design and construction practices that increase profitability while reducing the negative environmental impacts of buildings and improving occupant health and well-being.

What are the benefits of LEED certification?

LEED certification, which includes a rigorous third-party commissioning process, offers compelling proof to you, your clients, your peers and the public at large that you've achieved your environmental goals and your building is performing as designed. Getting certified allows you take advantage of a growing number of state and local government incentives, and can help boost press interest in your project.

The LEED rating system offers four certification levels for new construction -- Certified, Silver, Gold and Platinum -- that correspond to the number of credits accrued in five green design categories: sustainable sites, water efficiency, energy and atmosphere, materials and resources and indoor environmental quality.

1. SUSTAINABLE SITES

Site Selection: develop only appropriate sites and reduce the environmental impact from the location of a building on a site.

Urban Redevelopment: channel development to urban areas with existing infrastructure, protecting green fields and preserving habitat and natural resources.

Brownfield Redevelopment: rehabilitate damaged sites where development is complicated by real or perceived environmental contamination, reducing pressure on undeveloped land.

Alternative Transportation: reduce pollution and land development impacts from automobile use by taking advantage of public transportation and making the site convenient for bicycle users.

M. LEED information

Reduced Site Disturbance: conserve existing natural areas and restore areas damaged during construction to provide habitat and promote bio diversity.

Stormwater Management: limit disruption of natural water flows by minimizing storm water runoff, increasing on-site infiltration and reducing contaminants.

Landscape and Exterior Design to Reduce Heat Islands: reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on micro climate and human and wildlife habitat.

Low Maintenance Landscaping: minimize the need for excessive maintenance by using landscaping designed to be "naturally manicured" - indigenous landscaping and wildflowers chosen to promote low maintenance and to reduce cutting as well as the long-term needs for water, fertilizers and fossil fuels.

2. ENERGY AND ATMOSPHERE

Minimum Energy Performance: establish the minimum level of energy efficiency for the base building and systems.

Optimize Energy Performance: achieve increasing levels of energy performance above the minimum standard to reduce environmental impacts associated with excessive energy use.

Building Commissioning: verify and ensure that the entire building is designed, constructed, and calibrated to operate as intended.

Measurement and Verification: provide for the ongoing accountability and optimization of building energy and water consumption performance over time.

Renewable Energy: Encourage and recognize increasing levels of self-supply through renewable technologies to reduce environmental impacts associated with fossil fuel energy use.

Green Power: encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.

M. LEED information

Reduce Ozone Depletion: support early compliance with the Montreal Protocol by eliminating the use of CFC-based refrigerants and reducing the use of HCFCs and halons.

3. WATER EFFICIENCY

Water Use Reduction: maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Innovative Wastewater Technologies: reduce generation of wastewater and potable water demand, while increasing local aquifer recharge.

Water Efficient Landscaping: limit or eliminate the use of potable water for landscape irrigation.

4. MATERIALS AND RESOURCES

Storage and Collection of Recyclables: facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

Building Reuse: extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste, and reduce environmental impacts of new buildings as they relate to materials manufacture and transport.

Construction Waste Management: divert construction, demolition, and land clearing debris from landfill disposal and redirect recyclable material back to the manufacturing process.

Resource Reuse: extend the life cycle of targeted building materials, reducing environmental impacts related to materials manufacturing and transport.

Recycled Content: increase demand for building products that have incorporated recycled content material, reducing the impacts resulting from extraction of new material.

Local/Regional Materials: increase demand for building products that are manufactured locally, reducing the environmental impacts resulting from transportation, and supporting the local economy.

M. LEED information

Rapidly Renewable Materials: reduce the use and depletion of finite raw and long cycle renewable materials by replacing them with rapidly renewable materials.

Certified Wood: encourage environmentally responsible forest management.

5. INDOOR ENVIRONMENTAL QUALITY

Minimum Indoor Air Quality (IAQ) Performance: establish minimum IAQ performance to prevent the development of indoor air quality problems in buildings, maintaining the health and well being of the occupants.

Increase Ventilation Effectiveness: provide for the effective delivery and mixing of fresh air to building occupants to support their health, safety, and comfort.

Construction IAQ Management: prevent indoor air quality problems resulting from the construction/renovation process, to sustain long term installer and occupant health and comfort.

Low-Emitting Materials: reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.

Indoor Chemical and Pollutant Source Control: avoid exposure of building occupants to potentially hazardous chemicals that adversely impact air quality.

Controllability of Systems: provide a high level of individual occupant control of thermal, ventilation, and lighting systems to support optimum health, productivity, and comfort conditions.

Thermal Comfort: provide for a thermally comfortable environment that supports the productive and healthy performance of the building occupants.

Daylight and Views: provide a connection between indoor spaces and the outdoor environment through the introduction of sunlight and views into the occupied areas of the building.