

## 1.0 INTRODUCTION

### 1.1 Sustainable Watershed Action Team

The Sustainable Watershed Action Team (SWAT) is a partnership between local professionals in the fields of ecology, engineering, and conservation. SWAT's goal is to protect and enhance biodiversity in the Chicago Wilderness region by assisting, upon request, local government and community developers with design and planning that incorporates innovative, environmentally sensitive practices into new developments. The SWAT partners select development projects that warrant sensitive design and planning to protect and enhance natural resources such as endangered and threatened species, wetlands (ADID wetlands in particular), Illinois Nature Preserves or Natural Area Inventory sites, recharge zones, remnant woodlands and prairies, or other significant natural resources. Local development and/or the developer soliciting SWAT's involvement must be willing to actively participate in and accept decisions to incorporate conservation design practices.

### 1.2 Scope and Project Approach

Union's need for technical assistance in preparing a comprehensive plan to guide development in their community was brought to the attention of SWAT by Senator Pam Althoff. The SWAT Director met with the Union Village Board and offered to assemble SWAT, a team of experts to assist in the natural resources component of their comprehensive plan. The Board formally requested that SWAT assist the community. Union had recently hired Paul Bednar Planning & Design, Ltd. to prepare the comprehensive plan. SWAT and Mr. Bednar then collaborated in conducting a natural resources workshop. SWAT led the natural resources workshop and visioning exercises with Village representatives that identified natural resource issues and planning goals specific to Union. The natural resource issues and planning goals and objectives identified during the workshop and visioning exercises were then used to develop conservation guidelines for Union's Comprehensive Plan.

### 1.3 Using this Document

This document provides written guidelines for the Village to develop a Comprehensive Plan that incorporates conservation approaches. The guidelines are grouped into five major categories, each of which is summarized below and expanded in a section of the document. Each section of the document identifies issues specific to the Village of Union, outlines an approach for Union to consider in developing its Comprehensive Plan, and where appropriate, provides regulatory guidelines for refining or creating local ordinances.

#### *Stormwater Management*

The STORMWATER MANAGEMENT section describes the existing stormwater drainage pattern through the Village, offers regulatory guidance for stormwater management that builds on and supplements the McHenry County Stormwater Management Ordinance (MCSMO), and discusses strategies and recommends actions for improving water quality.

#### *Natural Resource Management*

The NATURAL RESOURCE MANAGEMENT section identifies natural resource issues for the Village, defines green infrastructure and its potential use in the Village, and provides guidance for

achieving a sustainable landscape through restoration, management, monitoring, and regulatory changes.

#### *Funding Mechanisms for Maintenance/Construction*

The FUNDING MECHANISMS FOR MAINTENANCE/CONSTRUCTION section describes mechanisms for securing funds to acquire, restore, and maintain open space and natural resources in the Village. It includes a list of federal and state agencies and programs currently in place for acquisition and restoration projects.

#### *Conservation Development Strategies*

The CONSERVATION DEVELOPMENT STRATEGIES section lists objective for development within the Village, defines conservation development and the conservation planning process, provides standards for built environments, and describes techniques for implementing conservation development regulations and ordinances. Finally, this section lists benefits of conservation development to the home owner, the developer (economic comparison to conventional development), and the municipality.

#### *Landscaping*

The LANDSCAPING section defines native landscaping and describes the factors that produce a successful native landscape feature within development. These factors include design, implementation, and maintenance and management. This section also provides lists of native species recommended for planting and invasive species to remove and, in particular, to avoid installing.

#### *Appendix A*

APPENDIX A includes photographs of stormwater features and drainage in the Village.

#### *Appendix B*

APPENDIX B compiles excerpts from the Kane County Stormwater Ordinance, a northeastern Illinois county that developed stormwater volume criteria.

#### *Appendix C*

APPENDIX C summarizes and compiles Best Management Practices from a variety of regional sources. It also includes a stormwater treatment train plan view exhibit and a rain garden cross sectional exhibit.

#### *Appendix D*

APPENDIX D includes an application for review by the Green Built Home™ green building initiative in Wisconsin, and a checklist for managing river- or lake-front property.

## 2.0 STORMWATER MANAGEMENT

### 2.1 Introduction

Stormwater runoff affects the Village of Union (the Village) and its valuable resources in a number of ways. Traditionally runoff originating from upland areas south of the Village flowed north toward the South Branch of the Kishwaukee River (South Branch). Today, this runoff regime persists, but is complicated by the Village's drainage infrastructure. Slight increases in the amount of impervious surface or decreases in retention features upstream of these areas will create flooding threats to property owners. Careful land use decision making that considers the amount of impervious surface tributary to the Village will be critical to minimizing the threat to property owners.

Throughout its history, the Village has had an intimate relationship with the South Branch. The Village has stated its passion for the preservation of this wonderful natural resource. The quantity and quality of stormwater runoff leaving and passing through the Village is a critical factor impacting the overall biotic health of the South Branch. Responsible land use decision making in areas tributary to the South Branch will ensure hydraulic and water quality issues will not compromise the ecological integrity of this unique natural resource.

### 2.2 Existing Conditions

Land use types in and around the Village of Union are mostly agricultural and residential (Exhibit 1). Once outside of the Village, the land use type is almost exclusively agricultural. As noted previously, upland areas south of the Village drain north toward the South Branch. The Village is situated at the base of this upland as the land begins to flatten on its approach to the South Branch. Areas north of the Village are extremely flat with extensive hydric soils and wetlands (Exhibit 2). Reportedly, there are also issues associated with high groundwater tables.

Much of the area tributary to the Village drains to a small unnamed stream that originates to the southeast (Exhibit 3). The unnamed stream travels in a northeast direction through culverts beneath Northrop Road and Union Road (Appendix A). Shortly after passing under Union Road the channel becomes reinforced in stone, and continues to wind into the heart of Union. It then enters a box culvert. The culvert outlets to a natural channel west of the intersection of Main St. and Clark St. This channel eventually joins a swale along the Chicago and Northwestern Railroad (railroad ditch), and travels northwest towards the South Branch of the Kishwaukee River.

This study has established three stormwater management zones to aid in discussing flooding issues associated with the Village (Exhibit 4). Regional and local flooding problems impacting property owners in the Village are caused by insufficient conveyance of stormwater. The primary conveyance feature in the community is the channel and box culvert system traveling through the center of the community. According to the Village Engineer (Engineering Enterprises, Inc.) site logistics have dictated that the design capacity of this conveyance feature has been limited to the 5- to 10-year recurrence interval design storms. When a storm of greater intensity and runoff flow rate impacts the Village, the system surcharges and flood waters drain through the streets, eventually reaching the railroad ditch.

Much of the flooding in the Village is likely due to inadequate maintenance of the channel and box culvert system and the Railroad Ditch. This conveyance system has limited capacity and is very

susceptible to blockages by debris. It is likely that flow velocities are very low even during the most severe of storm events due to small channel slopes. This limits the ability of the system to generate enough momentum to clean itself, and even light blockages can cause flooding great distances upstream. The severity of this problem is enhanced, because there are no alternative routes for flood waters to travel. The result is street flooding.

Flooding in remnant South Branch floodplain areas north of the Village occurs because of low-infiltrating hydric soils and small slopes. The result is very little conveyance, and localized flooding happens quite regularly. This area is largely agricultural and drained, but under residential land use more frequent and severe localized flooding should be expected.

### **2.3 Regulatory Guidance**

The base stormwater management regulatory criteria for the Village are outlined in the *McHenry County Stormwater Management Ordinance* (MCSMO 2004). Stormwater and water quality issues unique to the Village and its surrounding areas require special consideration in addition to this study. This study is intended to build on criteria outlined in the MCSMO, which should be consulted for guidance regarding all topics not discussed herein.

#### *Runoff Calculations*

Intricate stormwater analyses should be performed due to overland drainage limitations in and around the Village. Therefore, hydrologic analyses for tributary areas greater than 5 acres should include dynamic, hydrograph based computer modeling with one of the following software packages: TR-20, HEC-1, HEC-HMS, PondPack, XP-SWMM, or a McHenry County Stormwater Commission approved hydrograph method. The Rational Method may be used to calculate discharges for tributary areas of less than 5 acres.

#### *Release Rates and Discharges*

Allowable runoff release rates for Zone B should be set so as not to exceed the capacity of the box culvert downstream of the railroad. The allowable release rate for each development site within Zone C should be established by proportioning the capacity of the box culvert by the percentage of the total area of Zone C the development represents. For example, let's assume an individual would like to develop 40 acres of the 393 acres in Zone C. That individual would have an allowable 100-year critical duration release rate of 10% of the capacity of the box culvert.

#### *Runoff Volume*

Flooding and water quality concerns require special considerations in addition to criteria expressed in the MCSMO for areas in and around the Village. Development of areas greater than 5 acres within Zone A should employ extensive infiltration practices to ensure the protection of property against flooding. These areas are largely agricultural with very little overland conveyance capacity. These features, in addition to the presence of extensive hydric soil complexes, suggest that this area is probably drained with tiles. This drainage infrastructure will be inadequate to support residential land uses and alternative means of stormwater management will be required.

Reducing the flooding threat to property owners in this area will require stormwater volume control. Rate based stormwater management criteria are inadequate in low-lying areas with poor conveyance, because flooding can be severe even if the allowable release rate is exceeded. This is due to the allowable release rate occurring over longer durations under proposed conditions as compared to

existing conditions. The longer duration results in a greater volume being conveyed downstream resulting in flooding in these areas.

Communities throughout northeastern Illinois have adopted ordinances containing stormwater volume criteria (Appendix B). It is critical that development in Zone A retain or infiltrate the entire runoff volume generated from rainfall events less than or equal to 0.75 inches over a duration of 24 hours. For rainfall events greater than 0.75 inches the runoff volume for the first 0.75 inches of rainfall should be retained or infiltrated. Infiltration and groundwater recharge are preferred over surface retention. Infiltration and groundwater recharge techniques should employ best management practices whenever possible (Appendix C).

Infiltration and groundwater recharge are preferred over surface retention to preserve and enhance water quality in Zone A. A more exhaustive explanation of the impact of infiltration on specific water quality issues is provided in the *Water Quality* section of this study. As discussed previously, a common problem with rate-based stormwater management criteria occurs when allowable release rate criteria are met, but flow rates persist for longer durations than they would have under existing conditions. This phenomenon results in increased erosion and failure of water bodies, as they experience shear stresses over longer durations than would occur under existing conditions. In addition to the destruction of stream and shoreline habitat, water quality is compromised as flows carry eroded sediment and turbidity increases. Receiving water bodies are negatively impacted due to sediment deposition when flow velocities decrease. This occurs when storm flows subside or when sediment reaches static water bodies such as a lakes or wetlands.

## 2.4 Water Quality

The section of the South Branch of the Kishwaukee River (South Branch) directly tributary to the Village is a sensitive, high priority natural feature. The Kishwaukee River Ecosystem Partnership (KREP) has included it in its top 10% priority subwatersheds that should be the focus of concentrated watershed protection efforts to ensure that existing natural resources are enhanced and not compromised by future development.

KREP included the Village in the sub-watershed area identified as the South Branch Kishwaukee River (East). There is a deficiency of water quality data for this section of the Kishwaukee River, but the latest Illinois Environmental Protection Agency (IEPA) water quality report (2002) did not list the river as impaired. Despite this, its receiving stream (The Kishwaukee River) was considered impaired by non-priority organics, PCBs, and pathogens.

Overall, the existing condition of water quality is quite good in this section of the South Branch of the Kishwaukee River, and should be vigorously protected. Compared to other watersheds in Illinois, the South Branch of the Kishwaukee River does not contain excessively high loads of Nitrogen, Phosphorus, or Sediment (Short 1999).

### *Constituents of Concern*

Though portions of the South Branch of the Kishwaukee River in the vicinity of the Village are considered not impaired, steps should be taken to ensure that contamination will not occur in the future. Future development planned will increase impervious surface with potential adverse impacts on the water quality of the South Branch. Water quality protection programs and designs should

focus on the following contaminants and processes found elsewhere in the Kishwaukee River Watershed:

- PCBs
- Pathogens
- Non-priority organics
- Siltation
- Total Ammonia-N
- Metals
- Nutrients
- Phosphorus
- Nitrates
- Salinity/Total Dissolved Solids/Chlorides
- Low dissolved oxygen
- Thermal Pollution

#### *Regional Mitigation Strategies*

This study has established three zones of concern for water quality mitigation (Exhibit 5). The priority of action generally decreases with increasing distance from the South Branch. Stormwater runoff from areas immediately adjacent to the South Branch have lower travel times, and therefore experience less treatment. It is critical that runoff from Zone 1 experiences extensive and exhaustive treatment processes. It is not necessary for treatment of stormwater runoff in Zone 2 to be as extensive as that of Zone 1, but some treatment should be required. Treatment of runoff in Zone 3 should be performed to maintain good stewardship of the Kishwaukee River Watershed, but it is not critical to the overall health of the South Branch.

Native plant communities should be used to treat contaminants and improve water quality of stormwater runoff. Native plants out-perform non-native species by utilizing large amounts of water and increasing infiltration. These processes chemically and physically treat stormwater runoff resulting in improved water quality. Runoff not infiltrated or used by rain garden plants should be routed to vegetated swales (Appendix C). These features are simply earthen channels infused with native plant species that slow down and infiltrate large amounts of runoff. Vegetated swales should be used to convey runoff to expansive prairie complexes that spread runoff over a large area.

Distributing the flow over large areas in prairies enhances infiltration by large, deep rooted prairie plant species (Appendix C). In the process, contaminants are either drawn into the sub-surface or utilized by the extensive prairie bio-mass. In either case water quality is drastically improved. Prairies are particularly effective in removing Phosphorus, metals, Sodium, and non-priority organics. The increased friction the prairie introduces to the flow slows it down causing sediment to fall out. Lastly, enhanced infiltration draws warm surface runoff into cold, groundwater reservoirs greatly reducing the threat of thermal pollution.

Prairies should be sloped toward designed or existing wetlands for the final and most critical portion of the stormwater treatment process (Appendix C). Native wetland plant species treat stormwater similarly to prairie plant species. These species do so more by uptake than by infiltration, but the result is a very high quality stormwater effluent. These environments are critical for the removal of

nutrients such as Nitrogen, Nitrates, and Ammonia. They are also very effective at mitigating problems associated with non-priority organics, PCBs, and low dissolved oxygen.

The processes outlined above are applicable to all developments larger than 5 acres. Regional stormwater treatment should be provided for all design storms with exceedance probabilities greater than or equal to 0.50 (less than or equal to the 2-year recurrence interval). This will provide treatment of approximately 90% of all stormwater runoff in the watershed. Zone 1 should implement the entire stormwater treatment process outlined above. Integration of rain gardens, bioswales, and prairie complexes into all development in Zone 2 should provide adequate stormwater treatment. Utilization of pieces of the process outlined above should be encouraged in Zone 3, but is not absolutely necessary.

An environmental engineer or water scientist should be contracted to establish minimum water quality standards for the constituents discussed above prior to development in Zone I. It is recommended that this be done prior to development of any kind in the Village and surrounding areas, but it is particularly critical in Zone 1.

#### *Site Scale Best Management Practices*

Developments less than 5 acres in size should route stormwater runoff from impervious surfaces to infiltration zones such as rain gardens (Appendix C). This helps minimize thermal pollution by conveying runoff to cool, groundwater reservoirs. Runoff contaminants are either discarded through the respiration of rain garden plants, physically or chemically treated as they travel through subsurface substrates, or travel in solution to groundwater reservoirs and are diluted.

## **2.5 Planned Improvements**

Stormwater infrastructure improvements are planned for the future. The Illinois Department of Natural Resources (IDNR) is planning a hydraulic study of the railroad ditch, though a timeline has not been set. It is believed that this would establish water surface elevations and a well-articulated maintenance schedule for the entire system.

The Village Engineer (Engineering Enterprises, Inc) has identified a second potential major stormwater improvement project. This project includes a large regional detention facility southeast of the Village, along Union Road, just upstream of the recently designed box culvert. The goal of this improvement will be to provide adequate stormwater runoff rate control to prevent overtopping of the existing conveyance feature through the center of the Village. Presently, this project has not reached the design phase and is only a conceptual idea for the Village to consider.

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**Exhibit 1:** Existing land use conditions.

**Exhibit 2:** Aerial photograph with delineated wetlands and hydric soils.

**Exhibit 3:** USGS topographic map of Village of Union and surrounding areas.

**Exhibit 4:** Layout of zones used in stormwater management discussion.

**Exhibit 5:** Layout of zones used in water quality discussion.

## 3.0 NATURAL RESOURCE MANAGEMENT

### 3.1 Introduction

The Village of Union is located within the 1,250 square mile Kishwaukee River Watershed. The Village sits at the intersection of three subwatersheds: the Kishwaukee River Subwatershed, the South Branch Kishwaukee River (East) Subwatershed, and the Union Creek Subwatershed. All three subwatersheds contain greater than 70% agricultural land cover, and between 7% and 10% urban cover. Open space cover ranges between 9% and 17% (KREP 2004a, b, and c).

Natural resources within the Kishwaukee River Watershed are generally found along the river, or within the watershed's natural areas, nature preserves, and forest preserves and trails maintained by conservation districts. Fifty-three miles of the Kishwaukee River main stem are considered a "Class A Stream" due to the presences of sensitive fish species (KREP et al. 2004). Several biologically significant tributaries contain high mussel and fish diversity (IDNR 1997). And, at least 44 threatened or endangered plant and animal species utilize the watershed (KREP et al. 2004).

Natural resources within the three subwatersheds closest to the Village are predominately wetlands and hydric soils associated with tributaries of the mainstem and South Branch of the Kishwaukee River (South Branch). The river and its tributaries also support a fair amount of biological resources including mussels, fish, birds, reptiles, and amphibians, some of which are listed as threatened or endangered. Undoubtedly there are isolated resources on private lands, such as closed-canopy forests or prairies (the predominant pre-settlement vegetation types), seeps, hydric soils, and recharge zones that may be undocumented and likely unprotected but can be identified during the planning process.

The primary natural resource issues for the Village are urban development, habitat degradation or loss, and unprotected open space. Its location at the intersection of three subwatersheds makes the Village vulnerable to the consequences of upstream development, but also makes the Village a prime location for headwaters restoration. More specific natural resource concerns include:

- Unprotected and/or degraded wetlands;
- Other unprotected open space such as recharge zones;
- Degraded and/or channelized streams;
- Lack of wetland and stream buffers vegetated with native plants;
- Poorly managed and unprotected hydric soils;
- Habitat loss;
- Changing land uses favoring urban development and unmanaged agricultural land;
- Poor or unmanaged water quality;
- Overgrown riparian corridors or treelines;
- Invasive species in wetlands and floodplains.

Before developing a Comprehensive Plan, the Village should consult a variety of available watershed resources, GIS layers, and ordinance guidance, particularly to consolidate and create natural resources maps to guide land management and protection. Watershed information is extensive and

wide spread across several agencies. Some of the local contacts which have completed, contributed to, or funded recent studies are:

- Kishwaukee River Ecosystem Partnership: (815)-621-9358 or <http://krep.bios.niu.edu>;
- McHenry County Defenders: [www.mcdef.org](http://www.mcdef.org);
- McHenry County Soil & Water Conservation District: (815)-338-0099 or [www.mccdDistrict.org](http://www.mccdDistrict.org);
- Illinois Department of Natural Resources: [www.dnr.state.il.us](http://www.dnr.state.il.us);
- Northeastern Illinois Planning Commission website: [www.nipc.cog.il.us](http://www.nipc.cog.il.us), where you can order model ordinance documents.

Once natural resource information and/or maps are consolidated or created, the Village can proceed with developing goals, objectives, and implementation strategies for each natural resource issue, or for specific natural resources mapped within municipal limits. A field reconnaissance investigation of mapped resources is highly recommended before finalizing the Comprehensive Plan for natural resource protection.

### **3.2 Green Infrastructure**

Greenways are linear tracts of land, sometimes known as environmental corridors that typically follow natural corridors such as streams, remnant prairie areas, forested lands, and wetlands. Greenways inherently connect a variety of habitats and land uses, flowing from farm field to suburban stream.

Green infrastructure protects natural resources and provides wildlife habitat within natural communities such as wetlands, stream corridors, prairie remnants, and forest areas, while greatly enhancing the quality of life for the public. For example, stream corridors can be employed as stormwater and flood management while providing scenic bike trails. Unused rail tracks can be converted into corridors for utilities while providing nature trails, space for recreation and habitat for wildlife.

Nearly without exception, the more land available for ecological greenways, the better they will function and improve “ecological health.” Larger parcels, particularly when connected to other large parcels, display a greater richness in species diversity and have greater potential to sustain rare species that have very specific ecological requirements. River corridors are obvious passageways for many wildlife species, and providing connections between disjointed reaches of stream corridor or patches of natural areas will enable many species to travel more freely. Greenway connections not only help provide additional food sources and shelter for species, they also help broaden the gene pool, improving disease resistance and survivability.

#### *Union Greenway Potential*

Techniques for establishing greenways and trails involve several steps. The first step involves the development of a plan that proposes general locations for greenways and trails. River and stream corridors have the greatest potential for greenway planning, as evidenced by GIS maps developed and reported by KREP (2005), and mapped on a Greenway Infrastructure Vision Plan developed by the Northeastern Illinois Planning Commission (2004) for the six-county Chicago region. GIS layers could likely be obtained from KREP or NIPC for little or not cost to assist the Village with selecting sites for greenway development.

In the case of trails, the plan should identify who the users will be and provide direction on trail standards. Plans can be developed at the community and/or county level as well as regionally, statewide, and in a few cases, at the national level. Public and stakeholder input are crucial for developing successful greenway and trail plans.

Several techniques can be used for establishing greenways and trails. Greenways can remain in private ownership, they can be purchased, or easements can be acquired for public use. If the lands remain in private ownership, greenway standards can be developed, adopted and implemented at the local level through land use planning and regulation. Development rights for the greenway can be purchased from private landowners where regulations are unpopular or not feasible.

If the greenways will include trails for public use, the land for trails is usually purchased and held by a public agency such as a forest preserve district or local park system. In some cases, easements will be purchased rather than purchasing the land itself. Usually longer trail systems are built in segments, and completing connections between communities and to regional trails depends heavily on the level of public interest in those communities.

In new developing areas, the local planning authority can require trails. Either the developer or the community can build the trails. In some cases, the developer will voluntarily plan and build a trail connection through the development and use this as a marketing tool to future homebuyers. In other cases, the local planning authority may require the developer to donate an easement for the trail.

### **3.3 Restoration and Management**

The Union Comprehensive Plan should include goals and objectives to achieve a sustainable landscape that permits growth, change, and development while recognizing, protecting, enhancing, and maintaining natural resources. It is Union's responsibility to define the point at which it can indefinitely maintain an acceptable level of resource quality within the context of development and land use changes. Sustainable systems are characterized by having the following factors:

- Stable soils;
- A predominance of sustainable populations of native plants;
- Quality water, at appropriate rates and volumes (see Stormwater Management section);
- Ecological components in appropriate compositions and locations to reflect the local evolutionary ecological history between plants, animals, hydrology, soils, and other factors;
- The capacity to change and adapt to disturbance, climatic swings, etc.; and
- Diverse plant and animal communities.

All of these characteristics of a sustainable ecosystem require a stewardship commitment between people and ecological resources, funds and policies to improve and maintain ecological health, and a commitment by the Village and its residents to restore degraded ecosystems and promote their health through long-term management and monitoring.

## *Restoration*

Restoration of natural resources in the Village should focus on the following:

- Reduce non-native shrubs and trees;
- Reduce non-native ground cover vegetation both in the forested areas and in open fields;
- Reduce overstocked canopy of native, early successional trees;
- Enhance opportunities for growth of native ground cover vegetation;
- Reintroduce native plant material;
- Enhance opportunities for ecological buffers between developed properties and natural resource areas (i.e. vegetation buffers, detention ponds, etc.);
- Remove various debris in streams (i.e. piles of logs, litter, debris delivered as flotsam during floods, man-made structures, etc.);
- Restore fire and hydrology where possible.

There are a number of specialized yet straightforward techniques used to carry out the specific restoration tasks listed above. The following provides an overview of the techniques that are used most often. Of the techniques listed, prescribed burning is the single most useful and important management method required for restoration. The other restoration techniques and strategies are most often used to prepare a site for prescribed burning or as a means to reintroduce proper conditions and species into sites. It is important to underscore that these techniques are used as part of a well-thought-out program that considers scientific practicality, costs, and safety.

## Prescribed Burning

Prescribed burning is generally defined as:

*the highly controlled use of fire under optimal weather and environmental conditions to achieve specific ecological objectives.*

Fires started by indigenous people and natural causes have played an important role in the evolution and maintenance of many biological systems throughout North America. It is now realized just how essential the role of fire is in maintaining grasslands, wetlands, savannas, barrens, and numerous forest types. Prairies and savannas exist almost entirely because of fire. Fire kills saplings, keeping the prairies open and free of trees and shrubs. Fire also stimulates germination of many prairie seeds. The blackened, warmed soil encourages the early growth of grasses and forbs.

It is now realized that fire suppression can result in gross changes in the aspect, appearance, and ecological functions of natural systems. Fire suppression is often followed by a decline in the richness and diversity of native plants and animal species, increased litter, shading, phytotoxin build-up in substrates, decreased availability of essential nutrients and increased homogeneity in habitat structure and spatial heterogeneity. Reduced nutrient cycling and increasing domination by a few species often results. In some ecosystems, shifts in wildlife and increases in shade tolerant and less flammable plant species accompany fire suppression.

Prescribed burning has been the primary management tool in prairies, but only recently have efforts been made to use fire for the maintenance and restoration of other ecological systems. No other

technique comes close to the impact that this naturally occurring phenomenon has on restoring and preserving natural ecological systems. It is a fundamental component of the restoration program to which there is no reasonable substitute. Conducted by trained personnel, prescribed burning has proven to be safe and efficient.

### Weeding and Brushing

Preparation of the site so that prescribed burning can be introduced is necessary given the extent to which invasive species have established in forest, prairie, and wetland communities. Weeding and brushing are the primary techniques used where dense brush and little combustible fuel occur. Manual reduction of existing dense shrub growth is required to open these areas. Once open, prescribed burning can be used. This will be especially successful if native ground cover vegetation regeneration responds directly to the reintroduction of fire.

If the use of fire is hampered in areas with non-native cool season grasses, alternatives to consider to facilitate the eventual use of fire include:

- Very careful and discriminate use of herbicides – used where the evergreen growth of cool season grasses does not carry fire. Direct plant contact with a wick applicator and the herbicide Rodeo or Roundup provides quick and safe initial control of grasses.
- Low mowing of the grasses (0.5 to 1 inch height) – can reduce green foliage and, after drying, litter can be used as a fuel to carry a fire.

Herbicide is generally applied to cool season grasses after they have reached a height of 5 to 8 inches and display a new flush of green, actively growing foliage. It is applied at prescribed rates by trained and licensed field specialists. On larger pieces of property, wick applicators with adjustable boom heights are very useful for “wicking” plants.

Careful oversight of the process is critical regardless of the method used. Although the herbicides used are incorporated into plant tissues within several hours after application, and wick application (in contrast to spraying) involves a very small quantity of herbicide, the areas that are treated should be field labeled and guarded to restrict human use for the first couple hours after application. The herbicides used, such as Roundup, have very low toxicity to humans and wildlife and will not present a threat when used properly.

Prescribed fire usually follows 5-15 days after the herbicide treatment or after the mowed grasses are dry enough to burn, which varies depending on weather conditions.

### Seed Harvesting and Disbursement/Planting

Reintroduction of vegetative species is generally required in areas where natural seed banks are lacking or in areas offering little opportunity for self-regeneration. In these instances, it is recommended that reintroduction be limited as much as possible to species that have historically occurred in the area.

In some cases, the use of non-native vegetative species may be warranted. An example of this is display gardens with plant species that may or may not have historic relevance. Another example is

the use of short-lived non-native species (i.e., annual rye grass) that may assist in stabilizing badly eroding slopes. The key point is to understand the use of these plant species and their propensity for getting out of control, as is the case with buckthorn.

Plant propagation and the introduction of seeds and plants of local species should continue concurrently with other management and restoration strategies to achieve restoration objectives. Some native soil seed banks are likely present within the Village and will be vital to restoration programs. But to restore these and other areas, additional seeds from native species (either propagated and cultivated for seed production or hand-picked) should be gathered or produced in ample quantity and quality to enable prompt introduction during the early years of restoration.

For species that are no longer present in the area, appropriate locations should be identified for seed harvesting, propagation, cultivation and eventual introduction purposes. As much as possible, seeds should come from areas close to the site of introduction. The bounds for collection for any introduction program are typically limited to the physiographic province (i.e., natural area division) of the recipient location.

A list of native species recommended for various types of restoration is provided below.

***Emergent/Open Water Plants***

|                       |                              |
|-----------------------|------------------------------|
| Common water plantain | <i>Alisma subcordatum</i>    |
| Spike rush            | <i>Eleocharis spp.</i>       |
| Rice cut grass        | <i>Leersia oryzoides</i>     |
| Common arrowhead      | <i>Sagittaria latifolia</i>  |
| River bulrush         | <i>Scirpus fluviatilis</i>   |
| Chairmaker's rush     | <i>Scirpus pungens</i>       |
| Great bulrush         | <i>Scirpus validus</i>       |
| Common bur reed       | <i>Sparganium eurycarpum</i> |

***Wet Prairie Plants***

|                          |                                 |
|--------------------------|---------------------------------|
| Wingstem                 | <i>Actinomeris alternifolia</i> |
| Common water plantain    | <i>Alisma subcordatum</i>       |
| Canada anemone           | <i>Anemone canadensis</i>       |
| Swamp milkweed           | <i>Asclepias incarnata</i>      |
| New England aster        | <i>Aster novae-angliae</i>      |
| Panicled aster           | <i>Aster simplex</i>            |
| Beggar's ticks           | <i>Bidens spp.</i>              |
| Bebb's oval sedge        | <i>Carex bebbii</i>             |
| Bristly sedge            | <i>Carex comosa</i>             |
| Lance-fruited oval sedge | <i>Carex scoparia</i>           |
| Brown fox sedge          | <i>Carex vulpinoidea</i>        |
| Spike rush               | <i>Eleocharis spp.</i>          |
| Virginia wild rye        | <i>Elymus virginica</i>         |
| Cinnamon willow herb     | <i>Epilobium coloratum</i>      |
| Common boneset           | <i>Eupatorium perfoliatum</i>   |
| Fowl manna grass         | <i>Glyceria striata</i>         |
| Sneezeweed               | <i>Helenium autumnale</i>       |

|                        |                                 |
|------------------------|---------------------------------|
| Rush                   | <i>Juncus spp.</i>              |
| Rice cut grass         | <i>Leersia oryzoides</i>        |
| Cardinal flower        | <i>Lobelia cardinalis</i>       |
| Water horehound        | <i>Lycopus americanus</i>       |
| Monkey flower          | <i>Mimulus ringens</i>          |
| Switch grass           | <i>Panicum virgatum</i>         |
| Smartweed              | <i>Polygonum spp.</i>           |
| Common mountain mint   | <i>Pycnanthemum virginianum</i> |
| Dark green rush        | <i>Scirpus atrovirens</i>       |
| Wool grass             | <i>Scirpus cyperinus</i>        |
| Cup plant              | <i>Silphium perfoliatum</i>     |
| Grass-leaved goldenrod | <i>Solidago graminifolia</i>    |
| Blue vervain           | <i>Verbena hastata</i>          |
| Common ironweed        | <i>Vernonia fasciculata</i>     |
| Golden alexanders      | <i>Zizia aurea</i>              |

### ***Mesic Prairie Plants***

|                          |                                 |
|--------------------------|---------------------------------|
| Nodding wild onion       | <i>Allium cernuum</i>           |
| Lead plant               | <i>Amorpha canescens</i>        |
| Big bluestem             | <i>Andropogon gerardii</i>      |
| Little bluestem          | <i>Andropogon scoparius</i>     |
| Thimbleweed              | <i>Anemone cylindrica</i>       |
| Sky blue aster           | <i>Aster azureus</i>            |
| Smooth blue aster        | <i>Aster laevis</i>             |
| New England aster        | <i>Aster novae-angliae</i>      |
| White wild indigo        | <i>Baptisia alba</i>            |
| Beaked sedge             | <i>Carex bicknellii</i>         |
| Partridge pea            | <i>Cassia fasciculata</i>       |
| Prairie coreopsis        | <i>Coreopsis palmata</i>        |
| Tall coreopsis           | <i>Coreopsis tripteris</i>      |
| Showy tick trefoil       | <i>Desmodium canadense</i>      |
| Pale purple coneflower   | <i>Echinacea pallida</i>        |
| Canada wild rye          | <i>Elymus canadensis</i>        |
| Rattlesnake master       | <i>Eryngium yuccifolium</i>     |
| Flowering spurge         | <i>Euphorbia corollata</i>      |
| False sunflower          | <i>Heliopsis helianthoides</i>  |
| St. Johns wort           | <i>Hypericum spp.</i>           |
| Round-headed bush clover | <i>Lespedeza capitata</i>       |
| Rough blazing star       | <i>Liatris aspera</i>           |
| Wild bergamot            | <i>Monarda fistulosa</i>        |
| Evening primrose         | <i>Oenothera biennis</i>        |
| Switch grass             | <i>Panicum virgatum</i>         |
| Wild quinine             | <i>Parthenium integrifolium</i> |
| Foxglove beard tongue    | <i>Penstemon digitalis</i>      |
| Purple prairie clover    | <i>Petalostemum purpureum</i>   |
| Prairie cinquefoil       | <i>Potentilla arguta</i>        |
| Yellow coneflower        | <i>Ratibida pinnata</i>         |

|                   |                              |
|-------------------|------------------------------|
| Wild rose         | <i>Rosa spp.</i>             |
| Black-eyed Susan  | <i>Rudbeckia hirta</i>       |
| Cup plant         | <i>Silphium perfoliatum</i>  |
| Stiff goldenrod   | <i>Solidago rigida</i>       |
| Indian grass      | <i>Sorghastrum nutans</i>    |
| Meadow rue        | <i>Thalictrum dasycarpum</i> |
| Spiderwort        | <i>Tradescantia obiensis</i> |
| Hoary vervain     | <i>Verbena stricta</i>       |
| Common ironweed   | <i>Vernonia fasciculata</i>  |
| Golden alexanders | <i>Zizia aurea</i>           |

### ***Savanna/Woodland Plants***

|                          |                                |
|--------------------------|--------------------------------|
| Yellow giant hyssop      | <i>Agastache nepetoides</i>    |
| Nodding wild onion       | <i>Allium cernuum</i>          |
| Big bluestem             | <i>Andropogon gerardii</i>     |
| Little bluestem          | <i>Andropogon scoparius</i>    |
| Tall thimbleweed         | <i>Anemone virginiana</i>      |
| Columbine                | <i>Aquilegia canadensis</i>    |
| Purple milkweed          | <i>Asclepias purpurascens</i>  |
| Smooth blue aster        | <i>Aster laevis</i>            |
| Woodland brome           | <i>Bromus pubescens</i>        |
| Tall bellflower          | <i>Campanula americana</i>     |
| Beaked sedge             | <i>Carex bicknellii</i>        |
| Long-beaked sedge        | <i>Carex sprengeii</i>         |
| Tall coreopsis           | <i>Coreopsis tripteris</i>     |
| Showy tick trefoil       | <i>Desmodium canadense</i>     |
| Canada wild rye          | <i>Elymus canadense</i>        |
| Purple joe-pye weed      | <i>Eupatorium purpureum</i>    |
| Wild geranium            | <i>Geranium maculatum</i>      |
| Woodland sunflower       | <i>Helianthus divaricatus</i>  |
| False sunflower          | <i>Heliopsis helianthoides</i> |
| Bottlebrush grass        | <i>Hystrix patula</i>          |
| Round-headed bush Clover | <i>Lespedeza capitata</i>      |
| Rough blazing star       | <i>Liatris aspera</i>          |
| Wild bergamot            | <i>Monarda fistulosa</i>       |
| Switch grass             | <i>Panicum virgatum</i>        |
| Foxglove beard tongue    | <i>Penstemon digitalis</i>     |
| Yellow coneflower        | <i>Ratibida pinnata</i>        |
| Wild rose                | <i>Rosa spp.</i>               |
| Black-eyed Susan         | <i>Rudbeckia hirta</i>         |
| Brown-eyed Susan         | <i>Rudbeckia triloba</i>       |
| Rosinweed                | <i>Silphium integrifolium</i>  |
| Stiff goldenrod          | <i>Solidago rigida</i>         |
| Meadow rue               | <i>Thalictrum dasycarpum</i>   |
| Spiderwort               | <i>Tradescantia obiensis</i>   |
| Hoary vervain            | <i>Verbena stricta</i>         |
| Golden alexanders        | <i>Zizia aurea</i>             |

### **Woodland Enhancement Plants**

|                       |                               |
|-----------------------|-------------------------------|
| Wild garlic           | <i>Allium cernuum</i>         |
| Tall thimbleweed      | <i>Anemone virginiana</i>     |
| Columbine             | <i>Aquilegia canadensis</i>   |
| Smooth blue aster     | <i>Aster laevis</i>           |
| Woodland brome        | <i>Bromus pubescens</i>       |
| Tall bellflower       | <i>Campanula americana</i>    |
| Partridge pea         | <i>Cassia fasciculata</i>     |
| Canada wild rye       | <i>Elymus canadense</i>       |
| Virginia wild rye     | <i>Elymus virginicus</i>      |
| Wild geranium         | <i>Geranium maculatum</i>     |
| Woodland sunflower    | <i>Helianthus divaricatus</i> |
| Bottlebrush grass     | <i>Hystrix patula</i>         |
| Wild bergamot         | <i>Monarda fistulosa</i>      |
| Woodland phlox        | <i>Pblox divaricata</i>       |
| Smooth Solomon's seal | <i>Polygonatum biflorum</i>   |
| Blue-eyed grass       | <i>Sisyrinchium albidum</i>   |
| Elm-leaved goldenrod  | <i>Solidago ulmifolia</i>     |
| Germander             | <i>Teucrium canadense</i>     |
| Meadow rue            | <i>Thalictrum spp.</i>        |
| Spiderwort            | <i>Tradescantia obiensis</i>  |

### **Tall Grass Prairie Plants\***

|                 |                               |
|-----------------|-------------------------------|
| Big bluestem    | <i>Andropogon gerardii</i>    |
| Little bluestem | <i>Andropogon scoparius</i>   |
| Sideoats grama  | <i>Bouteloua curtipendula</i> |
| Prairie sedge   | <i>Carex bicknellii</i>       |
| Canada wild rye | <i>Elymus canadensis</i>      |
| Indian grass    | <i>Sorghastrum nutans</i>     |

### **Short Grass Prairie Plants\***

|                 |                               |
|-----------------|-------------------------------|
| Big bluestem    | <i>Andropogon gerardii</i>    |
| Little bluestem | <i>Andropogon scoparius</i>   |
| Sideoats grama  | <i>Bouteloua curtipendula</i> |
| Prairie sedge   | <i>Carex bicknellii</i>       |
| Canada wild rye | <i>Elymus canadensis</i>      |

\*Grassland prairie mixes can include varying amounts of mesic prairie forbs to add color and texture

## Target Species for Restoration

KREP (2005) has recommended that restoration in priority subwatersheds of the Kishwaukee River Watershed focus on target species habitat protection areas. KREP compiled a list of target species from several databases. These species are declining, unstable, are threatened or endangered, or have the potential to become threatened or endangered. KREP recommends that large tracts of land be identified and restored particularly to protect populations of species on the target list. Target species habitat restoration areas identified by KREP to include the riparian corridor along the South Branch of the Kishwaukee River adjacent to the Village of Union. Based on GIS maps developed by KREP (2005), the greatest potential for target species habitat restoration within municipal limits or its outlying areas appears to be within riparian forests and grasslands.

### *Maintenance and Management*

A short-term (up to five year) and long term (beyond five years) maintenance and management plan is a critical for restoration success. Landscapes restored with native species (prairies in particular) take three to five years to become established. Most of the maintenance and management work takes place during years one to three. If properly designed, installed, and maintained, the restored landscape should be relatively low maintenance in perpetuity after years three to five.

A typical five-year maintenance plan involves site preparation, herbicide management, seeding/planting, mowing, burn administration and prescribed burning, and routine site inspection for long-term weed management. There is generally enough fuel by the third or fourth year to permit a burn. Prescribed burning typically becomes the primary long-term management tool before the end of the five-year management period, and at that point can be reduced to one burn every two to three years in the spring or fall as conditions warrant.

### *Monitoring*

Monitoring compliments a short and long term management program by documenting restoration success and recommending management strategies to target specific problems and accomplish specific restoration goals. Monitoring is also important during installation. Like management, monitoring is most intense (one to four times per month) during the growing seasons of the first three years, but tapers off to twice annually in years four and five once plantings become well established. On occasion a regulatory agency requires a longer monitoring period, but most restored landscapes meet performance standards by the end of year five.

## TYPICAL FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

|   | YEAR 1                    | YEAR 2                    | YEAR 3                    | YEAR 4                    | YEAR 5                    |
|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|   | QTR                       | QTR                       | QTR                       | QTR                       | QTR                       |
| *[Bracket/ <b>Bold</b> ] indicates quarter when work will be conducted.   |                           |                           |                           |                           |                           |
| <b>1. Site Preparation:</b>   | <b>[1]</b> [2] 3 4        | 1 <b>[2]</b> 3 4          | 1 2 3 <b>[4]</b>          | 1 2 3 4                   | 1 2 3 4                   |
| Includes the application of herbicide or tilling as a means of removing unwanted existing vegetation and prepping the soil. The extent of prep work into years two and three depends on the Site Preparation specification. |                           |                           |                           |                           |                           |
| <b>2. Herbicide management:</b>   | 1 <b>[2]</b> <b>[3]</b> 4 |
| Herbicide reed canary grass, cool season grass, cattails.   |                           |                           |                           |                           |                           |
| <b>3. Seeding/Planting:</b>   | 1 <b>[2]</b> 3 <b>[4]</b> | 1 <b>[2]</b> 3 <b>[4]</b> | 1 2 3 4                   | 1 2 3 4                   | 1 2 3 4                   |
| Installed either in Spring or Fall after the site has been adequately prepared.   |                           |                           |                           |                           |                           |
| <b>4. Mowing:</b>   | 1 <b>[2]</b> <b>[3]</b> 4 | 1 <b>[2]</b> 3 <b>[4]</b> |
| Conducted once or twice the first year and once the second year for weed control. Mowing annually in the spring or fall can be used for long-term management if prescribed burning is not allowed.                          |                           |                           |                           |                           |                           |
| <b>5. Burn Administration:</b>  | 1 2 3 4                   | 1 2 3 4                   | 1 <b>[2]</b> 3 4          | 1 <b>[2]</b> 3 4          | 1 <b>[2]</b> 3 4          |
| Apply for permits, schedule burn, contact local authorities, finalize burn plan   |                           |                           |                           |                           |                           |
| <b>6. Conduct Burn:</b>   | 1 2 3 4                   | 1 2 3 4                   | 1 <b>[2]</b> 3 4          | 1 <b>[2]</b> 3 4          | 1 <b>[2]</b> 3 4          |
| <b>7. Weed Management and Site Inspection:</b>  | 1 <b>[2]</b> <b>[3]</b> 4 |
| Assess site conditions, identify threats, i.e. buckthorn, reed canary grass, cattail. Recommend mowing and/or herbicide application where necessary.  |                           |                           |                           |                           |                           |

NOTE: Quarter 1 = Winter, Quarter 2 = Spring, Quarter 3 = Summer, Quarter 4 = Fall

### *Performance Standards*

Performance standards are critical for quantifying progress toward restoration goals and objectives. Standards vary depending on planting zones and project objectives. The five year standards described below are reasonable guidelines for a restored landscape or a native planting created for a new development. The standards would not be appropriate for a wetland mitigation area or a natural area where biodiversity standards would be more stringent. Developers can adopt more stringent standards, but costs for materials and management increase with required performance.

|   |
|---|
| <b>Emergent/Open Water</b>  |
| <ul style="list-style-type: none"> <li>• By the end of the fifth year, 80% of the species installed shall be present, and at least 60% of the total cover shall be native species.</li> <li>• Total vegetation cover within emergent/open water zones shall be at least 60% by the end of year five.</li> <li>• Total reed canary grass cover shall not exceed 20%.</li> <li>• Total cattail cover shall not exceed 40%.</li> </ul>               |
| <b>Wet Prairie</b>  |
| <ul style="list-style-type: none"> <li>• By the end of the fifth year, 80% of the species installed shall be present, and at least 60% of the total cover shall be native species.</li> <li>• By the end of the third through the fifth year, total vegetation cover within the wet prairie shall be at least 90%.</li> <li>• Total reed canary grass cover shall not exceed 10%.</li> <li>• Total cattail cover shall not exceed 40%.</li> </ul> |
| <b>Mesic Prairie</b>  |
| <ul style="list-style-type: none"> <li>• By the end of the fifth year, 80% of the species installed shall be present, and at least 60% of the total cover shall be native species.</li> <li>• Total vegetation cover within mesic prairie zones shall be at least 90% by the end of the third through the fifth year.</li> <li>• Total reed canary grass cover shall not exceed 10%.</li> </ul>   |
| <b>Savanna/Woodland</b>   |
| <ul style="list-style-type: none"> <li>• During year one, reduce woody plant cover so at least 60% of the available light can reach ground layer vegetation.</li> <li>• Non-native woody vegetation shall not exceed 10% total cover.</li> <li>• By the end of the fifth year, 80% of the species installed shall be present, and at least 60% of the total cover shall be native species.</li> </ul>   |

*Funding*

Many projects fall short by not anticipating short and long term maintenance and monitoring costs. We recommend preparing a short term (one to five years) management budget as well as a long term (five to 10 years) budget to assure enough funds are put aside and made available, especially during the first five years of establishment. These funds should get turned over to the organization that ultimately will handle the maintenance of the restored landscape. We also recommend that municipalities create as part of the annexation agreement with the landowner a special service tax that would cover the entire short and long term maintenance budget, in perpetuity, should the developer or receiving land management agency fall short on their land management obligations.

**3.4 Regulatory Guidelines**

Natural resources, particularly wetlands, are protected under federal, state, and local law. The U.S. Army Corps of Engineers, the state of Illinois, and Kane County regulate wetlands through Section 404 of the Clean Water Act, the Interagency Wetland Policy Act, and the Kane County Stormwater Ordinance.

A municipal ordinance to address natural resources should focus on complimenting federal, state, and county laws already in place. Local laws are needed to protect locally significant resources and address local issues. Some of the issues not addressed by existing laws include:

- Pollution or sediment flow into wetlands (erosion control);
- Guidelines for removing or protecting riparian vegetation;
- Protecting natural resources adjacent to wetlands;
- Natural flood storage;
- Preserving plant and animal biodiversity;
- Native planting requirements, particularly in buffers adjacent to wetlands;
- Conservation easements or deed restrictions.
- Overlay districts.

Several Villages in the Chicago region have developed local natural resource ordinances that compliment countywide ordinances and would serve as excellent models for the Village of Union. Examples include the Village of Long Grove Zoning Ordinance, the Village of Algonquin Zoning, Soil Erosion and Sediment Control, and Landscaping Codes. See *References* section for links.

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## 4.0 FUNDING MECHANISMS FOR MAINTENANCE/CONSTRUCTION

Most funding for acquisition, restoration, and short-term maintenance and monitoring will have to be generated by the municipality. Although grant programs and other public funding sources are available, they are very competitive and therefore should not be considered a steady or reliable source of funding.

A critical component of securing funds for acquisition, protection, restoration, and maintenance is citizen support for the goals and objectives of a specific project. Local support is generated from private landowners, homeowner's associations, and other concerned citizens who are knowledgeable about environmental issues in their own backyards. Citizen groups can secure relationships with ecosystem partners, such as the Kishwaukee River Ecosystem Partnership, that have direct access to funds, or at least have connections to public organizations and state or federal agencies with funds. Other ways citizens assist municipal efforts include their influence on passing or rejecting tax reform programs, and participation in volunteer labor programs for restoration and maintenance (such as park district or forest preserve district work days).

### *Special service tax*

Many restoration projects fall short by not anticipating short and long term maintenance and monitoring costs. Although most short-term maintenance programs can be built into a restoration or development contract, long-term maintenance is often neglected because it is not included in the project's budget. Transferring long-term maintenance responsibility to a homeowner's association often results in negligence simply because managing stormwater features and natural resources requires knowledge and persistence.

A long-term maintenance plan should always be developed during project planning. Beyond that, municipalities can create as part of the annexation agreement with the landowner (for example), a special service tax to cover the entire short and long term maintenance budget, in perpetuity, should the developer or receiving land management agency fall short on their land management obligations. This protects the municipality and the long-term manager, and more importantly, the resource, from negligence.

### *Environmental impact fees*

Municipalities can investigate ways to reallocate fees received from developers for environmental impact review fees, or the impacts themselves when the developer is caught in violation of a local ordinance.

### *Grants and leveraging opportunities*

Although grant programs are competitive, they are worth investigating particularly for large-scale acquisitions or restoration projects. Public and private organizations that administer various conservation and environmental programs are often eager to form partnerships and leverage funds for land acquisition and restoration.

Funds that might be leveraged fall into two relatively distinct categories:

- *Existing grant programs funded by a public agency or by other sources.* These funds are available upon the submission of a qualified application. The Illinois Wildlife Preservation Fund is an example: an applicant will submit a grant application to the program, and, if the proposed project meets the required criteria and if the funds appropriated have not been exhausted, a grant can be made.
- *“Money to be found.”* The key to locating funding is to recognize that any given project may have multiple benefits. Potential funding partners, both private and public, may want to become involved in a project because they believe it will achieve their own objectives.

It is not uncommon for an exciting and innovative project to attract funds that can be allocated at the discretion of project partners. When representatives of interested organizations gather to talk about a proposed project, they are often willing to commit discretionary funds simply because the proposed project is attractive, is a priority for the agency, is a networking opportunity, or will help the agency achieve its mission. In this way, a new partnership is assembled.

Almost any land or water conservation project ultimately requires the support of those who live nearby if it is to be successful over the long run. Local neighborhood associations, homeowner associations, and similar groups interested in open space, preventing sprawl or protecting wildlife habitat and scenic vistas, make the best partners for specific projects. Those organizations ought to be contacted in the context of specific individual projects.

It is equally important to note that the development of partnerships that will leverage funding or goodwill can be, and typically is, a time-consuming process. In many cases, it takes more time and effort to develop partnerships that will leverage support for a project than it does to negotiate with the landowners for the acquisition of the property. Each acquisition or restoration project will be different; each will raise different ecological, political and financial issues, and each will in all likelihood attract different partners. It is also likely that the process will not be fully replicable. That is, each jurisdiction or partner will have a different process and different requirements.

In short, a key task in leveraging additional funds is to assign responsibility to specific staff for developing relationships with individual agencies and organizations, recognizing that the funding opportunities might not be readily apparent. With some exceptions, it will not be adequate simply to write a proposal or submit an application; more often, funding will follow a concerted effort to seek out and engage specific partners for specific projects, fitting those projects to the interests of the agencies and organizations. Successful partnerships are almost always the result of one or two enthusiastic individuals who believe that engagement in this process is in the interests of their agency. There is an old adage in private fundraising: people give to other people, not to causes. The same thing is true with partnerships using public funds.

Partnerships are also possible, and probably necessary, that will leverage assets other than money. By entering into partnerships with some agencies, organizations, or even neighborhood groups, the Village will leverage valuable goodwill, an increased “green” perception of the County by the media and members of the public, and relationships that have the potential to lead to funds and other support, including political support, from secondary sources (Conservation Fund et al. 2001).

The list below includes names of funding agencies and programs that would be worth investigating for future acquisition and restoration projects. Most program details are available on the internet web page of the agency listed. AES has more detailed information including descriptions, deadlines, and contact information if desired.

### ***U.S. Army Corps of Engineers***

- *Continuing Authorities Program (Section 206 Water Resources Development Act)*
- Project Modifications for Improvement of the Environment (Section 1135)
- Small Flood Control Projects (Section 205)

### **U.S. Fish and Wildlife Service**

- North American Wetlands Conservation Act
- Northeastern Illinois Wetlands Conservation Account
- Flexible Funds
- Partners for Fish and Wildlife
- Waterfowl Production Areas

### **Illinois Department of Natural Resources**

- Conservation 2000-Ecosystems Program
- Urban and Community Forestry Grant Program
- Division of Wildlife Resources Special Funds Application (Habitat, Furbearer, and Pheasant Funds)
- Illinois Migratory Waterfowl Stamp Fund
- Illinois Wildlife Preservation Fund
- Private Land Wildlife Habitat Management Fund
- Trees, Shrubs and Seedlings at No Cost Program
- Office of Water Resources Small Projects Fund
- Forestry Development Act Program
- Open Space Lands Acquisition and Development Program (OSLAD)
- Land and Water Conservation Fund (LWCF)
- Open Land Trust Fund Grant (OLT)
- Illinois Nature Preserves Commission Programs (INPC)
- Illinois Bicycle Path Grant Program
- Illinois Trails Grant Program
- Recreation Trails Program

### **Illinois Environmental Protection Agency**

- Lake Education Assistance Program
- Illinois Clean Lakes Program
- Non-point Source Management Program (Section 319 Grants)

### **U.S. Environmental Protection Agency**

- Environmental Education Grants
- Five-Star Restoration Challenge Grant Program

- Community Based Environmental Protection
- Wetlands Program Development Grant

#### **National Fish and Wildlife Foundation**

- Challenge Grants
- Wildlife Links

#### **U.S. Department of Agriculture (Natural Resources Conservation Service)**

- Wildlife Habitat Incentives Program (WHIP)
- Conservation Reserve Program (CRP)
- Illinois Conservation Reserve Enhancement Program (CREP)
- Environmental Quality Incentives Program (EQIP)
- Wetland Reserve Program (WRP)

#### **Illinois Emergency Management/Federal Emergency Management Agency**

- Hazard Mitigation Grant program
- Flood Mitigation Assistance Program

#### ***The Conservation Fund***

- Eastman Kodak American Greenways Awards Program

#### **U.S. Forest Service**

- Urban and Community Forestry

## 5.0 CONSERVATION DEVELOPMENT STRATEGIES

### 5.1 Introduction

It is understood that McHenry County faces development pressure by people interested in providing housing options for the Chicago Region. The development pressure can have a direct result on the rural character and preservation of farmland within the county. The development that is encouraged within the area can have a significant impact with maintaining the rural character. In order to maintain the rural character of the regions, several objectives should be followed when development is being considered.

1. Protection of economically productive farmland.
2. Protection of areas with significant natural resources, including wetlands, rivers and lakes, groundwater infiltration areas, woodlands and wildlife habitat areas.
3. Encourage new, dense development near existing community service centers.
4. Encourage new development areas in a way that helps maintain or protect natural resources or farmland.

If development areas are being considered outside of existing community service centers, the use of conservation development should be encouraged. The goal of conservation developments is to encourage the preservation or restoration of natural features in the area and allow growth while maintaining the rural character of the community.

A conservation development is a development based in the natural resources of the site, where a large portion of a parcel is preserved or restored in a natural state and the balance is developed into clusters of home sites. Conservation developments are an alternative approach to conventional lot-by-lot division of land in rural areas, which spreads development throughout the parcel, with little regard to natural features of the land. Conservation development allows for more flexibility in the size and location of home sites, compared to conventional development. In order to create the large, contiguous natural areas, the home sites in a conservation development are often smaller, the streets are not as wide or long and approximately half of the parcel is not impacted by the development. The density of a conservation development may be the same or higher than the proposed zoning for the parcel. The intent of conservation development is to primarily protect open space, whether it is natural areas or farmland. Conservation development should also offer flexibility to innovative site designs that strive to preserve open space. Several objectives can be used to determine the validity of a conservation development:

1. Clustered housing, usually smaller lots, concentrated in developable areas with more sensitive areas protected as public open space.
2. Many, if not all, lots border on substantial open space features. This gives the lot the “feel” of a larger lot and allows the developer to charge a premium price while saving public open space.
3. Expanses of natural open space. This usually requires planting of native species and/or enhancing existing natural features. The purpose of restoring or enhancing ecological systems is to increase ecological health as defined by diversity of species, age groups,

improved wildlife habitat, and stability. The natural open space should be as large and continuous as possible and is accessible to users.

4. Passive stormwater features: swales, ditches, shallow ponds and wetlands that slow water and help improve infiltration and evapotranspiration.
5. Covenants that require homeowners to support stewardship of natural resources in the public open spaces
6. Covenants that encourage or require native landscaping.

The town should develop a plan to outline the existing and proposed community service areas. This would assist in encouraging development within the community area and future re-zone decisions. The town should identify large natural areas within the community, in order to preserve and enhance these areas. The town should consider requiring rural development to be conservation development.

## **5.2 Conservation Planning Process**

The first step in developing a conservation development plan is ecological planning, which includes completing a natural resources inventory, restoration plan, stormwater management plan, and trail system design. The following summarizes the steps that need to be completed in the first step of a conservation development.

### *1. Base Map Preparation*

Base maps need to be prepared for field investigation. The maps that should be gathered include: soils, topography, wetlands, flood plains, steep slopes, threatened and endangered species, and natural areas.

### *2. Natural Resources Field Inventory*

The base maps prepared in the first step are used for field verification. A natural resources inventory reveals and details, in graphic and written form, the natural resources on the site. The natural resources inventory includes: land cover maps (vegetation, land use, and habitats), confirmation of base map information, wetland delineation, hydrology, soil verification and the current ecological health of the natural resources.

### *3. Development of Conceptual Plans for Ecological and Hydrological Protection and Restoration*

Based on the current ecological health of the parcel, restoration plans are developed. The first step in the development of the restoration plan would be to identify existing high quality natural areas, areas that are degraded but restorable and natural hydrologic patterns. These areas are the primary areas of preservation. Additional areas of the site are then identified, including areas that would connect high quality natural areas, creating large continuous natural areas. Additionally, both the high quality natural areas and restored areas need to be buffered. Enforced buffer widths are provided in the McHenry County Watershed Development Ordinance for all water bodies. Linear water body buffers (along streams) shall require a 30-50 foot buffer depending on the quality. High quality non-linear water body buffers (along lakes and ponds) shall have a 100-foot buffer. Buffer widths along other restoration projects can vary but should not be less than 30 feet.

#### *4. Definition and mapping of restorable/creatable natural resource areas*

Additional areas that are restorable or able to be created are identified. These areas would include the expansion of areas for similar vegetation types to re-connect, reduce created geometric edges, reduction of perimeter to area ratios. Additionally, these areas should buffer other natural resource areas, both on and off the site, integrate soil types, slopes, tributary acreage and upgradient land-uses.

#### *5. Identification and mapping of viewsheds and areas of scenic value*

In relation to a given site, views are always important. People will have either a positive or negative experience of the landscape and the structures within it based on the quality of the design and views of the community. A new development has to be concerned with what it will look like from the “outside looking in” as well as from the “inside looking out.” Moreover, large scenic vistas may encompass land within the development in combination with off-site property. Typically, high ground, ridges and hilltops need to be located on the plan because they command the greatest view potential. Then, pleasant views (for example, a scenic valley or prairie) as well as unpleasant views (for example, an adjacent industrial site) need to be identified on the plan. If development (for example a homesite) is slated for a hilltop, it may have great views (“inside looking out”) down into a valley. However, this same house may ruin the scenic view (“outside looking in”) of unbroken hills experienced from a well-traveled road. Siting the home down the hillside a bit could maintain the scenic hill profile while still providing enough elevation for the homesite’s valley views. Solutions to viewshed problems may also encompass screening of negative views (via vegetation, earthmounds, or built structures) or correcting the orientation of homes or offices during planning in order to direct views away from negative areas. It should also be noted that potentially negative smells, light pollution and noise pollution need to be accounted for as well during this site analysis.

#### *6. Development of Stormwater Treatment Train*

A stormwater treatment train concept integrates existing and proposed natural resources (Appendix C). Natural drainage areas need to be identified including: poor soil areas, surface and subsoil areas that support infiltration, surface water conveyance areas, seeps/springs and conceptual recharge areas cross-slope swales, and topographic low areas. Base on this research, a conceptual stormwater treatment train can be designed, including preliminary plan for water storage opportunities in natural depressional areas and long-slope surface water interceptors that can be created to infiltrate.

#### *7. Preliminary Hydrology, Hydraulics and Water Quality Modeling*

In order to determine the volume and quality of water on and coming into the site, monitoring needs to begin. Appropriate models need to be established to test predevelopment water and sediment yields. Additionally, this model will test the benefits of the conceptual stormwater treatment train.

#### *8. Design of Conceptual Trail System and Passive Recreation*

The open space serves multiple functions including stormwater treatment and passive recreational opportunities. Local trail corridors and linkages to regional trails, overlooks, and outdoor educational areas are designed into the development.

### 5.3 Built Environmental Planning

#### *Architectural Standards*

1. Unity of Architectural Styles: Establish an Architectural Review Committee that will ensure adherence to established Architectural Guidelines.
2. Energy Efficient Housing Design: Implement a system of incentives for energy efficient housing (see point system under Greenbuilt Homes example in appendix)

#### *Streetscape Standards*

Architectural cohesiveness, sign standards, etc. should follow aesthetic guidelines for materials, style and dimensions, and be subject to Architectural Review Board approval.

#### *Septic Standards*

Especially for rural residential zoning, septic requirements need to be environmentally sound from a water quality standpoint, be flexible in their application (for example combined septic systems allow much more flexibility in Conservation Development design than individual systems because lot sizes can be reduced and the septic system can be located in the most appropriate place), and finally need to have a clear, enforceable monitoring and maintenance schedule.

#### *Parking Requirements*

Reduce parking ratios: Rather than using a single formula, use demonstrated demand and allow for expansion potential. Design in BMP's such as infiltration islands, shade tree requirements.

The Wisconsin Environmental Initiative provides "Green Built Homes" checklists and "Waterfront Management Practices Checklists" as examples of built environmental guidelines. These documents can be found in Appendix D of this report.

### 5.4 Conservation Development Regulatory Guidance/Implementation

There are a variety of techniques that can be used to implement conservation developments, including zoning or regulatory techniques or the community can purchase the conservation portion of the parcel through fee acquisition or conservation easements. Zoning will enable the community to protect or restore environmentally sensitive areas. Zoning that specifies conservation development areas allows developers to develop more dense home sites near environmentally sensitive areas, in order to fund the restoration or continued protection of sensitive areas. Additionally, green infrastructure is used in the areas that are developed to encourage sensitivity and connection to the environmentally sensitive area. Conservation development zoning can also be used in areas where agricultural preservation is necessary, where areas that are not agriculturally viable are developed near areas that are agriculturally rich. Zoning is very effective and does not require expending community funds. The community may also consider purchasing environmentally sensitive areas, which would permanently preserve these areas. Additionally, these areas could serve as community greenways or parks. Other ownership related mechanisms include acquiring conservation easements, deed restrictions or protective covenants.

## *Zoning, Regulatory Techniques*

### Conservation Zoning

Conservation zoning districts are created to protect environmentally sensitive lands, such as streams, lakes, wetlands, drainage ways, steep slopes or scenic vistas. Typically, the community identifies these areas through a land use study and creates a scale of conservation zoning districts, based on environmental sensitivity. Based on the conservation zoning district, permitted and conditional uses are applied to various districts. Additionally, buffer areas can be added to different conservation zoning districts to allow for additional protection.

### Open Space Dedication

Open space dedication is used by communities, through ordinances that require developers of new subdivisions to dedicate a part of the subdivision for the purpose of preserving open space areas or environmentally sensitive lands, or adding additional active open space areas. Often an open space dedication is some ratio relating to the number of lots or the overall site acreage. This type of ordinance allows the community to work with the developer to preserve environmentally sensitive areas.

### Conservation Development

Conservation development zoning should be applied to re-zoning changes in rural areas. Often the density for a conservation development is the same to as much as double what current zoning would permit. This density bonus should be flexible and is necessary to cover the cost of the restoration or preservation of the open space areas. Conservation development zoning should outline the intent, design guidelines, density bonus and in what areas can be permitted for conservation development zoning changes.

The areas that may be re-zoned to a conservation development might include areas that are adjacent to areas zoned for conservation, rural residential districts, or less productive agricultural areas. These areas would provide large areas to preserve agricultural character and environmentally sensitive. Additionally, areas that are defined as rural residential could provide a transition from higher density residential to rural.

The intent of this zoning should be defined in order to understand where to use conservation development zoning. The intent of the zoning should outline how this type of zoning should be used to protect unique or environmentally sensitive areas such as streams, lakes, wetlands, drainage ways, steep slopes or scenic vistas. Conservation development zoning should also emphasize the design flexibility and efficiency, diversity in building density and lot sizes, and preservation of unique characteristics on a particular parcel.

Design guidelines for conservation developments should include the process used to determine the environmentally sensitive areas on the site and which areas are developable. Because each site will have different developable areas and sizes, design guidelines should be flexible and should consider different roadway length, width, and lot size. Design guidelines should review the overall building footprint on the parcel and the safety and circulation patterns. Density bonus may be written into the zoning code and could include bonuses for the following: use of native vegetation throughout the development, including individual lots, reduction in pavement or impervious surface, percentage

of open space, trail or sidewalk connection to other developments or regional trails, additional buffering of natural areas and adjacent spaces and creation of wildlife habitat

### *Ownership Mechanisms*

#### Fee Acquisition

The community can purchase park or open space from developers. Fee simple acquisition is the purchase of all rights to a specific property, or portion of property.

#### Acquisition of Conservation Easements

A conservation easement is a legal document which contains permanent restrictions on the use or development of land. This legal document allows the property owner to continue using and owning the parcel of land while assuring its protection in a conservation or current state. Conservation easements are contracts that are written between a landowner and a land trust, who is often a private, non-profit corporation that ensures the development restrictions are maintained. The value of an easement for tax purposes is usually the difference in land value of the property before and after the grant of the easement. A conservation easement is typically considered a charitable gift of development rights, therefore will reduce the property owners taxes.

#### Deed Restriction and Protective Covenants

Typically a deed is created to enforce the protection of the open space. This protection is detailed in protective covenants which guide the use, maintenance and protection of the open space areas. A deed restriction and protective covenants are similar to those in a conservation easement, but may be less permanent. Deeds can be contested in court if the restrictions can no longer be enforced.

Protective covenants are often written for conservation developments. Covenants in a conservation development may be more complex due to the large, shared natural open space and trail systems. In order to maintain the open space and trail systems, a homeowner's association is typically formed. The homeowner's association makes decisions regarding maintenance of the open space and manages the funds necessary for the maintenance. The homeowner's association often works with a third party, typically an ecological firm or public conservancy group to assist the residence on the best choices for the land. This third party often monitors the health of the ecosystem restoration or preservation, as well as the more engineered areas of the site, such as the stormwater treatment systems.

## **5.5 Economics of Conservation Development**

The economics of development is important to understand because developments have a large impact on your community; including increased taxes as additional services for new developments may offset the revenue costs of additional residents. In order for the community to make wise development decisions, it is important to quantify the costs and savings associated with different development types, costs to different members of the community and the unforeseen ecological costs. Construction costs for a conventional development can be far higher than the construction costs for a conservation development. Typically, cost savings occur from the reduced infrastructure costs of a more clustered development, for example road lengths and widths are often reduced. The economics cost savings of a conservation development occur at a number of scales, ranging from the homeowner to the municipality. For example, a homeowner in a conservation development may not spend as much money on lawn maintenance, because the size of their lawn is much smaller.

Additional cost savings are less readily measured and may include the reduced life cycle cost of an ecologically based stormwater system compared to a traditionally engineered stormwater system. The life cycle cost of a traditionally engineered stormwater system will be greater due to the need to replace stormwater pipes and drains.

*Community Scales: Costs and Benefits of Conservation Development*

Homeowner

- Site Landscaping – native plantings can be affordable
- Site Maintenance is “low input” requiring less fertilizer, irrigation, pesticides
- Homeowner’s Association: dues collected for maintenance of common open space and other typical HOA expenditures
- Site Amenities – Higher quality of life; opportunity for interacting & “Living with Nature”; buy a smaller lot but have access to a large natural area.

Developer

***Conventional Versus Conservation Development:***

EXAMPLE: Typical conservation development savings based on Laurel Springs subdivision in Jackson, WI.

| <b>Development Expense</b>   | <b>Low-Impact Cost</b> | <b>Conventional Cost</b> |
|------------------------------|------------------------|--------------------------|
| Grading                      | \$358,500              | \$441,600                |
| Paving                       | \$255,760              | \$335,665                |
| Concrete (sidewalks, curbs)  | \$259,995              | \$271,800                |
| Storm sewer                  | \$204,100              | \$444,300                |
| Sanitary sewer               | \$385,280              | \$415,600                |
| Main water line              | \$384,240              | \$405,950                |
| Landscaping costs            | \$120,000              | \$65,000                 |
| Total site development costs | \$1,967,875            | \$2,379,915              |
| <b>Total savings</b>         |                        | <b>\$412,040</b>         |

***Other development benefits:***

- Higher Absorption rates (lots sell faster)
- Greater “Site Appeal”: Lot premiums – Lots sell for as high as 25-30% more than conventional development lots.
- Dedication of conservation areas can yield tax benefits & monetary assistance
- Developer can receive density bonus, resulting in more lots to sell than in a conventional development

### Municipality

- Less Roadway Maintenance Cost due to shorter runs/narrower roads
- Trails/Amenities for all citizens, providing critical pedestrian links
- Improvement in Water Quality and Volume
- Less Utility maintenance via shorter utility runs
- Reduced cost of Community Services (trash, police, etc.) due to compact design

### Ecological Costs and Benefits

- Smaller Development Footprint
- Restoration/Protection & Maintenance
- Improved Water quality
- Improved control of Water volume/Flooding
- Improved Erosion Control
- Increase citizen's understanding of the environment

## 6.0 LANDSCAPING

### 6.1 Introduction

Native landscape zones refer to areas within the development where native plant communities will be restored or created. These could include stormwater treatment systems, swales, common open space, individual commercial and residential lots, or small formalized landscape features.

Successfully establishing a native landscape depends on the following factors:

- Design
- Implementation
- Maintenance and Management
- Performance Standards
- Sources for funding
- Accountability

Native landscaping is an environmentally responsible and aesthetically pleasing alternative to conventional, horticultural landscaping. The environmental objective of native landscaping is to create ecologically sound landscapes that minimize the use of artificial methods of plant care such as chemical fertilizers, watering (other than natural precipitation) and mowing by using plant species and communities native to your particular region (Ingram 1999). Native plants have evolved in a particular region for over many thousands of years and therefore have many advantages that come from their having adapted to the climate, geography, and wildlife populations of a region. Native plants are typically selected first for their appropriateness for a locale and then specifically selected for the light, moisture, and soil conditions prevalent on a particular site.

By using native plants in urban, suburban, and rural landscapes you will also be restoring important ecological functions within the context of each individual lot site. Once established, native plants are hardier than many of their non-native, cultivated cousins. They have natural defenses to many diseases and insect pests. Native plants also provide food and meet the functional habitat needs for our native wildlife such as birds, butterflies, and mammals. Additionally native plants have deeper root systems than typical turf and ornamental plants. Deeper plant root systems facilitate better water infiltration into our soils, thereby reducing the amount of runoff typically encountered with turf grasses. They also help stabilize and restore soil and, in some cases, through phytoremediation, can even help clean up contaminated areas

### 6.2 Design

If designed correctly, native landscaping can provide four season beauty for any size project. By opening your plant palette up to a wide variety of species, a native planting can be not only environmentally beneficial, but aesthetically rich and diverse too. Flowering species in the spring, summer, and fall, and grasses with autumn hues in fall and winter give a colorful, texturally-rich and ever-changing aesthetic that entices more and more people everyday.

Native landscaping as a planned or designed aesthetic can be characterized as a garden style that mimics or draws inspiration from nature. Nature is observed, interpreted, and simplified into aesthetically pleasing arrangements that symbolically express the prairies, savannas, woodlands, and wetlands reminiscent of the early images settler's first saw. Designed native landscapes use forms

and principles of composition that follow natural examples. Curvilinear or organic forms are often used to layout the landscape and help harmonize the geometries of the built landscape with the natural landscape. Also important to native landscaping is trying to retain a site's natural character while at the same time designing for maximum color and effect. Native landscapes should be designed to look intentional - like they belong where they have been placed - and result in low maintenance solutions that are relatively easy and inexpensive to maintain. Designing apparent shapes and deliberate forms with visual cues like gathering spaces, benches, and other landscape features, with defined edges or borders, a user group will better understand the design intent and be able to readily pick out the obvious maintenance and care being done for the landscape.

Where a more traditional landscape is desired, native landscaping can be used as an alternative to non-native species to provide a cleaner more formalized look when needed. Native landscaping can also be used to ease the transition between natural areas and more formal gardens to depict a more seamless landscape. Typically higher maintenance formal gardens are installed close to buildings, around entry features and signs, and pathway intersections or other high profile areas. More naturalized native plantings work best located in open areas, around significant natural features, as a buffer to other natural areas, and near the property line. Formalized plantings are planted in a traditional manner and are typically done in masses for a bold and colorful appearance. Naturalized areas are planted using a combination of seeds and live plants and are designed to function like a natural system while looking aesthetically pleasing at the same time.

Good designs should also contain explicit direction, usually in the form of design and construction documents, as to implementation, maintenance and management, monitoring (short and long term), performance standards, funding sources, and project oversight.

Selecting the proper plant material for the site conditions is an important step. When designing and selecting native species, it is best to choose an ecological model that is common to your area. Rare communities do not transfer easily to many sites. Consulting with a local ecologist, nursery or landscape architect who specializes in native landscaping, to help with plant selection, will save valuable time and money. Plant stock should be purchased at local reputable nurseries. Origin of plant and seed material can be verified by nurseries dedicated to preserving local genotypes. By making sure plants originated in and are native to the geographic area, local species of insects and birds that co-evolved with these plants can be preserved. Using locally collected seeds or cuttings will also ensure plants will thrive under local conditions.

### **6.3 Implementation**

A successfully built landscape starts with a clearly written specification and design document. Installation techniques should be spelled out in a way that a contractor will be able to adequately install with minimal questions. At a minimum the specifications should address Soil Preparation, Native Seeding, Cover Crop Seeding, Herbaceous Perennial Planting, Woody Planting, Management and Monitoring. The specifications should include a section that requires only qualified contractors. All aspects of the installations should be overseen by the project ecologist or landscape architect.

Choosing to work with an ecological or landscape design and installation firm during the planning process will help define appropriate techniques for preparation and installation based on your design intent, available budget, and timeframe. Depending on the current state of your site it may be necessary to undertake a number of preparation activities before beginning to install any of the

native plant materials, therefore it is sometimes better to phase an installation thereby spreading the upfront costs of native landscaping over several years.

Plans and specifications should also clearly outline the installation process in a way that strives to minimize direct and indirect negative impacts to the natural surroundings. Choosing methods that help stabilize, maintain, enhance, and protect the existing natural resources is critical to the success your native landscape. The following is a list of some examples of landscape practices that can be incorporated into the native landscape installation process:

- Reduce site disturbance, limit grading, tree removal, and balance cut and fill. Reducing site disturbance conserves resources and reduces the energy cost of the transportation of landscape elements such as topsoil and new trees.
- Protect disturbed or recently seeded areas and steep slopes with straw bales, silt fencing, and erosion blankets to limit the amount of erosion on site and siltation of adjacent waterways.
- Trees and natural features on site should be protected during construction. Keep all construction outside of the drip line of trees, including driveways or construction access, parked cars, stored material, utility runs, etc.
- Establish barriers around trees to prevent soil compaction, trunk injury, and the spilling and flushing of toxic materials near the root zone. Never pile excavated soil around any tree.
- Limit site disturbance and construction to within 20 feet of structures and paved areas.

## **6.4 Maintenance and Management**

As with restored natural resources, a short term (zero to five year) and long term (five years and longer) maintenance and management plan must be designed, planned for and implemented if a native landscape within development is to succeed. Many of the same components of a natural resource maintenance and management plan apply to native landscapes (see Section 3.3). Additional components include regular hand-weeding in areas planted with live plugs used at high profile areas around structures and in other key viewsheds. Formal gardens are also best maintained using a couple of inches of hardwood mulch and redefining or edging the bed every other year during the spring, summer, or fall quarters. This will help prevent the undesired migration of other nearby natives into formal areas.

### *Monitoring*

Monitoring of native landscapes is as important as monitoring of restored natural resources. This includes monitoring to accomplish specific goals, and monitoring during installation.

### *Performance Standards*

Performance standards listed in Section 3.3 for natural resource restoration are reasonable guidelines for a created native planting that is part of a development or larger site.

### *Funding*

Many projects fall short by not anticipating short and long term maintenance and monitoring costs. We recommend preparing a short term (one to five years) management budget as well as a long term (five to 10 years) budget to assure enough funds are put aside and made available, especially during the first five years of establishment. These funds should get turned over to the organization that

ultimately will handle the maintenance of the native landscape. We also recommend that municipalities create as part of the annexation agreement with the landowner a special service tax that would cover the entire short and long term maintenance budget, in perpetuity, should the developer or receiving land management agency fall short on their land management obligations.

*Accountability*

We have found that recommendations described above are not generally implemented unless the governing body has not only the will, but the mechanisms in place to enforce them, and the expertise to know what to enforce. The annexation agreement in conjunction with a special service area tax is a good mechanism for enforcement. We also recommend hiring a consultant with expertise in natural area restoration and native landscaping to make sure that specifications are followed, and performance standards met.

**6.5 Recommended List of Native Plants for Use in Native Landscaping**

***Emergent/Open Water Plants***

|                  |                                 |
|------------------|---------------------------------|
| Hornwort         | <i>Ceratophyllum demersum</i>   |
| Common Rush      | <i>Juncus effusus</i>           |
| Rice Cut Grass   | <i>Leersia oryzoides</i>        |
| Pickeral Weed    | <i>Pontederia cordata</i>       |
| Common Arrowhead | <i>Sagittaria latifolia</i>     |
| Common Bur reed  | <i>Sparganium euycarpum</i>     |
| Sweet Flag       | <i>Acorus calamus</i>           |
| Tussock Sedge    | <i>Carex stricta</i>            |
| Blue Joint Grass | <i>Calamagrostis Canadensis</i> |
| Blue Flag        | <i>Iris virginica</i>           |

***Wet Prairie Plants***

|                        |                                 |
|------------------------|---------------------------------|
| Swamp Milkweed         | <i>Asclepias incarnata</i>      |
| Blue Joint Grass       | <i>Calamagrostis canadensis</i> |
| Common Lake Sedge      | <i>Carex lacustris</i>          |
| Sedges                 | <i>Carex sp.</i>                |
| Spotted Joe Pye Weed   | <i>Eupatorium maculatum</i>     |
| Common Boneset         | <i>Eupatorium perfoliatum</i>   |
| Rice Cut Grass         | <i>Leersia oryzoides</i>        |
| Common Water Horehound | <i>Lycopus americanus</i>       |
| Dark Green Rush        | <i>Scirpus atrovirens</i>       |
| Great Bulrush          | <i>Scirpus validus</i>          |
| Prairie Cord Grass     | <i>Spartina pectinata</i>       |

***Mesic Prairie Plants***

Full Sun

FORBS:

|            |                          |
|------------|--------------------------|
| Lead Plant | <i>Amorpha canescens</i> |
|------------|--------------------------|

|                           |                                 |
|---------------------------|---------------------------------|
| Pasque Flower             | <i>Anemone patens</i>           |
| Heath Aster               | <i>Aster ericoides</i>          |
| Silky Aster               | <i>Aster sericeus</i>           |
| Cream Wild Indigo         | <i>Baptisia leucophaea</i>      |
| Sand Coreopsis            | <i>Coreopsis lanceolata</i>     |
| Prairie Coreopsis         | <i>Coreopsis palmate</i>        |
| Pale Purple Coneflower    | <i>Echinacea pallida</i>        |
| Rattlesnake Master        | <i>Eryngium yuccifolium</i>     |
| Prairie Smoke             | <i>Geum triflorum</i>           |
| Western (Naked) Sunflower | <i>Helianthus occidentalis</i>  |
| False Boneset             | <i>Kubnia eupatorioides</i>     |
| Round Headed Bush Clover  | <i>Lespedeza capitata</i>       |
| Rough Blazing Star        | <i>Liatris aspera</i>           |
| Cylindrical Blazing Star  | <i>Liatris cylindracea</i>      |
| Pale Spiked Lobelia       | <i>Lobelia spicata</i>          |
| Wild Quinine              | <i>Parthenium integrifolium</i> |
| Prairie Cinquefoil        | <i>Potentilla arguta</i>        |
| Deam's Rosin Weed         | <i>Silphium integrifolium</i>   |
| Gray Goldenrod            | <i>Solidago nemoralis</i>       |
| Riddell's Goldenrod       | <i>Solidago reddellii</i>       |
| Golden Alexanders         | <i>Zizia aurea</i>              |

GRASSES:

|                       |                               |
|-----------------------|-------------------------------|
| Big Bluestem Grass    | <i>Andropogon gerardii</i>    |
| Little Bluestem Grass | <i>Andropogon scoparius</i>   |
| Sideoats Gramma       | <i>Bouteloua curtipendula</i> |
| Switch Grass          | <i>Panicum virgatum</i>       |
| Porcupine Grass       | <i>Stipa spartea</i>          |
| Indian Grass          | <i>Sorghastrum nutans</i>     |
| Prairie Dropseed      | <i>sporobolus heterolepis</i> |
| Prairie Cord Grass    | <i>Spartina pectinata</i>     |

Full Sun-Part Shade

FORBS:

|                         |                            |
|-------------------------|----------------------------|
| Nodding Wild Onion      | <i>Allium cernuum</i>      |
| Prairie Thimbleweed     | <i>Anemone cylindrical</i> |
| Butterfly Weed          | <i>Asclepias tuberosa</i>  |
| Smooth Blue Aster       | <i>Aster azureus</i>       |
| Sky Blue Aster          | <i>Aster laevis</i>        |
| New England Aster       | <i>Aster novae-angliae</i> |
| White Wild Indigo       | <i>Baptisia leucantha</i>  |
| Showy Tick Trefoil      | <i>Desmodium canadense</i> |
| Shooting Star           | <i>Dodecatheon meadia</i>  |
| Purple Coneflower       | <i>Echinacea purpurea</i>  |
| Wild Bergamot (Beebalm) | <i>Monarda fistulosa</i>   |
| Foxglove Beard Tongue   | <i>Penstamon digitalis</i> |

|                   |                               |
|-------------------|-------------------------------|
| Obedient Plant    | <i>Physostegia virginiana</i> |
| Black-eyed Susan  | <i>Rudbeckia hirta</i>        |
| Ohio Goldenrod    | <i>Solidago ohioensis</i>     |
| Spiderwort        | <i>Tradescantia ohioensis</i> |
| Golden alexanders | <i>Zizia aptera</i>           |

GRASSES:

|                           |                          |
|---------------------------|--------------------------|
| Common Wood Reed          | <i>Cinna arundinacea</i> |
| Canada Wild Rye           | <i>Elymus canadensis</i> |
| Virginia Wild Rye         | <i>Elymus virginicus</i> |
| Fowl Meadow (Manna) Grass | <i>Glyceria striata</i>  |
| Bottlebrush Grass         | <i>Hystrix patula</i>    |

Shade

|                     |                                  |
|---------------------|----------------------------------|
| Wild Columbine      | <i>Aquilegia canadensis</i>      |
| Jack-in-the-pulpit  | <i>Arisaema atrorubens</i>       |
| Wild Ginger         | <i>Asarum canadense</i>          |
| Dutchman's Breeches | <i>Dicentra cucullaria</i>       |
| Yellow Trout Lily   | <i>Erythronium americanum</i>    |
| Wild Geranium       | <i>Geranium maculatum</i>        |
| Virginia Waterleaf  | <i>Hydrophyllum virginianum</i>  |
| May Apple           | <i>Podophyllum peltatum</i>      |
| Solomon's Seal      | <i>Polygonatum canaliculatum</i> |
| Bloodroot           | <i>Sanguinaria canadensis</i>    |
| Trillium            | <i>Trillium spp.</i>             |

Woodland Community Plants  
(includes trees, dominant grasses, and some shrubs)

Oak Savanna

|                       |                               |
|-----------------------|-------------------------------|
| Big Bluestem Grass    | <i>Andropogon gerardii</i>    |
| Little Bluestem Grass | <i>Andropogon scoparius</i>   |
| Shagbark Hickory      | <i>Carya ovata</i>            |
| New Jersey Tea        | <i>Ceanothus americanus</i>   |
| American Hazelnut     | <i>Corylus americana</i>      |
| Purple Love Grass     | <i>Eragrostis spectabilis</i> |
| June Grass            | <i>Koeleria cristata</i>      |
| Rough Blazing Star    | <i>Liatris aspera</i>         |
| White Oak             | <i>Quercus alba</i>           |
| Bur Oak               | <i>Quercus macrocarpa</i>     |
| Black Oak             | <i>Quercus velutina</i>       |
| Indian Grass          | <i>Sorghastrum nutans</i>     |

## Floodplain Forest

|              |  |
|--------------|--|
| Silver Maple | <i>Acer saccharinum</i>                      |
| Hackberry    | <i>Celtis occidentalis</i>                   |
| Green Ash    | <i>Fraxinus pennsylvanica subintegerrima</i> |
| Elderberry   | <i>Sambucus canadensis</i>                   |

## Mesic Woodlands (Savanna Grasses are often part of this community)

|                    |  |
|--------------------|--|
| Sugar Maple        | <i>Acer saccharum</i>                        |
| Pennsylvania Sedge | <i>Carex pennsylvanica</i>                   |
| Shagbark Hickory   | <i>Carya ovata</i>                           |
| Grey Dogwood       | <i>Cornus racemosa</i>                       |
| Green Ash          | <i>Fraxinus pennsylvanica subintegerrima</i> |
| White Oak          | <i>Quercus alba</i>                          |
| Swamp White Oak    | <i>Quercus bicolor</i>                       |
| Bur Oak            | <i>Quercus macrocarpa</i>                    |
| Red Oak            | <i>Quercus rubra</i>                         |
| Elderberry         | <i>Sambucus canadensis</i>                   |
| Basswood           | <i>Tilia americana</i>                       |
| American Elm       | <i>Ulmus americana</i>                       |

## **6.6 Invasive Plant Species to Avoid Using in Native Landscaping**

|                      |                                |
|----------------------|--------------------------------|
| Norway maple         | <i>Acer platanoides</i>        |
| Garlic mustard       | <i>Alliaria petiolata</i>      |
| Common burdock       | <i>Arctium minus</i>           |
| Japanese barberry    | <i>Berberis thunbergii</i>     |
| Smooth brome         | <i>Bromus inermis</i>          |
| Creeping bellflower  | <i>Campanula rapunculoides</i> |
| Oriental bittersweet | <i>Celastrus orbiculatus</i>   |
| Spotted knapweed     | <i>Centaurea maculosa</i>      |
| Canada thistle       | <i>Cirsium arvense</i>         |
| Lily of the valley   | <i>Convallaria majalis</i>     |
| Field bindweed       | <i>Convolvulus arvensis</i>    |
| Crown vetch          | <i>Coronilla varia</i>         |
| Hawksbeard           | <i>Crepis tectorum</i>         |
| Queen Anne's lace    | <i>Daucus carota</i>           |
| Cut-leaved teasel    | <i>Dipsacus laciniatus</i>     |
| Common teasel        | <i>Dipsacus sylvestris</i>     |
| Russian olive        | <i>Elaeagnus angustifolia</i>  |
| Autumn olive         | <i>Elaeagnus umbellata</i>     |
| Quackgrass           | <i>Elytrigia repens</i>        |
| Helleborine          | <i>Epipactis helleborine</i>   |

|                        |                           |
|------------------------|---------------------------|
| Cypress spurge         | Euphorbia cyparissias     |
| Leafy spurge           | Euphorbia esula           |
| Tall fescue            | Festuca elatior           |
| Creeping Charlie       | Glechoma hederacea        |
| Kentucky bluegrass     | Poa pratensis             |
| Japanese knotweed      | Polygonum cuspidatum      |
| White poplar           | Populus alba              |
| Curly-leaf pondweed    | Potamogeton crispus       |
| Common buckthorn       | Rhamnus cathartica        |
| Glossy buckthorn       | Rhamnus frangula          |
| Black locust           | Robinia pseudoacacia      |
| Multiflora rose        | Rosa multiflora           |
| Sheep sorrel           | Rumex acetosella          |
| Soapwort               | Saponaria officinalis     |
| Climbing nightshade    | Solanum dulcamara         |
| Tansy                  | Tanacetum vulgare         |
| Red clover             | Trifolium pratense        |
| White clover           | Trifolium repens          |
| Narrow-leaved cattail  | Typha angustifolia        |
| Hybrid cattail         | Typha x glauca            |
| Siberian elm           | Ulmus pumila              |
| Common periwinkle      | Vinca minor               |
| Orange day-lily        | Hemerocallis fulva        |
| Dames rocket           | Hesperis matronalis       |
| Orange hawkweed        | Hieracium aurantiacum     |
| Yellow hawkweed        | Hieracium caespitosum     |
| St. John's wort        | Hypericum perforatum      |
| Yellow Iris            | Iris pseudacorus          |
| Motherwort             | Leonurus cardiaca         |
| Amur honeysuckle       | Lonicera maackii          |
| Morrow honeysuckle     | Lonicera morrowii         |
| Tartarian honeysuckle  | Lonicera tatarica         |
| Bells honeysuckle      | Lonicera x bella          |
| Birds-foot trefoil     | Lotus corniculatus        |
| Moneywort              | Lysimachia nummularia     |
| Purple loosestrife     | Lythrum salicaria         |
| White sweet clover     | Melilotus alba            |
| Yellow sweet clover    | Melilotus officinalis     |
| White mulberry         | Morus alba                |
| Forget me not          | Myosotis scorpioides      |
| Eurasian watermilfoil  | Myriophyllum spicatum     |
| Wild parsnip           | Pastinaca sativa          |
| Reed canary grass (nn) | Phalaris arundinacea (nn) |
| Common reed grass (nn) | Phragmites australis (nn) |
| Scotch pine            | Pinus sylvestris          |
| Canada bluegrass       | Poa compressa             |

## 8.0 REFERENCES

- Applied Ecological Services, Inc. 2003. Indian Creek Watershed Plan (Final Draft).
- Applied Ecological Services, Inc. 2003. Schaumburg Biodiversity Recovery Plan (Final Draft).
- Arendt, R.G. 1996. Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks. Island Press. Washington, DC.
- Buslaff, J. Editor. 1997. Wild Ones Handbook: A Voice for the Natural Landscaping Movement. Wild Ones – Natural Landscapers Ltd. Milwaukee, WI.
- Center for Watershed Protection. 1998. Better Site Design: A Handbook for Changing Development Rules in Your Community. Prepared for: the Site Planning Roundtable.
- Claytor R.A. and T. R. Schueler. 1996. Design of Stormwater Filtering Systems. Prepared for: Chesapeake Research Consortium, Inc.
- Claytor, R.A. 1999. Performance of a Proprietary Stormwater Treatment Device: The Stormceptor®. Watershed Protection Techniques. 3(1): 605-608.
- Conservation Fund, Applied Ecological Services, Inc., Resource Data, Inc., Heart Lake Conservation Associates, Velasco & Associates, and K. Singh & Associates. 2001. Conservation Plan. Submitted to Milwaukee Metropolitan Sewerage District.
- Department of Environmental Resources Prince George's County, Maryland. 1997. Low-Impact Development Design Manual.
- Dreher, D.W. 1994. Management Program Action Plan for the Lake Michigan Watershed. Northeastern Illinois Planning Commission. Chicago, IL.
- Dreher, D.W. and T.H. Price. 1997. Reducing the Impacts of Urban Runoff: The Advantages of Alternative Site Design Approaches. Northeastern Illinois Planning Commission. Chicago, IL.
- Dreher, D.W. and L. Heringa. 1998. Restoring and Managing Stream Greenways A Landowner's Handbook. Northeastern Illinois Planning Commission. Chicago, IL.
- Farnsworth, C.B. 2003. Dollars and Sense. Builder magazine. October issue. pp 244-250.
- Friends of the Kishwaukee River. Date unknown. Sustainable Development Guide for Kishwaukee Watershed Municipalities.
- Highland Park Environmental Commission. 1998. Habitats: A Guide to Natural Landscaping in Highland Park. Highland Park, IL.
- Illinois EPA, Bureau of Water. 2002a. Illinois Water Quality Report. IEPA/BOW/02-006, 99pp. + appendices.

- Illinois EPA, Bureau of Water, Watershed Management Section. 2002b. Illinois Draft Section 303(d) List. IEPA/BOW/02-009, 33pp. + appendices.
- Illinois Department of Natural Resources – Office of Water Resources. 1983. Stream Preservation Handbook. Springfield, IL.
- Illinois Department of Natural Resources. 1997. The Kishwaukee River Basin: An Inventory of the Regions Resources.
- Illinois Department of Natural Resources. Date unkown. Kishwaukee River Area Assessment.
- Ingram, J. 1999. When Cities Grow Wild-Natural Landscaping from an Urban Planning Perspective. Natural Landscapers, Ltd.
- Kane County. 2005. Kane County Stormwater Management Ordinance. Available at
- Kishwaukee River Ecosystem Partnership (KREP). 2004a. Kishwaukee River Subwatershed Plan (Draft).
- \_\_\_\_\_. 2004b. South Branch Kishwaukee River (East) Subwatershed Plan (Draft).
- \_\_\_\_\_. 2004c. Union Creek Subwatershed Plan (Draft).
- \_\_\_\_\_. 2005. Strategic Plan for Habitat Conservation and Restoration in the Kishwaukee River Watershed (Draft).
- \_\_\_\_\_, Watershed Resource Consultants, Inc., and GeoAnalytics. 2004. Report on the Natural Resources and Habitat in the Kishwaukee River Watershed.
- Labaree, J.M. 1992. How Greenways Work: A Handbook on Ecology. 2<sup>nd</sup> Edition. National Park Service and Atlantic Center for the Environment. Ipswich, MA.
- McHenry County. 2004. McHenry County Stormwater Management Ordinance.
- Mitchell, F. 1996. Vegetated Buffers for Wetlands and Surface Waters Guidance for New Hampshire Municipalities. Wetland Journal Vol. 8, No. 4.
- Northeast Illinois Planning Commission. 1997. Natural Landscapes for Public Officials: A Source Book. Chicago, IL.
- Northeastern Illinois Planning Commission. 2004. Chicago Wilderness Green Infrastructure Vision Plan.
- Northeast Illinois Planning Commission and Openlands Project. 1997a. Trails: An Amenity for Property Owners and Communities. Illinois Prairie Trail Authority. Chicago, IL.

- Price, T.H. and D.W. Dreher. Assisted by CH2M Hill. 2000. Urban Stormwater Best Management Practices for Northeastern Illinois.
- Price, T.H. and D.W. Dreher. 1995. Flossmoor Stormwater Detention Basin Retrofit: A Demonstration of Detention Basin Modifications to Improve Nonpoint Source Pollution Control. Northeastern Illinois Planning Commission. Chicago, IL.
- Price, T.H., D.W. Dreher and C.W. Schaal. 1994. Model Best Management Practice Selection Methodology and Lake County Decision-Making Framework. Northeastern Illinois Planning Commission and Lake County Stormwater Management Commission. Libertyville, IL.
- Schueler, T.R. 1995. Site Planning for Urban Stream Protection. Metropolitan Washington Council of Governments. Washington, DC.
- Schueler, T.R. 1997. Comparative Pollutant Removal Capability of Urban BMPs: A Reanalysis. Watershed Protection Techniques Technical Note 95. 2(4).
- Schueler, T.R. and Claytor, R.A.. 1997. Impervious Cover as an Urban Stream Indicator and a Watershed Management Tool. *Effects of Watershed Development and Management on Aquatic Ecosystems*. American Society of Civil Engineers. New York, NY. Pp. 513-529.
- Shepp, D. 1995. A performance Assessment of an Oil-Grit Separator in Suburban Maryland. Metropolitan Washington Council of Governments. Washington, D.C.
- Short, Matthew. 1999. Baseline Loadings of Nitrogen, Phosphorus and Sediment from Illinois Watershed. Prepared for the Illinois Environmental Protection Agency.
- Stowe, R. and DuPage County Environmental Concerns Department. 1991. DuPage County Stream Maintenance Program Report. DuPage County Environmental Concerns Department. Wheaton, IL.
- Terrene Institute. 1994. Urbanization and Water Quality: A Guide to Protecting the Urban Environment. Washington, DC.
- USDA Natural Resources Conservation Service. 1997. Native Plant Guide for Streams and Urban Stormwater Facilities in Northeastern Illinois.
- Village of Algonquin. 1999. Village Code.
- Village of Long Grove. 2004. Village Code.
- Wildlife Society and American Fisheries Society. 1983. Stream Obstruction Removal Guidelines. Bethesda, MD