Guidebook on Using Natural Restoration Methods in the Ralston Creek Watershed

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Prepared for the Natural Resources Conservation Service

By
Chris Snyder and Andrew Bertelsen
Field Problems in Planning 102:210
Graduate Program in Urban and Regional Planning
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Instructor: Peter Fisher
Advisor: Cheryl Contant
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Introduction

This guidebook is intended to serve all of the people who have an interest in the Ralston Creek watershed. We focus on the North Branch area of Ralston Creek, but many of the principles could easily be applied outside of the watershed. Within this book we have attempted to provide you with much of the preliminary information, contacts, and suggestions that will help guide your planning efforts in the Ralston Creek watershed. The stormwater and regulatory sections are meant to provide the basis of our argument that this type of planning should be used throughout the watershed. The guidebook includes a case study of the Rochester Hills development to show how application of the concepts might appear on the ground.

The Rochester Hills Condominium community occupies approximately 27 acres, bordering a southern portion of the North Branch area of Ralston Creek (Figure 1). The Rochester Hills site is unique to the Iowa City community, as homes are clustered on the upper topographic regions, preserving approximately 19 acres of open space. Rochester Hills contains a variety of habitats, many potentially supportive of natural prairie features. Preserving open space is only one step in the process of maintaining an ecologically stable landscape. Creating a balance between human activity and natural processes is essential because it will reduce problems for both the landowner and the surrounding environment. A well-balanced landscape uses natural features of the land to help absorb the impacts of human intervention. As a cluster development the Rochester Hills site provides us with a study area in which to develop a land management policy for open space in the North Branch area of Ralston Creek.

Figure 1: Map of Ralston Creek in Iowa City, IA

The author’s of this guidebook are currently working toward completion of urban planning degrees. Both Chris Snyder and Andrew Bertelsen are second year students in the Department of Urban and Regional Planning at the University of Iowa. Chris has concentrated his course work on land use
and environmental planning, researching such topics as landscape ecology and watershed protection. Working with Countryman Group Planners in Iowa City, Chris assisted with the development of the North Liberty Zoning Ordinance and the Johnson County Land Use Plan. Chris also gained professional experience working as an intern for East Central Iowa Council of Governments in Cedar Rapids. Like Chris, Andy has also emphasized land use and environmental planning procedures. Currently, Andy serves as a planning intern for the Iowa City Planning and Community Development Department where he assists with area plans, staff reports, subdivision, variance, special exception, and rezoning applications. Andy also works as an intern for the Johnson County Council of Governments Transportation Planning Division.
Executive Summary

In preparing this guidebook, we have collected information on both the functions of the natural environment and land management procedures conducive to these natural functions. The data collection process involved contacting both natural landscaping professionals and government officials, to researching publications found at the University of Iowa Library, the State Historical Society, and the Johnson County Natural Resources Conservation Service Office. The Internet is also a useful tool for locating prairie grass seed distributors throughout the Midwest.

This guidebook outlines basic natural landscaping protection and procedures applicable to development sites within the North Branch area of Ralston Creek. We begin with site assessment procedures, which suggest that we take historical inventory of a particular site, identifying vegetative areas. Development sites in the North Branch of Ralston Creek may have traces of prairie remnants, oak savanna features, woodlands, wetlands, and transitional areas. The problem assessment phase evaluates these areas, determining the level of disturbance. After taking inventory of the site and the problems on that site we suggest evaluation of proper restoration techniques. Restoration techniques include site preparation, seeding, and maintenance.

Implementing natural landscaping techniques on a particular site can prove costly. The Iowa City Community Development Department currently provides grants for neighborhood organizations working to benefit the community, such as the prairie grass implementation project in the Longfellow neighborhood. Implementing natural landscaping features also requires commitment. Project success requires cooperation between local government, development firms, neighborhood organizations, and the individual homeowner. Local officials are in a position to advocate natural landscaping features and bring the benefits to their communities. In cooperation with development firms, Iowa City can create a distinctive community image, preserving community identity and adding strength to the real estate market. Residents may volunteer in the installation and maintenance of the natural landscaping project. Members of the Rochester Hill Homeowner’s Association have the opportunity to become actively involved in the restoration process.

The Rochester Hills development site is used as a case study of how to implement natural landscaping features in the North Branch of Ralston Creek. Outlined is a brief assessment of site history, soil and slope characteristics, and identification of habitat locations. After evaluating many of these factors at the Rochester Hills site, we decided that a combination of native landscape restoration and natural stormwater management techniques is needed to meet the overall goals of reducing stormwater flows into Ralston Creek and reestablishing native ecosystems in the open areas of the property.
Ecology

The word "ecology" may not be a friendly word to all of those using this guidebook. Too often it evokes visions of radical elements who would like nothing better than to see all human activity removed from natural areas. We propose that you take a minute to think of the word in a different perspective. In order to construct a building, an enormous number of calculations must be taken into consideration. The builder needs to know the strengths of various materials, which materials work best together, which materials are resistant to moisture, fire, and pests. The builder must also consider the costs of materials versus their quality and aesthetic appearance. All of these elements are ultimately brought together into an architectural plan. If the plan is based upon faulty materials or has not adequately addressed the physical properties of the site, then the building will not be sound.

Now consider the open areas along Ralston Creek. In order to properly develop a plan to manage these areas we must consider the underlying physical properties that exist in the area. We need to understand how the landscape functions at a variety of levels. Which areas retain moisture and which plants work best together? These are just a few of the questions that need to be addressed. Developing this underlying knowledge is what we mean by the word ecology. Before we can construct our plan we need the underlying principles for our landscapes that builders have been developing for our housing for thousands of years.

The chapters to follow are based upon a number of important and fundamental principles. These principles make up the foundation and reasoning behind the need to adopt ecologically sound management practices. We refer to the following concepts throughout the guidebook.

*Disturbance* refers to both natural and human events that shape the way the landscape appears and functions. In the Ralston Creek area the most dramatic forms of disturbance have been agriculture and the creation of urban areas. Disturbance can also occur from fire, flooding, and even insects. Disturbance, whether caused by humans or other events is not fundamentally bad. The act of disturbance, though, does create new conditions in the landscape and should therefor be understood. Row cropping and urban development is much more likely to have removed remnant patches of native landscapes than if the land was used as pasture. Pasture is also more likely to contain a native landscape because grazing mimics some of the properties of fire as a disturbance (Collins & Wallace, 1990). In many cases, disturbance is the method by which the landscape renews resources. Disturbed areas also create opportunities for new plants and animals to enter an area.

*Fire* is extremely important to landscapes. In the case of both woodlands and prairies, fire acts to control the growth of certain plants. Oaks, hickories, and many prairie plants have evolved over time to be resistant and dependent, on fire. Periodic outbreaks of fire were necessary in order to prevent the growth of invasive species. The qualities that made plants resistant to fire, such as a very extensive root system, also
made them particularly good at retaining moisture and holding soil in place. This created a landscape that was capable of absorbing large amounts of rainfall.

**Fragmentation** refers to the breakup of ecosystems into smaller units, which become increasingly disconnected from each other. Once an ecosystem becomes too fragmented, it will begin to lose its functional characteristics. This occurs because many of the organisms that exist within this landscape are no longer able to survive in the smaller habitat. The result is often a degraded system that has only a fraction of the original number of species. The degree to which you can avoid fragmentation will determine how close to the original ecosystem you will be able to get.

**Infiltration** refers to the ability of an area to absorb water that is moving along the surface, into the ground. Once infiltration has occurred there is a much greater chance that the water will be retained in the area and slowly released into local streams. The reason it is important to get water below the surface is because this slows the speed at which the water will move. The slower the water is traveling, the less potential it has to carry your soil, plants, and backyards with it. The goal is not to stop water from moving off the land, but simply to decrease its velocity. Unfortunately, the mere presence of soil does not mean that a large amount of water will be able to get into the ground. Soil loses its ability to absorb water when it becomes compacted on the surface, dried from lack of vegetative cover, or covered with impervious surfaces such as roofs and streets.

**Interception** is the direct absorption of water by plants. Soil alone also has a finite capacity for absorbing moisture. If you take an old dried out sponge and run it under water, you will notice that most of the water simply flows off. Once the sponge is moistened, it will absorb water until it is filled and again most of the water will run off. What is needed is a way to not only get water into the soil, but also to enhance the soils ability to absorb and hold water. This can be done in a number of ways that we will address later in the chapter on restoration techniques. In a native system, prairie plants and large trees such as oaks act as sponges, drawing water in from their leaves and roots systems. Their root systems reach farther into the soil, eight to ten feet, than many traditional urban plants like Kentucky bluegrass, about 6 inches. This allows native plants to draw water from many different soil layers. This same root system can also be very effective in removing pollutants from water as they pass through the landscape.

**Depression Storage** refers to areas within the landscape that are capable of holding water during a storm and slowly releasing it later. During land clearing, much of the natural areas of depression storage are removed, only to be replaced later in the form of engineered detention basins.

**Stormwater** is included as both a definition and a unique subsection within ecology because of its undeniable role within any watershed. Stormwater refers to rainfall that is not held by the local ecosystem through either interception, infiltration, or depression storage. This overland flow of water is directly discharged into Ralston Creek. Stormwater merits special concern because it is often the most immediately
disturbing force on the landscape, especially in developed areas. The force of water from a storm is often concentrated by the design of our roads, downspouts, and ditches. The fast moving and high volume water can tear out loose plants and soil, carrying them into local waterways such as Ralston Creek. Reducing this overland flow is essential in order to prevent further degradation of Ralston Creek and its surrounding watershed. The creation of a comprehensive stormwater management plan for Ralston Creek by the City of Iowa City would greatly aid individual efforts and potentially prevent much of the need for mitigative measures later on.

Stormwater presents another threat to Ralston Creek in the form of non-point pollution. Non-point source pollution refers to sources such as lawn chemicals, automobile fluids, and materials placed on roads during winter. These pollutants are often fairly dispersed in their local area, but when carried by stormwater they become concentrated in streams such as Ralston Creek.
Site Assessment

Gathering data about your particular site is crucial in order to place the ecological principles in context. We have divided this section into two phases. In the first phase you should begin by learning some of the history of your site. In Phase II you should examine your site for signs of degradation or potential degradation.

Phase I - Site Inventory

Locating site maps, soil maps, topographic maps, and even photos of the area will help you put together an inventory of features on your site. This might also involve asking several of the following questions.

- What types of vegetation are currently on the site?
- Are these the types that have always been there or have they been planted or allowed to grow due to some form of disturbance?
- What was the area used for in the past, was it pastureland, row crops, or has it already been developed to some degree?
- Are there major water features, hills, or other specific landscape forms on the site?

A review of early surveyor notes of the Ralston Creek area was done to gain a better understanding of what the area was originally like. The notes indicated that the area was indeed composed of a variety of landscapes including Oak Savanna and rolling prairie. The notes also indicate that many areas were heavily wooded prior to extensive human settlement.

Important Maps

If your site has already been developed, it could be very helpful to locate an official plat map. The plat map should provide an accurate scale, describe the total acreage of the site, and indicate underground features such as stormwater drainage lines, and even irrigation systems.

We have provided a map of land uses within the North Branch area prior to major development (Figure 2, following page). Much of the area was used as pasture or remained wooded due to the many steep slopes within the region.

The Johnson County Soil and Water Conservation District office can provide a copy of topographic maps in your area. If the area has recently been developed it may be difficult to obtain complete topographic information due to recent grading and filling. Development generally occurs within or along major topographic features and the overall layout of slopes should not have changed dramatically. You can expect that ridge tops will have been smoothed and the upper portion of major ravines may have been filled during development.
Soils play a fundamental part in understanding the history and potential of your site. The soils on your site will tell you which areas are most susceptible to erosion and the type of vegetation most easily supported. The USDA provides soil maps for all of Johnson County (Appendix C). The area along Ralston Creek is primarily composed of soil classification 729B – Nodaway-Arenzville Silt Loams with 1 to 4 percent slopes. This soil type has typically been used for
pasture. The upland areas are predominately Fayette Silt Loams with soil classification 163B-G. The Johnson County soil survey provides tables describing each soil type. Soils have a variety of properties that should be understood before beginning any restoration plan. Many of the soil types in the Ralston Creek area are easily eroded and generate large amounts of runoff.

Identifying Habitats

In the Ralston Creek Watershed you will find approximately four major habitats. The existence of particular habitats on your site determines the restoration and management approach that is most suitable to particular areas. In the Ralston Creek area it can be expected that many of these subtypes will exist only in a degraded form. This is due to the significant human activity that has occurred throughout the area since the late 1800's.

Prairie remnants are most likely to be found in the least disturbed areas of the watershed. These areas are often along fencerows, slopes and former pasture. In the case of prairie within the Ralston Creek Watershed, it may be more appropriate to look for areas capable of supporting a prairie habitat. This is due to the severely degraded nature and lack of prairie remnants within Iowa generally. Pastureland may harbor native seeds because it has generally not been routinely tilled. These native seeds may also reappear once grazing has stopped. Grazing can have an effect similar to fire on invasive species, because grazing animals tend to eat and trample young saplings and other vegetation.

Prairies exist in a number of different forms depending upon the soil, moisture, and drainage conditions of a particular area. In the Ralston Creek area you may encounter conditions suitable to wet prairies, mesic prairies, or dry prairies. Wet prairie conditions may exist along Ralston Creek and the floodplain in areas that are not very well drained. Figure 3 shows an example of a wet prairie. Mesic prairies represent a transition between wet and dry prairies. Mesic prairies "occur on sites that are relatively well drained, but have high moisture available through most of the growing season (Ladd, 1995)." Wet prairies thrive on land that is also highly suited for agriculture; thus they are likely to have already been converted for agricultural purposes. Dry prairies occur on well-drained upland areas (Ladd, 1995). Little bluestem and side oats grama are particularly well suited to these dryer conditions (Christiansen).

Oak Savanna is characterized by openly spaced, hardwood species, including oak and hickory trees. Openly

Figure 3: Wet Prairie

Source: Ladd, 1995
spaced generally implies more than one mature tree per acre but less than 50 percent tree canopy cover (Maloney). The open canopies of this system allowed shade tolerant native grasses such as big bluestem and june grass to flourish (EPA, 1998). Colorful forb species such as sky blue aster and shooting star made up a variety of flowering plants native to savannas in Iowa and other regions (Ladd, 1995). Degradation of Oak Savanna is most visible in the form of large numbers of non-native trees that took hold as settlers moved into the area and created conditions where fire was suppressed. In newly developed areas you may find a few old oaks which have fairly recent undergrowth of invasive species. An example of a savanna habitat is shown in Figure 4.

**Figure 4: Oak Savanna**

![Oak Savanna](source: Ladd, 1995)

Woodland differs from an oak savanna in that there is a greater variety of tree species and the trees are more dense. Native woodlands were characterized by species such as elms, ashes and maples (Collins & Wallace, 1990). These species are more shade tolerant than oaks and hickories and also more susceptible to fire. Many invasive woodland species are characterized by their quick growth and thin bark. Invasive species such as Box Elder indicate that the traditional disturbance regime has been upset. As fires were suppressed during settlement, native grasses and cover in the hardwood forests were overtaken by more invasive tree species. These species are much quicker to reproduce than the native hardwoods.

Wetlands can be hard or easy to identify depending on the time of year, precipitation conditions, and the nature of surrounding development. Wetlands are characterized by the presence of shallow surface water, but also by specific soils and hydrologic conditions, which may not be readily visible. Consulting a soil survey map will help to determine if your site has "wetland soils." The U.S. Fish and Wildlife Service lists three attributes, of which a wetland must have one or more: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (Marsh, 1998).

Areas in and around Ralston Creek may exhibit signs of riparian wetlands and surficial wetlands. Riparian wetlands exist along streams or runoff channels. Surficial wetlands form
due to surface runoff and direct precipitation and are generally spread out along a low-lying area (Marsh, 1998). Wetland plants and wet prairies share common characteristics and plants. An expert in wetland plantings could help in determining the exact plants suitable to your area, based upon soil and moisture conditions.

**Transitional areas** may need special attention because they will be capable of supporting a variety of habitats. They represent the boundary between one set of landscape conditions and another. A transitional area may be in the form of a change from sandy to more clay like soils. Different species would exist in each area and might blend together in the transitional area. In mapping the location of vegetation types you should pay heed to the fact that much of your site may contain a transitional area. Transitional areas may be found in abundance along Ralston Creek due to the extremes of soil moisture levels within the watershed. This is due to the variety of slopes and in developed areas, to the impact on drainage conditions. Wet prairies may be found within the floodplain, but wet and mesic areas may also be found further upland, especially around detention basins. The size of your site will determine the number and degree of transitional areas that you may find.

**Phase II - Problem Assessment**

Identifying specific problems on your site is important in helping you to prioritize restoration projects. Typical concerns will be soil erosion problems, stormwater discharges in undesirable locations, and large numbers of weedy or invasive species.

**Soil Erosion and Slope Stability**

Erosion will often be visible in a number of different forms. In the case of streams it may be seen in the form of bank erosion or what is known as downcutting, where the stream bed is literally being cut downwards by the flow of water. In other areas you may find the formation of gullies on slopes with particularly high levels of concentrated runoff. Slopes can also erode in a slower process in which a large section of the slope literally begins to slide downwards.

The stability of slopes in the Ralston Creek watershed is highly dependent upon proper siting of development and maintenance of vegetative cover. Development within the watershed could threaten the plant communities that are needed to maintain structural stability on the sites. The degree to which a slope can incline without failing is referred to as the angle of repose. Slopes that are inclined beyond their normal failure point depend upon a concept known as conditional stability. Conditional stability refers to the fact that steep slopes often depend upon a critical balance of forces in order to maintain their structure. Once this balancing force, such as a dense network of roots is removed, the slope can quickly collapse. Many slopes within the Ralston Creek watershed may be at this critical stage. Disruption or further degradation of the soil stabilizing ground cover could lead to localized slope failures.
Invasive Species and Stormwater Discharge

Invasive vegetation can be in the form of shrubs, trees, or even common weeds such as dandelions. These species can cause significant ecological problems because of their ability to completely shade vulnerable slopes in the area. Once they have taken over a site, much of the groundcover may disappear as less light reaches the floor woodlands. Many of the non-native species such as bluegrass are also much less tolerant of extreme weather conditions. A drought may kill many of these invasive species, leaving the ground bare when rains returns.

Figure 5 shows an area that has many young invasive trees. They have already begun to shade the forest floor to the point that little ground cover remains. The lack of ground cover is also allowing stormwater runoff to begin the process of gully erosion. This area would benefit from less shade and reduction of the stormwater discharge at the top of the slope.


**Restoration Techniques**

The first step in developing a restoration plan is to evaluate what your restoration goals will be. This should be based upon several factors as outlined below.

- The degree to which you feel you can create a "natural" system.
- The amount of space you have to work with; larger areas may provide a better opportunity to produce a more ecologically balanced ecosystem.
- Your funding situation: How much can you spend up front and long term?
- The geography of your neighborhood and your relationship with your neighbors.
- The level of involvement you wish to have in the project.

Your plan should be based on the principles outlined in the ecology and site identification sections. It is not possible to truly restore an area to its pre-European settlement conditions and this is not our goal. We believe however, it is possible to restore a high degree of ecological integrity to our landscapes. This may require human intervention in order to reproduce natural events, such as fire. Ecosystems exist on many scales; the larger an area becomes, the more ecosystems it is likely to contain. A true prairie ecosystem existed on a vast scale prior to extensive European settlement. Within this system existed subsystems of plants and animals. While it may be possible to restore only a few of these subsystems on your site, they will provide numerous benefits and bring you one step closer to restoring some of our Iowa and national heritage.

This section is meant to provide you with a variety of techniques and tools that are capable of enhancing native landscapes while providing a high measure of erosion control and aesthetic quality. The installation of many of these devices and procedures should not be conducted without the help of a trained professional who can evaluate the specific physical requirements of your site. An important tool to be used prior to many of the restoration techniques is seedbank testing (EPA, 1998). This simply refers to the sampling of a section of soil, placing it in a flat, and waiting to see what grows. This can reveal the presence of native species and allow you to gauge their abundance within a particular area. This could save you considerable expense toward the purchase of new seeds. Our focus in this section is on prairie and oak savanna restoration techniques because these are the dominate native landforms of Iowa. Many of the restoration techniques can also be applied to wetland and woodland areas to some degree and will be mentioned briefly.

**Prairie Restoration**

**Site Preparation**

Once you have determined that an area is suitable for prairie restoration you can begin planning. The time, cost, and labor involved will vary depending upon your starting conditions. If you already have prairie remnants on the site it
may not be necessary to completely reseed the entire site. The most expensive element of a prairie restoration is the seed. This is because the native seeds are not in great supply and there are so many different varieties of plants that go into reestablishing a native prairie system. Table 1 provides a cost comparison of prairie seeding versus more traditional methods.

In order to allow your native plants the best chance for success, removing the current invasive species is necessary. The size of the area you wish to restore will affect the cost of killing these non-native species. You should also consider erosion control costs, such as oats for large areas or erosion control mats for small areas, before removing anything. If you kill everything off and the ground lies bare, you will lose a lot of valuable soil. You may want to remove only small sections at a time depending on your restoration goals (PMN, 1999). Actual removal of plants can be done in a variety of ways. For large areas, tilling, burning, or chemical spraying may be appropriate. Smaller areas can be removed with burning, chemical spraying, or the use of a dark cover such as black plastic. The two most controversial methods of restoration are burning and the use of chemical sprays. Prescribed burning involves the use of a professional burn specialist capable of safely burning a portion of the site in a controlled manner. A good burn specialist will know the proper time to conduct a burn and will be able to control the spread of fire and smoke to avoid the creation of a nuisance to you and your neighbors. Chemical spraying should be performed in a controlled manner in order to protect waterways and soils. Use of a low-toxicity and non-persistent herbicide is very important if you choose to use chemical spraying (EPA, 1998). Roundup is a commonly recommended herbicide by many seed and native restoration sources. Per acre costs of treating an area with Roundup are between $45.00 and $60.00 (Christiansen). Chemical spraying can be useful in areas that are susceptible to erosion and thus not suitable for tilling (Heyne, 1995). If your site has recently been used for agriculture you should be careful to learn if any long-lasting herbicides such as Atrazine have been used on the site. Carry-over from herbicides or chemical drift from neighboring fields can kill prairie seedlings (PMN, 1999).

Table 1: Approximate Per Acre Costs of Two Landscape Treatments, 1995

<table>
<thead>
<tr>
<th>Installation and Seed Costs per Acre</th>
<th>Kentucky Blue Grass</th>
<th>Prairie Grasses &amp; Forbes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed</td>
<td>$500.00</td>
<td>$1,200.00</td>
</tr>
<tr>
<td>Ground Prep. And Installation</td>
<td>$2,000.00</td>
<td>$500.00</td>
</tr>
<tr>
<td>Watering, mowing, and weeding related to installation</td>
<td>$2,000.00</td>
<td>No weeding 1st yr.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$4,500.00</strong></td>
<td><strong>$1,700.00</strong></td>
</tr>
</tbody>
</table>

Source: EPA, 1998

Seeding
Seeds and plants can be acquired from many specialized nurseries (see Appendix A). Larger restoration projects can include strategically placed plantings in combination with larger seeding areas. A common strategy is to include very colorful prairie plants such as black-eyed susans in the beginning to provide a highly visible, colorful and very positive initial impression (EPA, 1998). Table 2 provides an example of seed costs for a variety of prairie habitats. The
Ralston Creek watershed ranges from wet to dry prairie habitat, depending on specific slope and drainage conditions. Exact seed costs will depend on specific suppliers, availability of plants, and the diversity of plants included in your prairie mix. When ordering native seed you should be sure that the price is based upon the amount of pure live seed in the mix (Christiansen). This means that you won’t simply be paying for chaff and other material that is not actual live seed.

Table 2: Prairie Seed Mixture Costs per 5000 Square Foot

<table>
<thead>
<tr>
<th>Prairie Habitat</th>
<th>Soil Suitability of Forb and Grass Mix</th>
<th>Cost per 5000 square feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tall Grass Woods Edge Savanna</td>
<td>Wet Mesic to Dry Mesic</td>
<td>$200.00</td>
</tr>
<tr>
<td>Tall Grass Woods Inexpensive</td>
<td>Mesic &amp; Dry Mesic</td>
<td>$110.00</td>
</tr>
<tr>
<td>Short Sedge Meadow</td>
<td>Wet &amp; Mesic</td>
<td>$380.00</td>
</tr>
<tr>
<td>Short Grass Prairie</td>
<td>Mesic</td>
<td>$245.00</td>
</tr>
<tr>
<td>Tall Grass Prairie</td>
<td>Mesic</td>
<td>$150.00</td>
</tr>
<tr>
<td>Short Grass Inexpensive</td>
<td>Dry Mesic</td>
<td>$120.00</td>
</tr>
<tr>
<td>Mixed Height Shady Woodland</td>
<td>Wet Mesic to Dry Mesic</td>
<td>$445.00</td>
</tr>
<tr>
<td>Short Grass Woods Edge Savanna</td>
<td>Mesic &amp; Dry Mesic</td>
<td>$360.00</td>
</tr>
</tbody>
</table>

Source: Prairie Moon Nursery, 1999

Larger areas are generally priced per pound of seed mix. Typically it is recommended that seed be planted at the rate of six to ten pounds per acre depending on the soil conditions in the area. Table 3 provides an average cost estimate for seeding three varieties of native habitats. Averaging seed costs for each soil type in the three habitat ranges created the estimated costs per acre. These costs are based on a mixture of approximately 12 forbs and 2 grasses. Increasing the number of forb and grass species will increase seed costs, but will also create a more diverse habitat.

Table 3: Seed Costs per Acre, 43,560 square feet

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Six Pounds</th>
<th>Ten Pounds</th>
</tr>
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<tbody>
<tr>
<td>Prairie</td>
<td>$422</td>
<td>$704</td>
</tr>
<tr>
<td>Savanna</td>
<td>$439</td>
<td>$732</td>
</tr>
<tr>
<td>Woodland</td>
<td>$1560</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: Prairie Moon Nursery, 1999

Prairie planting in Iowa is generally done between early April and the end of June (Heyne, 1995). "Planting in hot and dry summer conditions may delay germination and growth or require irrigation" (EPA, 1998). Prairie seeds require planting at a shallow depth of not more than 1/4 of an inch and a firm seedbed (Christiansen). Large areas can be mechanically planted with equipment such as the Truax Drill or John Deere Power Seeder (Christiansen). Seeds may also be broadcast (sprayed) onto the site using a conventional seeder. Heyne (1995) recommends mixing the seeds with an equal amount of damp sand to ensure that they stay properly mixed in the seeder. Use of a roller following broadcasting can be very beneficial (Christiansen). Mulching can help ensure proper soil moisture conditions and enhance seed germination (EPA, 1998). Straw mulches, or alternatively, cover crops such as
oats and barley, can be seeded simultaneously with the prairie seeds and plants to control subsequent weed germination. The cover crop seeding rates should be light to moderate as not to compete with developing seedlings. Using community volunteers can reduce the cost of installation procedures.

Maintenance

As cover crops reach a height of 1-2 feet, mow the planting to a height of no lower that 6-8 inches (EPA, 1998). Use of a flail type mower is recommended for larger areas because the cuttings can serve as mulch (PMN, 1999). Noxious weeds such as thistles can be removed by hand or sprayed with herbicides in some cases. In order to keep weeds down and prevent them from suppressing young prairie plants, mowing is necessary. Mowing should be performed whenever weeds reach a height of six to ten inches (PMN, 1999). The most important thing to remember concerning weeds is not to allow them to go to seed. There is no prescribed season or number of times for mowing, but weather will be an important factor in growth of the newly planted prairie and will affect the mowing schedule. Prairie Moon Nursery (1999) recommends allowing weeds to reach a height of eight inches before winter, to help protect seedlings the first year.

Routinely, prescribed burning is recommended in the spring of the year, however, late spring and early to mid-summer burns can be used and alternated with fall burns. “Burning on a strictly alternating-year pattern can favor certain non-prairie biennials and should be avoided” (Christiansen). Some conservation specialists also recommend conducting yearly burns for the first three to five years after seeding to completely eliminate non-native species. Keep in mind, a qualified professional is required for burning control, and a good prairie care professional will have their own burning methodology and timing schedule.

Oak Savanna Restoration

Site Preparation

Oak savanna restoration can require many of the same site preparation techniques used for prairie restoration. The main exception will be the removal of shrubs and invasive trees that may have grown underneath the old oak and hickory canopies. Tree removal can be performed by cutting the trees, girdling, or burning depending upon the maturity of the invasive species. Stumps can be treated with a herbicide to prevent resprouting (EPA, 1998). Garlon 4 or Roundup can be used to control both resprouting and growth of weedy vegetation in selective areas (Maloney). While not as effective as the native grasses at controlling erosion, these invasive trees provide some measure of protection on steep slopes. Removal of invasive species should be performed with caution to ensure that slopes are not left bare for an extended period of time. “Certain native trees, such as box elder, are considered a detriment to regeneration of desirable plants; however they are often valued by the public which values vegetation for the purpose of scenic buffering” (EPA, 1998). In the case of native savanna and prairie restoration it may be this buffer of
trees that is actually preventing people form enjoying the scenic views available in the Ralston Creek watershed.

Seeding

Once the understory has been removed you can begin planting your seed. In some cases the abundance of sunlight able to reach the newly cleared area will allow native plants to regenerate. When picking a seed mix you should pay careful attention to the variety of light levels in different areas of the savanna. If planting in the fall, it may be possible to simply broadcast the seed onto the bare ground, allowing frost and thaw cycles to work seed into the ground (Maloney). If you decide to plant native tree species such as bur oak, be careful that any trees you plant are truly native to the area. Nurseries sell non-native trees such as Norway maple that can eliminate penetrating ground light (EPA, 1998). Oak trees of any species often do not reproduce in their own shade and need openings for sprouting and maturing (EPA, 1998).

Maintenance

Periodic burning of the savanna is also similar to the management options presented for prairie restorations. If you have planted young native tree saplings, care should be taken to protect them from the effects of an intense burn. Mowing of weedy species, or hand pulling may also be an option depending on the size of your site. After native grasses have become established, management of weedy species will become less intensive.

Woodland Restoration

Woodland areas can also be planted with native seeds where lighting permits. In some cases it may be determined by your plant specialist that the woodland has spread beyond its native confines and should be trimmed back. Woodlands occurred primarily in stream valleys and lowland areas, but may have spread due to fire suppression (Collins & Wallace, 1990). Restoring a regular fire schedule, as part of a prairie or savanna restoration, and allowing it to burn into the woodlands will allow the natural system to determine the true extent of woodlands on your site. We do not recommend large clearing of woodlands, since they may indeed be the most suitable habitat for a particular area, especially along stream corridors. Identification of non-native tree species can be done to gradually remove invasive species and replace them with native trees. Again, planting of a cover crop such as oats or native grass planting can help to stabilize soils if any extensive clearing is performed. The Ralston Creek watershed contains many steep slopes and erosion control should be a first priority before any woodland clearing is performed.

Wetland Restoration

Wetland restoration shares much of the same seeding and maintenance requirements of native prairie restoration. Burning may be the most effective method of removing invasive species if the ground is too wet for equipment. Native plants should be selected that are best suited to a wet prairie environment such as the prairie sundrop, which is native to
Iowa (Figure 6). Chemical spraying will be particularly hazardous and hard to control if the area is a true wetland and is not recommended. Construction of a wetland or wet prairie site from a formerly dry area is discussed further as part of the natural stormwater techniques.

**Figure 6: Prairie Sundrop**

![Prairie Sundrop](image)

*Source: Ladd, 1995*

**Natural Stormwater & Erosion Control Techniques**

A variety of techniques exist to manage stormwater and thus control erosion, using more natural devices. These techniques do not necessarily restore an area to a native state, although native plants can be used, but they can be used to reduce the impact of development on the landscape as a whole.

**Swales**

Swales (Figure 7, following page) are entrenchments designed to permit infiltration and removal of stormwater (Terrene Institute, 1994). They can also include small check dams, which help to slow the velocity of runoff and remove sediment from the flow. Swales are easily implemented on rolling topography, and are strongly recommended in development situations where a large residential site is present, but can also be used effectively on smaller sites. They can be used to convey stormwater from parking lots or roadways with less cost than installing a traditional underground stormwater system. Parking lot swales also are useful for the disposal of plowed snow. Swales can be vegetated with turf, prairie or wetland vegetation.

**Vegetated Filter Strips**

Vegetated Filter Strips (Figure 7, following page) are designed to handle small amounts of runoff. They aid in infiltrating water, removing sediment, and purifying runoff. These vegetated areas allow runoff to infiltrate into the ground before it is conveyed to swales or other stormwater devices. Runoff can be conveyed from rooftops, roads, driveways, or parking lots. Healthy vegetation is important to minimize erosion and to improve the filtering of pollutants in the runoff water. It is important that filter strips be located in less shady
areas. The more sunlight available to foster plant growth, the more effective the strips will be at removing nutrients and other materials from the water.

**Figure 7: Illustration of a Swale and Vegetated Filter Strip**

Source: Terrene Institute, 1994

**Stormwater Basins**

The use of detention and infiltration basins in the developed areas of Ralston Creek may be necessary to account for the loss of depression storage during land clearing activities. Detention basins are designed primarily to hold runoff for short or long periods of time. Infiltration basins can be very similar to detention basins, but they are principally designed to hold water until it is infiltrated into the surrounding soil. Natural detention basins are designed to combine the holding capacity of an engineered depression with natural vegetation to slow runoff velocity and remove sediments. Naturally landscaped detention basins incorporate native plants and gradual side slopes to enhance the removal of stormwater pollutants, improve aesthetic appearance, and reduce maintenance needs. Detention basins are generally built as either wet or dry ponds. Dry ponds hold water for short periods following a storm, but are typically dry most of the time. Wet ponds are designed to permanently retain water most of the time. The use of native vegetation can enhance the effects of detention and infiltration basins by absorbing and filtering water. Native vegetation will also enhance the aesthetic quality of these stormwater devices.

**Filter Berms**

Filter Berms (Figure 8) are mounds of earth constructed to follow the contour of a slope. Sand and fabrics can be used within the mounds to help infiltrate water that passes through and along the berm (Marsh, 1998).

**Figure 8: Filter Berm**

Source: Marsh, 1998
Infiltration Trenches
Infiltration Trenches (Figure 9) are similar in function to berms except they are trenches rather than mounds of earth.

Figure 9: Infiltration Trench

Source: Marsh, 1998

Infiltration trenches, swales, and filter strips are all measures capable of providing a good degree of stormwater filtration, soil infiltration, and velocity reduction. If used in combination with small detention basins they could form the basis of a site’s stormwater management effort. The incorporation of these features during the predevelopment phase of sites within the Ralston Creek Watershed would be clearly beneficial due to the cost of laying extended drainage lines and retrofitting areas after development.

Cluster development is one method of decreasing the amount of impervious cover and thus allowing for greater absorption of overland flows. By clustering homes we attempt to preserve open spaces designed with native plants as a substitute for conventional subdivision design, thus reducing the amount of impervious surface. This allows the developer to preserve and enhance existing natural areas such as prairie, wetland, floodplain, and woodland areas, making them an essential component of site planning. In preserving the natural features of a site, it allows the builder to design and retrofit stormwater detention basins as natural prairie systems, working to essentially enhance water quality. Rochester Hills is an example of a clustered development where the majority of the site has been preserved as open space.
Obstacles and Opportunities

Implementing your restoration plan can be a formidable task depending upon the scale of your goals. For small backyard prairie projects, this may mean nothing more than purchasing a few bags of seed and expending a few hours of labor. For larger projects, it is wise to carefully evaluate all of your options. It is increasingly common for state and federal governments to be involved in restoring native landscapes and using natural erosion control measures, and a variety of resources are becoming available to those who are willing to follow the practices within this guidebook. We already have examples of these approaches in the Ralston Creek watershed. The Longfellow Neighborhood Association used local grant money to restore a section of streambank along Ralston Creek using native landscaping. In this section we discuss some of the options you may have within Iowa City and beyond to incorporate native planning into your site.

Funding

Adequate financial resources are essential to implement a successful natural landscaping management plan. Normally, environmental programs do not fare well during budget deliberation. Alternative funding sources must be found for urban conservation programs. We recommend funding options at the state and national levels be explored by local governing officials. Some states have created funding sources by implementing fees on cement, asphalt, oil, fertilizer, pesticides, or water. For some localities, utilities are the most widespread and equitable funding source. The Groundwater Protection Fund includes revenue from increases in pesticide dealer license fees.

The cost of diverting runoff away from the current drainage system at Rochester Hills could be shared by those benefiting downstream of the site. A common resource pool could be set up to fund projects capable of diverting large percentages of the discharge away from Ralston Creek.

Government's Responsibility

Currently, neighborhood grant applications are available in Iowa City from Marcia Klingaman, Neighborhood Services Coordinator, in the Planning and Community Development Department. These grants are made available to local neighborhood organizations for community betterment projects. In Iowa City, the Longfellow Neighborhood Association recently held a public display of a controlled prairie burn on the Longfellow Nature Trail as well as a “Let’s Grow a Habitat” fair. It is possible for local government to incorporate natural landscaping techniques while promoting stormwater management by awarding grants to neighborhood organizations demonstrating a desire to “get their hands dirty.” With careful planning, native plants can constitute the primary landscaping material in new development sites as well as sites that are being re-landscaped. The approach is appropriate for clustered residential developments, such as the Rochester Hills.
development site. It can work to realize major environmental improvements and cost savings.

Local officials are in a position to facilitate natural landscaping and bring its benefits to their communities. By amending the current comprehensive plan and adopting ordinances to promote the appreciation and use of natural landscapes, local government can install natural landscaping on new and existing public sites, providing a model for urban conservation techniques, and promote it on new, private sector developments. Citizens must understand how everyday activities contribute to runoff problems. Citizen education provides a powerful incentive, working to provide information about urban conservation to residents, developers, and community organizations. Special programs such as “Let’s Grow a Habitat” and “eco-neighborhoods” are proving successful in encouraging citizens to buy into programs.

The benefits of adopting urban conservation are both environmentally pleasing and aesthetically rewarding. By restoring and protecting habitat, we enhance the aesthetic appeal of natural landscaping efforts, improve water quality by enhancing the infiltration of contaminated stormwater, and combat soil erosion by stabilizing easily eroded soils. Appendix B dictates an executive order by the President, William J. Clinton, prescribing natural landscaping methods as for use on federal grounds.

Iowa City can help to promote better watershed management by streamlining some of the processes and requirements needed to conduct proper restoration techniques. This includes a clearer process for obtaining a burn permit and clear distinction of who should be allowed to conduct burns. Public education about the difference between "weeds" and native landscaping would also be helpful.

**Development Opportunities**

The developer has the opportunity to create a distinctive community image. This unique image has the ability to strengthen the real estate market, thus preserving the identity of a community. A community that appears to care for a high quality environment establishes a market niche that the traditional development approach may not offer. Indeed, property values are a function of public perception, and as natural landscaping techniques become more accepted, they will be looked upon as an asset to the community. Natural landscaping attempts to give the area an early frontier feel. By implementing such landscaping principles, we can create an atmosphere that is Iowa: rolling hills, large oaks, and flowing prairies. Clustering has the added benefits of reducing the amount of cement usage, reducing the total impervious area, and minimizing soil compaction associated with mass grading activities. In Coralville, the Sturbridge Square development site, located near the Oakdale Campus, is attempting to create a model demonstrating innovative, environmentally sustainable, and economically sensible land planning and development approaches for developments throughout the region. The intent of the design is to produce a native landscape design solution specifically tailored to the soils, hydrology, vegetation, and proposed land use characteristics of the site.
Citizen’s Role

Homeowners have the opportunity to “get their hands dirty”. If natural landscaping were a component of new development projects, residents would have the opportunity to volunteer in the installation and maintenance of the project. Volunteers can work with local officials and conservation organizations to promote urban conservation. Volunteer work provides an opportunity for residents to learn from nature in their own yard or community. For the individual yard, deck, or porch, we suggest decorating with natural flowering amenities and adopt the “Living with Nature” concept, as people living in natural landscapes learn to appreciate the variety of textures, colors, and shapes of native plants and the dramatic progression of hues throughout the season. In the Iowa City Longfellow Neighborhood, neighborhood association members organized a seminar in which members of the community were able to learn how to make their urban gardens more attractive and enjoyable for people and wildlife. One seminar session discussed the benefits of using native species instead of imported varieties and provided information on how to begin choosing the right plants.
Rochester Hills Case Study

Following the procedures outlined throughout this guidebook, we used the Rochester Hills site to illustrate how all of the elements can be brought together in an overall land management plan.

Site Assessment at Rochester Hills

We began our assessment of Rochester Hills by collecting maps, photos, and other historical information that was available for the site and Ralston Creek as a whole. We then identified the various habitats on site and documented specific problem areas.

History of Rochester Hills Site

Rochester Hills was developed in 1994 to provide 32 Townhouse style buildings. The site occupies 25.19 acres on the northeast edge of Iowa City, situated between Rochester Avenue on the south and Ralston Creek on the north. The developed area is clustered onto approximately 7.0 acres on the southeastern third of the site. Prior to its most recent development the site was owned by a local Iowa City couple and used primarily as pastureland, which is supported by analysis of aerial photography taken prior to major development activity in the area. Aerial photographs taken in 1939, 1979, and 1990 combined with surveyor notes of the Ralston Creek area in the late 1860's reveal a fairly consistent pattern of open land with small clusters of large mature trees in a savanna setting. Trees also appear to have been widely spaced prior to the 1980's. This suggests that much of the current shrub and tree growth has occurred within the last ten to twenty years.

Soil and Slope Characteristics

Analysis of soil and slope conditions on site revealed an area highly susceptible to erosion. Portions of the site contain steep slopes composed of easily eroded Fayette Silt Loam soils. Please refer to Figures 10 and 11, following page, for a display of soil and topographic features at Rochester Hills. Table 4 on page 26, provides a description of each soil type found at Rochester Hills.
Figure 10: Soil Overlay of Rochester Hills

Source: Soil Data Provided by the Natural Resources Conservation Service

Figure 11: Topographic Features at Rochester Hills

Source: Topographic Data Provided by the Natural Resources Conservation Service
Table 4: Soil Types and Characteristics within Rochester Hills

<table>
<thead>
<tr>
<th>Soil Unit</th>
<th>Name</th>
<th>Typical Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>729B</td>
<td>Nodaway-Arenzville silt loam, 1-4% slopes</td>
<td>Primarily used for pasture, slow surface runoff, moderately permeable, susceptible to gully erosion</td>
</tr>
<tr>
<td>163G</td>
<td>Fayette silt loam, 25-40% slopes</td>
<td>Primarily pasture or trees, rapid surface runoff, moderately permeable, highly erosion danger</td>
</tr>
<tr>
<td>163E2</td>
<td>Fayette silt loam, 14-18% slopes</td>
<td>Best suited to pasture, moderately permeable, rapid surface runoff</td>
</tr>
<tr>
<td>163F2</td>
<td>Fayette silt loam, 18-25% slopes</td>
<td>Primarily pasture or trees, rapid surface runoff, moderately permeable, highly erosion danger</td>
</tr>
<tr>
<td>163C2</td>
<td>Fayette silt loam, 5-9% slopes</td>
<td>Moderately permeable, medium surface runoff</td>
</tr>
<tr>
<td>163B</td>
<td>Fayette silt loam, 2-5% slopes</td>
<td>Generally cultivated, moderately permeable, medium surface runoff</td>
</tr>
</tbody>
</table>

Habitat Identification

Mapping of the various habitats at Rochester Hills was done primarily through on-site evaluations. A map of each habitat area is provided in Figure 12, following page. The site contained all four of the major habitats. This is a result of the clustered nature of the development. Typically, many of these areas would have been cleared under conventional development practices.

Pasture

While a large area of former pastureland exists to the north of the site, there were no immediate signs of intact prairie remnants. There may however be dormant prairie seeds beneath the former pastureland, which could be reactivated during restoration. Former pastureland also extends south along the eastern property line. Much of this eastern edge has been mowed to control invasive weedy plants that were not covered by turf grass. The area was likely heavily disturbed during development and thus fostered the growth of invasive weedy plants. Pasture may also have originally existed along the western property edge, which is supported by photos and the historical land use map, but the area has become overgrown and heavily impacted by development.

Oak Savanna

A remnant oak savanna community transitions into a steeply sloped woodland area directly behind building 18 and 19 (Figure 12, following page). The savanna may have originally extended throughout much of the west central portion of site. Some large mature savanna trees remain, but they are surrounded by large amounts of invasive undergrowth.

Woodland

Two areas contain fairly dense woodlands and may have formerly existed as a more open savanna habitat. This is evidenced primarily by the existence of several large mature
Figure 12: Habitat Map of Rochester Hills
oaks and hickories within the wooded areas and analysis of historical photos. Soil erosion problems suggest that the area has only recently been heavily shaded, since there appears to be a lack of natural groundcover. The woodlands also exist on some of the steepest slopes on the Rochester Hills property.

**Wetland**

A large wetland area exists within the 100-year floodplain at the northwest corner of the site. The area has been continuously saturated throughout the course of this study, is designated as a wetland on the official plat map, and is fed by runoff from both Rochester Hills and the Bluffwood neighborhood to the west. Construction of a stormwater device at the southwest corner of the development directs runoff along a corridor, which flows along the western property line. This area was most likely a wet meadow throughout most of the year, receiving runoff from the upland areas.

**Problem Assessment**

Two main concerns were immediately evident upon examination of the Rochester Hills site. The first was soil erosion problems, which are affecting not only the structural stability of the development and surrounding slopes, but also water quality within Ralston Creek. The second concern is the existence of large numbers of invasive and most likely non-native shrub, tree, and grass species on the site. These invasive species are compounding soil erosion problems created by the addition of urban runoff, because they prevent vegetation from covering the soil. We have prepared a set of photographs to highlight some areas of particular concern. Figure 13 and Figure 14, following page, both show examples of erosion problems on the site. Figure 13 shows the exposed root system of a mature native tree. This was likely initiated by the grazing of animals in this area and later worsened by the growth of invasive trees as seen in the photo. Figure 14 shows the effect of erosion on the runoff channel along the west property line. The channel banks are collapsing and the channel bottom is slowly being undercut as it experiences approximately a three foot drop at this location.

**Figure 13: Exposed Root System of Mature Tree**

Another area of concern at Rochester Hills is the overall management of stormwater on the site. The small stormwater basin at the southwest corner does not appear to adequately retain water to allow infiltration, depositing of sediment, or reduction of runoff velocity. The use of pipes to direct runoff from homes on the site may cause a negative
impact where they direct runoff onto steep and less vegetated slopes.

**Figure 14: Erosion of Stream Banks on West Property Line**

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**Restoration Options at Rochester Hills**

After evaluating many of the factors present at the Rochester Hills site we decided that a combination of native landscape restoration combined with natural stormwater management techniques are needed to meet the overall goals of reducing stormwater flows into Ralston Creek and reestablishing native ecosystems in the open areas.

**Native Prairie Restoration**

The native plant restoration would be concentrated on the north end of the property where the degree of local fragmentation would be minimal. Native prairie planting could also occur up through the east property line to the edge of the developed area and in a small area toward the southwest side. Depending on resident goals, the native planting could be used to replace a portion of the current turf grass, thus reducing some current maintenance costs. We also recommend planting of native grasses and forbs within the small common space within the first cul de sac. Based upon soil conditions and the location of Ralston Creek directly to the north of the site, we would say that a restored prairie would range from wet prairie to mesic and dry mesic prairie towards the oak savanna area. There are also a number of wet corridors along the western edge of the property and towards the north end of the eastern woodland that may be capable of supporting a colorful variety of wet prairie forb species. Figures 15 and 16, following page, display the north pasture area, looking east, and what the area might potentially look like after a native prairie restoration. The restored prairie in Figure 16 shows a typical mesic prairie system with plants such as the prairie sunflower.

**Oak Savanna & Woodland Restoration**

Based upon our examination of slopes and soil conditions on site we have outlined the wooded areas most appropriate for limited restoration techniques. We recommend removal of invasive tree species around the existing Oaks and hickories within the 163E2 corridor nearest the west property line. This would involve either mechanical removal, girdling,
or burning of the smaller diameter species. A combination of burning with native planting would provide the greatest potential for restoration. Restoration could be extended over time towards the southwest depending upon the success of prescribed burns and or native prairie seeding in the adjacent area. The slopes behind and between buildings 20 and 31 and behind buildings 15 through 17 are very steep and highly susceptible to erosion. It would involve considerable expense to properly remove invasive species without the risk of slope failure. Figures 17 and 18, following page, show an example of what the northwest remnant oak savanna might look like after the removal of invasive undergrowth and seeding with a native plant mixture.

**Wetland Restoration**

A prairie burn and seeding could significantly enhance the quality of the wetland area at the northwest corner of the property. There are signs that weedy shrubs have begun to move into this area and could be controlled through a regular burning regimen. The use of mowing equipment in this area could be very detrimental to both machine and wetland. The soil appears to remain consistently saturated and machinery could cause severe erosion problems. The use of native vegetation further south along the west property line in combination with a prescribed burn could help to stabilize the channel banks in that area and reduce runoff flows towards Ralston Creek.
Stormwater Mitigation

The construction of a standpipe and possibly of a second detention or infiltration basin along the west edge of the property would greatly enhance the effectiveness of stormwater management in that area. We recommend that the existing detention basin be retrofitted to incorporate a more natural design. This will aid in stabilizing the existing slopes, reduce sedimentation problems, and enhance the aesthetic quality of the area as it is in close proximity to existing buildings. Creation of a wet pond or detention basin capable of retaining water for 24 to 48 hours would allow sediment to drop out of the flow prior to moving into the wetland area.

Construction of a small pool within the channel along the west property line should be considered to prevent further erosion of the channel banks and bed in the area previously identified in Figure 14, page 29. Another area of concern within this same channel is the location of the stormwater outlet from the Bluffwood neighborhood. Currently the outlet flows into the channel along the west property line with little or no barriers to reduce the velocity of the outflow. Placement of aesthetically pleasing rock and extensive planting of native vegetation could significantly reduce the impact on the channel in this area. Some regrading of the channel in this area may also be necessary to create more suitable infiltration conditions.

The installation of infiltration berms near the wooded areas may be a less expensive alternative to extensive removal of invasive trees. Combining infiltration devices with understory clearing though would enhance long-term restoration efforts. This would provide an outlet for residential
rooflines and ease the velocity of water flowing along the steep slopes to the north and west of the developed area. Preventing additional surface runoff on the steep slopes will be critical in preventing slope failure due to the degraded nature of groundcover in the area.

Repeated removal of resprouting undesirable shrubs and trees should be expected, creating management challenges during the first five years of the project. The most effective method to control these invasive species would be annual burns. However, once the initial ground cover of sedge and prairie grass is present, management requirements will gradually diminish, thus working to increase the aesthetic quality of the area. Human touches can be added, such as places to sit and bird houses, working to link the residents with the landscape and providing a source of recreational activity.

**Role of Watershed Planning**

We also recommend that the homeowners association work closely with its neighbors to the west and even across Ralston Creek to the northwest in developing some neighborhood management goals. The Bluffwood neighborhood will need to play an active role if runoff is to be better controlled along the west property line. Creation of a neighborhood and regional restoration plan should be focused towards ultimately reestablishing more natural hydrologic conditions throughout the Ralston Creek watershed.

**Conclusion**

We feel that the adoption of these restoration options will provide the residents of Rochester Hills with a relatively low maintenance, attractive, and ecologically stable landscape. The benefits of this approach will be a reestablishment of natural vistas, enhancement of property values, greater structural integrity in the developed and undeveloped areas, and avoidance of future costs arising from violations of stormwater regulations or repairs due to slope failures and drainage problems.

The Rochester Hills development site is a cluster development, therefore this gives us an opportunity to utilize some of the natural features that have been preserved. The preserved natural areas need to be maintained however. Once a prairie restoration project has been implemented there are still various maintenance procedures that need to occur. Although not maintenance free, the time and money comparison is considerably less than traditional turf lawn maintenance. Both homeowners and developers alike are beginning to appreciate the environmental, economic, and aesthetic benefits of natural landscaping. Seeking experienced guidance is the best insurance for a successful restoration program. Guidance can come from a hired site manager, a local consulting ecologists, or highly involved community leaders. Local nurseries and professional landscape design firms are eager to provide their services in helping to create a viable conservation site plan.
rooflines and ease the velocity of water flowing along the steep slopes to the north and west of the developed area. Preventing additional surface runoff on the steep slopes will be critical in preventing slope failure due to the degraded nature of groundcover in the area.

Repeated removal of resprouting undesirable shrubs and trees should be expected, creating management challenges during the first five years of the project. The most effective method to control these invasive species would be annual burns. However, once the initial ground cover of sedge and prairie grass is present, management requirements will gradually diminish, thus working to increase the aesthetic quality of the area. Human touches can be added, such as places to sit and bird houses, working to link the residents with the landscape and providing a source of recreational activity.

**Role of Watershed Planning**

We also recommend that the homeowners association work closely with its neighbors to the west and even across Ralston Creek to the northwest in developing some neighborhood management goals. The Bluffwood neighborhood will need to play an active role if runoff is to be better controlled along the west property line. Creation of a neighborhood and regional restoration plan should be focused towards ultimately reestablishing more natural hydrologic conditions throughout the Ralston Creek watershed.

**Conclusion**

We feel that the adoption of these restoration options will provide the residents of Rochester Hills with a relatively low maintenance, attractive, and ecologically stable landscape. The benefits of this approach will be a reestablishment of natural vistas, enhancement of property values, greater structural integrity in the developed and undeveloped areas, and avoidance of future costs arising from violations of stormwater regulations or repairs due to slope failures and drainage problems.

The Rochester Hills development site is a cluster development, therefore this gives us an opportunity to utilize some of the natural features that have been preserved. The preserved natural areas need to be maintained however. Once a prairie restoration project has been implemented there are still various maintenance procedures that need to occur. Although not maintenance free, the time and money comparison is considerably less than traditional turf lawn maintenance. Both homeowners and developers alike are beginning to appreciate the environmental, economic, and aesthetic benefits of natural landscaping. Seeking experienced guidance is the best insurance for a successful restoration program. Guidance can come from a hired site manager, a local consulting ecologists, or highly involved community leaders. Local nurseries and professional landscape design firms are eager to provide their services in helping to create a viable conservation site plan.
Appendix A: Native Seed Sources

John Huntrods
Rural Route 1,
Collins, IA 50055
(515) 385-2446

Carl Kurtz
1562 Binford
St. Anthony, IA 50239

Gene Kromray
546 Crestview
Ottumwa, IA 52501

Dan Allen
Allendan Seed Company
RR 4 Box 625
Winterset, IA 50273
(515) 462-1241
(515) 462-4084 fax

Cedar River Garden Center
Box 259, 2889 Palo Marsh Rd
Palo, IA 52324-0259
(319) 851-2161
(319) 851-2164

Jon Judson
Diversity Farms
RR 1 Box 87
Dedham, IA 51440

Allan Hadfield
Hadfield Prairie Seed
RR 1 Box 132
McClelland, IA 51548
(712) 484-3326

Daryl Kothenbeutel
Iowa Prairie Seed Company
1740 220th St
Sheffield, IA 50475-8031
(515) 892-4111

Keith McGinnis
McGinnis Tree and Seed Company
309 East Florence
Glenwood, IA 51534
(712) 527-4308
(712) 527-4786 fax
John Osenbaugh
Osenbaugh Grass Seeds
RR 1 Box 44
Lucas, IA 50151
1-800-LUCAS-88

Bruce Heyne
Heyne Custom Seed Services
26420 510th St
Walnut, IA 51577-4110
1-800-784-3454
(712) 784-2030 fax
www.netins.net/showcase/bluestem

Howard & Donna Bright
Ion Exchange
1878 Old Mission Drive
Harpers Ferry, IA 52146-7533
1-800-291-2143
www.ionexchange.com

Prairie Grass Unlimited, Inc.
Box 59
Burlington, IA 52601
(319) 754-8839

Glenda Buenger & Pat McAdams
Rose Hill Nursery
2282 Teller Road
Rose Hill, IA 52586
(515) 632-8308

John Herdich
Silver Mountain
Box 172
Mt. Sterling, IA 52573
(319) 494-5515
(319) 276-3082
Silvermt@netins.net

Walker’s Green Space
2699 53rd St
Vinton, IA 52349
1-800-837-3873

Dorothy Baringer
Wildflowers From Nature’s Way
RR 1 Box 62
Woodburn, IA 50275
(515) 342-6246

Bruce and Meg Walker
Willowglen Nursery and Landscaping
3512 Lost Mile Road
Decorah, IA 52101

Johnson County Soil & Water Conservation District
238 Stevens Dr
Iowa City, IA 52240
(319) 337-2322
Other States

Prairie Moon Nursery
RR 3 Box 163
Winona, MN 55987

Stock Seed Farms
RR 1 Box 112
Murdock, NE 68407

Prairie Nursery
Box 306
Westfield, WI 53964

Prairie Ridge Nursery
RR 2, 9738 Overland Rd
Mt. Horeb, WI 53572
Appendix B: Executive Order on Natural Landscaping

THE WHITE HOUSE
WASHINGTON
April 26, 1994

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

SUBJECT: Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds

The Report of the National Performance Review contains recommendations for a series of environmental actions, including one to increase environmentally and economically beneficial landscaping practices at Federal facilities and federally funded projects. Environmentally beneficial landscaping entails utilizing techniques that complement and enhance the local environment and seek to minimize the adverse effects the landscaping will have on it. In particular, this means using regionally native plants and employing landscaping practices and technologies that conserve water and prevent pollution.

These landscaping practices should benefit the environment, as well as generate long-term cost savings for the Federal Government. For example, the use of native plants not only protects our national heritage and provides wildlife habitat, but also can reduce fertilizer, pesticides, and irrigation demands and their associated costs because native plants are suited to the local environment and climate.

Because the Federal Government owns and landscapes large areas of land, our stewardship presents a unique opportunity to provide leadership in this area and to develop practical and cost-effective methods to preserve and protect that which has been entrusted to us. Therefore, for Federal grounds, Federal projects, and federally funded projects, I direct that agencies shall, where cost-effective and to the extent practicable:

(a) use regionally native plants for landscaping;
(b) design, use, or promote construction practices that minimize adverse effects on the natural habitat;
(c) seek to prevent pollution by, among other things, reducing fertilizer and pesticide use, using integrated pest management techniques, recycling green waste, and minimizing runoff. Landscaping practices that reduce the use of toxic chemicals provide one approach for agencies to reach reduction goals established in Executive Order No. 12856, "Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements;" and
(d) implement water-efficient practices, such as the use of mulches, efficient irrigation systems, audits to determine exact landscaping water-use needs, and recycled or reclaimed water and the selecting and siting of plants in a manner that conserves water and controls soil erosion.

Landscaping practices, such as planting regionally native shade trees around buildings to reduce air conditioning demands, can also provide innovative measures to meet the energy consumption reduction goal established in Executive Order No. 12902, "Energy Efficiency and Water Conservation at Federal Facilities;" and

(e) create outdoor demonstrations incorporating native plants, as well as pollution prevention and water conservation techniques, to promote awareness of the environmental and economic benefits of implementing this directive. Agencies are encouraged to develop other methods for sharing information on landscaping advances with interested nonfederal parties.

In order to assist agencies in implementing this directive, the Federal Environmental Executive shall:

(a) establish an interagency working group to develop recommendations for guidance, including compliance with the requirements of the National Environmental Policy Act, 42 U.S.C. 4321, 4331-4335, and 4341-4347, and training needs to implement this directive. The recommendations are to be developed by November 1994; and
(b) issue the guidance by April 1995. To the extent practicable, agencies shall incorporate this guidance into their landscaping programs and practices by February 1996.

In addition, the Federal Environmental Executive shall establish annual awards to recognize outstanding landscaping efforts of agencies and individual employees. Agencies are encouraged to recognize exceptional performance in the implementation of this directive through their awards programs.

Agencies shall advise the Federal Environmental Executive by April 1994 on their progress in implementing this directive.

To enhance landscaping options and awareness, the Department of Agriculture shall conduct research on the suitability, propagation, and use of native plants for landscaping. The Department shall make available to agencies and the public the results of this research.

Source: EPA, 1998
Appendix C: Soil Survey Map of Ralston Creek

Source: Johnson County Soil and Water Conservation District
Glossary

Biodiversity: A measurement of the number of species and the variety of life and its processes in an area.

Bioengineering: The use of vegetation for civil engineering purposes such as slope stabilization, water erosion control, and sensitive area protection.

Buffer: A management area closest to a sensitive environmental site in which human activities are prohibited or limited in order to minimize the negative impacts from adjacent land uses affecting the sensitive environmental site.

Cluster Development: Accumulation of development onto only a portion of a site, thereby allowing sensitive areas to be protected with no loss in the number of lots and maintaining the gross density of the site.

Constraint: Any feature or condition of the built natural environment that poses an obstacle to land use planning.

Conveyance: Drainage through a channel or valley in a drainage basin.

Detention: A strategy used in stormwater management in which runoff is detained on site to be released later at some prescribed rate.

Discharge: The rate of water flow in a stream channel.

Disturbance: An impact on the environment characterized by physical alteration.

Ecosystem: A community of plants and animals interacting with each other and their physical environment.

Environmental Inventory: Compilation of classification of data and information on the natural and human features in an area proposed for a planning project.

Exotic Species: A non-native plant or animal introduced from another geographic area.
Filtration: A term generally applied to the removal of pollutants, such as sediment, with the passage of water through soil or organic materials.

Forest: Plant communities which exist along floodplains or on the eastern side of rivers where they were protected from fires. They are dominated by trees that are intolerant of fire and can grow in poorly drained soils.

Forb: Any herbaceous plant that is not a grass.

Habitat: The physical, chemical, and biological environment in which an organism lives.

Herbaceous Plant: Any plant that is not woody.

Impervious cover: Any hard surface material, such as asphalt or concrete, that limits infiltration and induces high runoff rates.

Landscaping: The design of outdoor space to serve the needs of people by planting, altering contours of the ground and/or building structures like pedestrian ways, paths, picnic areas, etc.

Native Landscaping: Landscaping only by using native plants.

Native Species: A plant or animal original to the area.

Natural Landscaping: Landscaping in a way that tries to capture the character and spirit of nature in a designed landscape by arranging plants in a community context resembling their context in nature. While implementing natural landscaping techniques, one may either plant exclusively native species or incorporate a small percentage of exotic species.

Noxious Weed: Any plant which is determined to be detrimental to public health, crops, land or other property.

Oak Savanna: A transitional community between prairie and forest, sustained by fires, characterized by scattered, open-grown oak and hickory trees and grasses and forbs which flourish in partly shady conditions.

Open Space: Term applied to underdeveloped land, usually land designated for parks, greenbelts, water features, and nature preserves.
**Prairie:**
a plant community dominated by a
diversity of perennial herbaceous plants
growing between a majority of grasses.
Prairie communities are categorized by
soil conditions into dry, mesic and wet
prairies. Often characterized by very
deep rooted plants, prairie vegetation
also consists of shallow rooted species,
some with widely spreading root
systems.

**Prescribed burn:**
Controlled application of fire to
naturally occurring vegetative fuels
under specified environmental
conditions and following appropriate
precautionary measures, which causes
the fire to be confined to a
predetermined area and accomplish the
planned land management objective.

**Stormwater Detention Basin:**
A waterbody designed to detain
stormwater runoff and reduce flooding.

**Sustainability Planning:**
An area of planning in which the
objective is to achieve long-term and
productive balance between land use and
the environment.

**Weed:**
Any undesirable or troublesome plant,
especially one that grows profusely
where it is not wanted.

**Wetland:**
An area where the ground is
permanently wet or wet most of the year
and is occupied by water-loving
vegetation.

**Restoration Planning:**
An area of planning that addresses
damaged environments, such as
degraded wetland habitats and disturbed
stream channels.

**Setback:**
Area between intensive development and
a protected area.
References


Maloney, John N. *Oak Savanna Restoration Techniques.* On the web, address unknown.


