An Introduction to Conservation Design

Course Number: SU-02-110

PDH: 4

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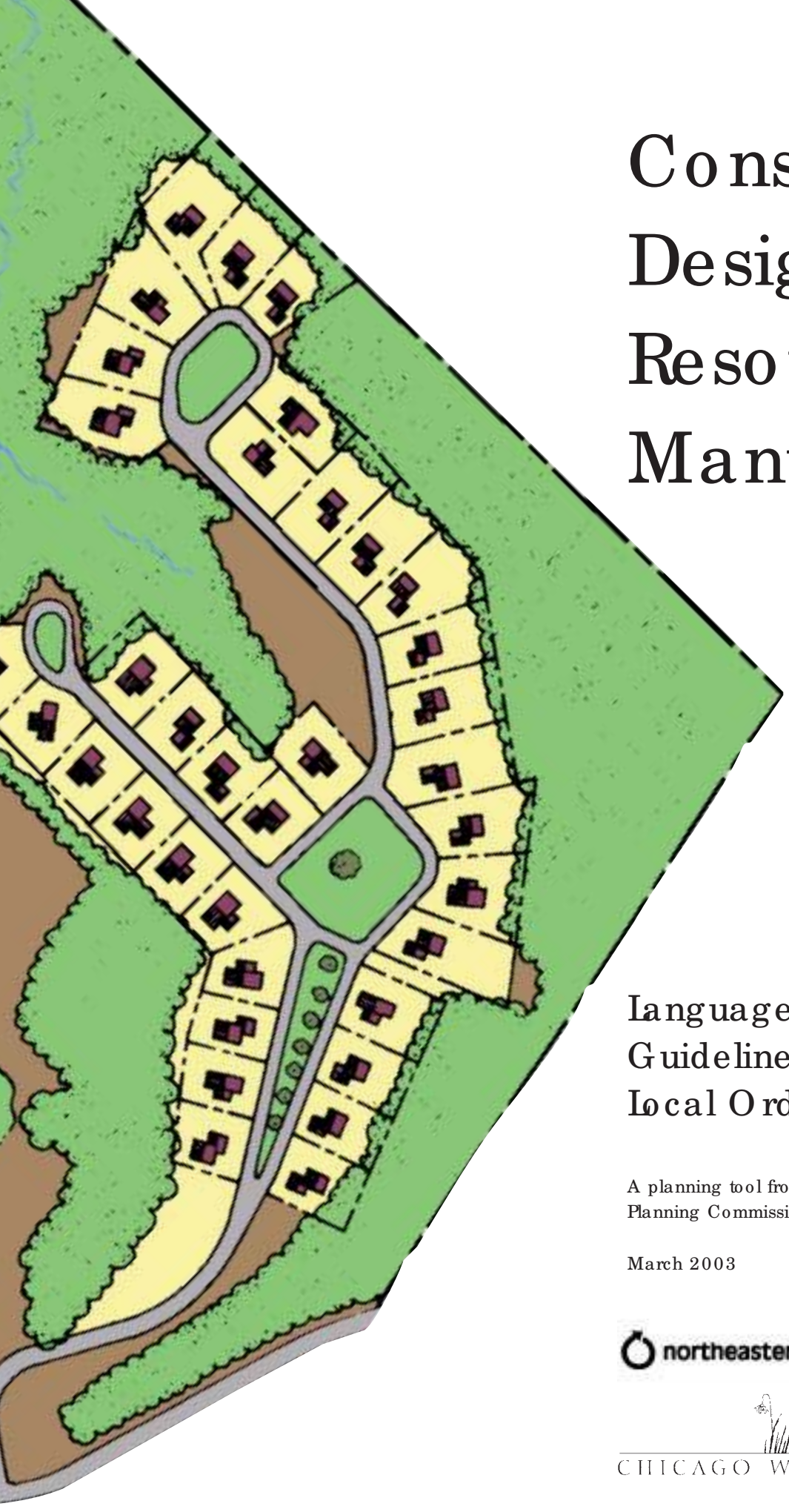

Conservation Design Resource Manual

Language and Guidelines for Updating Local Ordinances

A planning tool from the Northeastern Illinois Planning Commission and Chicago Wilderness

March 2003

northeastern illinois planning commission

CHICAGO WILDERNESS

Acknowledgements

This project has benefited from the expertise of the members of our Technical Advisory Committee, who have generously donated their time and attention to the development of the document.

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We also have been fortunate to be able to draw on a collection of resources and examples of similar projects undertaken in other areas around the Midwest and the country. In particular, we would like to acknowledge the work of Randall Arendt; Kirby Date, Project Coordinator for the Countryside Program; and the University of Wisconsin Extension. Substantial portions of the model ordinance language and adapted from the Countryside Program's Conservation Development Resource Manual and from the University of Wisconsin's An Ordinance for a Conservation Subdivision. Ideas for formatting and organization were adapted from the Center for Watershed Protection's Better Site Design.

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Dennis Dreher (NIPC) and Martin Jaffe (University of Illinois, Chicago) provided thorough editorial review.

This project was funded through a grant program supported by the USDA Forest Service Northeastern Area, State and Private Forestry, and the US Fish & Wildlife Service, in support of Chicago Wilderness. USFS and USFWS grants of federal monies are administered by the Illinois Conservation Foundation. Additional funding was provided by Illinois Conservation 2000 and through voluntary financial support from local governments and the private sector.

Overview

This Conservation Design Resource Manual has been funded in large part by Chicago Wilderness in keeping with its goal of involving local governments in the processes of restoring and maintaining regional biodiversity.

The Resource Manual is written for use by local governments interested in modifying local comprehensive plans, zoning and subdivision ordinances, and other ordinances to accommodate the principles and practices of conservation design. In many cases, communities are committed to enhancing local residents' quality of life through natural resource conservation. However, outdated plans and ordinances may work in opposition to these conservation goals. In this document, four principles and 13 practices for conservation design are identified and discussed. For each of the 13 practices, model ordinance language is offered. Local governments can adapt this language to update their own local ordinances.

Local governments, communities, developers, and homeowners all can contribute to the protection of biodiversity by observing the four principles identified here:

- Develop Flexible Lot Design Standards
- Protect and Create Natural Landscape and Drainage Systems
- Reduce Impervious Surface Areas
- Implement Sustainable Stormwater Management Techniques

The goal of this Resource manual is to provide ample information about conservation design principles and practices, and to provide the necessary language to enable communities to implement conservation design at varying levels. The document is structured by practice, so that communities new to conservation design can begin with cautious modifications, while more experienced communities can more fully implement the ordinance revisions, which ultimately will lead to more comprehensive change. Communities that choose to implement conservation design will see a variety of benefits, including reduced flooding, improved water quality, enhanced biodiversity, higher property values, higher property tax revenues, and greater community cohesion.

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Chapter 1
Introduction

This is one of a series of planning aids and manuals prepared by the Northeastern Illinois Planning Commission (NIPC) as a service to local governments.

The primary aim of this Conservation Design Resource Manual is to assist communities in northeastern Illinois in creating regulations conducive to conservation design.

Conservation design **is a density neutral design system that takes into account the natural landscape and ecology of a development site and facilitates development while maintaining the most valuable natural features and functions of the site.**

The intent of this document is to provide practical alternatives to conventional zoning, subdivision, weed-control, and other development-related ordinances. In many cases, conventional ordinances conflict with the goals of conservation design. With thoughtful revision, most existing ordinances can be modified and updated to not only allow, but encourage residential, commercial, and mixed-use development that is sensitive to both the natural ecology of the development site and economic needs of the community, land owner, and developer.

Several practices outlined here apply most directly to residential subdivision design. However, conservation design is by no means limited to residential subdivisions. The principles apply to the design and construction of any type of development, and should be applied as widely as possible.

A Regional Conservation Perspective: Chicago Wilderness

In 1999, the Chicago Region Biodiversity Council, or Chicago Wilderness, published its Biodiversity Recovery Plan for the northeastern Illinois region. The Biodiversity Recovery Plan is now a guiding document for the organization and its more than 160 members; Chicago Wilderness seeks to support various projects that further the goals outlined in the Plan. Chicago Wilderness recognizes the importance of restoring, protecting, and managing natural resources for the benefit and enjoyment of the residents of the Chicago region, for the economic growth that results from resource conservation, and for the environmental benefits realized.

The Biodiversity Recovery Plan notes that while traditional land management agencies, such as forest preserve and conservation districts, have a clear mandate to protect biodiversity, the involvement of local governments also is critical if the goals of the Plan are to be achieved. This conclusion is born out by the fact that while 200,000 acres of natural land are protected under the umbrella of Chicago Wilderness, that leaves 90 percent of the landscape subject to the planning, development, and management decisions of local governments.

With the importance of local government participation in mind, the Biodiversity Recovery Plan states the following **Goal for Local Governments**:

- Local and regional development policies should reflect the need to restore and maintain natural areas and biodiversity.

Three **Objectives for Local Governments** are offered as methods of pursuing this goal:

- Inventory sensitive habitats and identify opportunities for open space preservation and restoration.
- Modify comprehensive plans, ordinances, and engineering practices to consider the impacts of development on biodiversity.
- Incorporate provisions for biodiversity protection and restoration in the design plans for new development and redevelopment

For more information about Chicago Wilderness and the Biodiversity Recovery Plan, visit Chicago Wilderness on the web at www.chicagowilderness.org. For more information on an array of programs and techniques, see NIPC's publication Protecting Nature in Your Community. (Available on the web at http://www.nipc.cog.il.us/protecting_2001%20.htm.)

What is Conservation Design?

Conservation design is a design system that takes into account the natural landscape and ecology of a development site and facilitates development while maintaining the most valuable natural features and functions of the site. Conservation design includes a collection of site design principles and practices that can be combined to create environmentally sound development. The main principles for conservation design are:

1. flexibility in site design and lot size,
2. thoughtful protection and management of natural areas,
3. reduction of impervious surface areas, and
4. sustainable stormwater management.

A similar term, **conservation development**, is used to describe a development that is designed and constructed using the principles of conservation design. Conservation design is one of many tools available to communities committed to implementing sustainable development practices. **Sustainable development** is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

In the context of this ordinance, conservation design is **density neutral**, meaning that designers plan development such that there is no overall loss of buildable units despite the conservation goals achieved on the site. Existing community standards for density and land use are not challenged here; rather, the practices given here offer alternative design strategies that are more environmentally friendly while maintaining existing densities and land uses.

In a residential conservation subdivision, for example, house lot size is substantially decreased, so that large areas of contiguous natural areas can be conserved with no net loss of housing units. In contrast, conventional development techniques often involve carving the development site into parcels such that the lots and road rights-of-way consume nearly all developable land without regard for the natural conditions on the site. Developments constructed this way often have wide roads, minimal pedestrian access, and may be similar in character and design to many other neighborhoods. While development pressures are heavy in urban and urbanizing areas, increasing attention has been given to the necessity of preserving rural, agricultural, and important environmental lands even as development continues.

The two graphics below (Conservation Design Forum, 2003) show the difference between conventional and conservation design. Figure 1 shows a conventional subdivision layout, where the entire site is converted to roads and building lots. Figure 2 shows the same site with the same number of building lots laid out using conservation design practices. Note that natural areas and features of the site are preserved in the conservation design model, where this preservation is not possible using conventional design.

Figure 1: Conventional Subdivision Layout (Conservation Design Forum, 2003)

Figure 2: Conservation Subdivision Layout (Conservation Design Forum, 2003)

What are the Benefits of Conservation Design?

Through conservation design techniques, development and a healthy natural environment need not be mutually exclusive. The benefits of conservation design are substantial. Communities, developers, and homeowners all can benefit from well planned and implemented conservation design. The environment is another major beneficiary; while it may be difficult to quantify the value of an expanse of habitat, an undisturbed streambank, or a panoramic view protected from careless development, there is little disagreement that conserving these resources is an important aim.

The benefits of conservation design fall roughly into three categories, quality of life benefits, environmental and biodiversity benefits, and economic benefits. Chapter 2, Economic Benefits of Conservation Design, lists in detail many economic benefits of the conservation design practices.

Quality of Life Benefits

Conservation design addresses concerns about community interaction and access to the natural environment. In addition to potentially conserving large areas of valuable natural resources, conservation design may create a variety of formal and informal public spaces within developments. These spaces create opportunities for neighbors and residents to meet and to build community together. Conservation design offers a variety of recreational prospects which may include organized group activities such as picnics or soccer games, biking or walking in natural areas, or observing the plants and wildlife that thrive in preserved habitats. For residents of conservation developments, these amenities can make a noticeable difference in the quality of daily life.

Increasingly, notice is being given to the importance of community and social interaction in residential neighborhoods. Large homes, private backyards, and automobiles work together to make it possible for residents of conventional suburbs to spend all their time in private space without interacting with neighbors. While this type of privacy was once considered an advantage, many people now seek alternatives to the conventional subdivision lifestyle. Conservation design offers just such an alternative, and experience has shown that homes in these developments will be increasingly valuable as homebuyers increasingly demand access to nature and community along with the residences they purchase.

Environmental and Biodiversity Benefits

Thoughtfully implemented conservation design practices are beneficial to the natural environment in a number of ways.

- Protected water quality
- Reduced flooding
- Protected habitat and biodiversity
- Protected and recharged aquifers

In short, while conventional development practices have historically led to flooding, degraded water quality, and habitat destruction, conservation design practices work together to counteract these negative consequences of development. Through the practice of conservation design, communities can protect valuable natural resources even while growing and expanding.

Economic Benefits

There are various economic benefits of conservation design. Communities, homeowners, and developers all can benefit economically from the use of the conservation design practices presented here. For a detailed discussion of these economic benefits, see Chapter 2, *Economic Benefits of Conservation Design*.

Why Update Local Ordinances?

The community, environmental, and economic benefits of conservation design are clear, and for most communities, the use of conservation design makes sense for at least some types of development. While there are many ways to approach conservation design, the most effective way is to update local comprehensive plans, codes, and ordinances to reflect the community's commitment to conservation. Most importantly, conservation design should be allowed *by right* and should be the preferred option for many development projects.

Presently, conservation design projects in most communities are approved through the Planned Unit Development (PUD) process. While the PUD process has the advantage of allowing the Plan Commission to maintain close oversight of unconventional development projects, the process is burdensome for both developers and planning staff. A major benefit of updating local ordinances to allow conservation design by right is that it reduces the approval time for projects. This saves time and aggravation for all parties involved in the development process, and as a result also saves money.

Conservation Design and Sprawl

An occasional critique of conservation design is that while it is presented as an environmentally responsible development form, it encourages development of previously undisturbed (greenfield) sites on the urban fringe and ultimately leads to sprawl, albeit more responsible sprawl. Several responses can be made to this critique.

First, development on the urban fringe is inevitable. Conservation design recognizes this inevitability and defines methods by which development can be sensitive to the natural areas and systems of the development site.

Second, conservation design does not position itself as a comprehensive solution to the challenges of urban and suburban development. The more inclusive umbrella of "sustainable development" seeks to address these challenges more fully, while conservation design addresses specific situations. In keeping with this limitation, please keep in mind that this resource manual is not a comprehensive treatment of sustainable development practices. A comprehensive document would include discussion and ordinance language for Traditional Neighborhood Development, mixed-use development, urban infill development, New Urbanism, brownfield redevelopment, energy efficiency, farmland preservation, and other practices. This resource manual focuses exclusively on conservation design. While a comprehensive resource manual is beyond the scope of this project, it is anticipated that future projects will address other aspects of sustainability.

Finally, the development principles and practices offered here are highly adaptable. While all practices may not be relevant to all development projects, certainly the environmental impact of nearly any development can be reduced through the employment of conservation design practices. When planning revisions to local codes and ordinances, consider that while some practices may be applicable only in lower density zones, others may apply to all development regardless of its location.

How to Use This Resource Manual

This resource manual is meant as a guide and is not intended to be adopted "as-is." Rather, it allows each community to adapt the language and concepts to best fit the unique circumstances of that community.

The model ordinance language has not been organized by type of ordinance (subdivision, zoning, etc.). Rather, in order to respond to the unique regulatory environment of each community, the information has been organized by the principles and practices of conservation design. To use the resource manual, begin by selecting the practices that would be most applicable to your community, then adapt the model language given with each concept to update the appropriate existing ordinance. Communities desiring to implement conservation design in place of the Planned Unit Development process should consider incorporating all or nearly all of the practices into the zoning and subdivision ordinances. This large scale adoption is most helpful in creating a predictable development approval process, which will encourage developers to utilize the conservation design practices.

To facilitate the amendment of local ordinances, introductory language to be added to zoning and subdivision ordinances is also provided. Again, although several of the practices apply most directly to residential subdivision developments, most of the suggested practices offered here can be adapted to enhance nearly any type of development.

Chapters 3 and 4 of this resource manual contain the majority of the information and language for conservation design. Chapter 3, Integrating Conservation Design Principles into Local Plans and Ordinances, addresses the basics of enabling conservation subdivision design in your local comprehensive plan and development ordinances. Chapter 4, Site Design Practices for Conservation Design, gives detailed information about the principles and practices suggested for conservation design, including ordinance language to enable each practice. Chapter 4 also lists several additional references for the four major conservation design principles; these references should be consulted by communities wishing to conduct additional research into the principle. Additional information is provided in the Appendices. Of particular interest is Appendix A, which contains a list of definitions for conservation design. Appendices B – E provide expanded technical discussions of key concepts.

While most ordinances contain a section on the development review process, such language was not included here because the review process varies widely by locality.

Text in [brackets] indicates terms that need to be written specifically for the local jurisdiction, such as the jurisdiction name. Similarly, blank lines (_____) in the model ordinance language should be filled in. Suggestions for filling these blanks will be provided in the commentary. Definitions may need to be added to the appropriate portion of the local code if they are not elsewhere used or if they are used in a different context. Depending on the structure of the local code, some elements of the ordinance may need to be inserted into the zoning code and others may need to be added to the subdivision or development ordinance.

It is impossible to draft a model ordinance to fit perfectly into all of the innumerable varieties of regulatory programs that exist at the local government level. The ordinance language given here is designed to be adapted to the unique characteristics of each local government organization. The ordinance language can be combined with or replace existing ordinances, such as weed ordinances, which address issues covered by the resource manual. It is presumed that some provisions of the ordinance will be modified or possibly even rejected altogether. Some provisions may have to be added.

Introduction to Principles and Practices for Conservation Design

The following four principles have been identified as essential considerations in the Conservation Design process:

1. **Develop Flexible Lot Design Standards**
2. **Protect and Create Natural Areas and Drainage Systems**
3. **Reduce Impervious Surface Areas**
4. **Implement Sustainable Stormwater Management Techniques**

Thirteen specific site design practices are presented to implement these principles. A list of these appears below. The practices are organized by principle, with each practice being listed under the subsection for the most relevant principle. The practices are designed to have specific suggestions, guidelines, and language for implementation. The principles and practices outlined here are discussed in detail in Chapter 4.

Principle A. Develop Flexible Lot Design Standards

Practice 1. Lot Size, Density, and Suggested Open Space
Practice 2. Arranging the Development Site
Practice 3. Building Setbacks

Principle B. Protect and Create Natural Landscapes and Drainage Systems

Practice 4. Natural Area Protection and Conservation
Practice 5. Natural Landscape Sensitivity
Practice 6. Natural Landscaping
Practice 7. Open Space Management

Principle C. Reduce Impervious Surface Areas

Practice 8. Roadway Design
Practice 9. Parking Lot Design
Practice 10. Vegetated Swales
Practice 11. Walkways
Practice 12. Driveway Design
Practice 13. Roof Runoff Management

Principle D. Implement Sustainable Stormwater Management Techniques

Urban Runoff Mitigation Plan

Chapter 2:
Economic Benefits of Conservation Design

The economic benefits of conservation design are interrelated among the various conservation design principles. Few principles have stand alone economic benefits, but rather one benefit often produces another, typically producing environmental benefits as well; as a result it is useful for readers to consider the benefits across all four principles, below. In addition, the economic benefits of conservation design accrue to communities, homeowners, and developers.

According to Arendt (1999), the primary economic benefits of conservation design can be summarized as:

- greater areas of preserved open space,
- lower construction and maintenance costs associated with reduced infrastructure,
- real estate value appreciation, and
- a marketing and sales advantage.

Actual economic benefits in real dollar terms are difficult to present in a one-size-fits-all basis and cannot be presented herein. Local costs of supplies, labor, and equipment vary across the Chicago metropolitan region, and net costs are affected by the size of a particular development and the extent to which it incorporates the various conservation design practices. In addition, specific long-term maintenance costs need to be considered.

As a result, each section below provides examples of economic benefits realized by various communities that have employed the conservation design practices detailed in the next chapter. By illustrating the factors involved, the scale of the benefit, and how they accrue to the community, homeowners, and developers, communities can formulate how the economic benefits will apply to them.

Please note that many of these benefits cross over various principles.

Benefits of Principle A–Develop Flexible Lot Design Standards

Practice 1. Lot Size, Density, and Suggested Open Space
Practice 2. Arranging the Development Site
Practice 3. Building Setbacks

Community Benefits

- Minimizes stormwater runoff and its negative impacts.
- Preserves natural resources and features.
- Produces a broader range of marketable housing.
- Clarifies and simplifies the development review process.
- Reduces the municipal cost of open space, since natural areas are acquired more economically through conservation design than through outright purchase.
  - ◊ Conservation design provides open spaces and buffers without the need to incur direct public expenditures to obtain or protect such areas. This results in a significant cost savings for municipalities while still deriving the social benefits of open space. Furthermore, municipalities can increase the value and the size of any existing public parkland by implementing zoning and other ordinances that specify adjacent parkland buffers as a required design element in new subdivisions (Arendt 1999).

- Reduces long-term maintenance and development costs, since infrastructure (roads, sewer, streetlights, water, etc.) is reduced.
- More compact layouts result in shorter sewer and water connections and arterial roads. This reduces the public sector's long-term infrastructure maintenance costs. CH2MHill found that although demand for public services is relatively insensitive to lot size or density, the public service costs of compact cluster developments were still 4 to 8 percent lower than the cost for large lot developments (CWP 1995).
- Increases the community real estate tax base. It has been found that property values in conservation developments are considerably higher than conventional developments (see Homeowner Benefits below). As property values increase, so too do real estate property taxes, which are often a municipality's prime sources of funds.

Homeowner Benefits

- Increases property values.
  - ◊ Property values in developments where houses are grouped together have been found to appreciate more rapidly than homes in conventional developments. For example, a Massachusetts study compared two subdivisions where homes in developments of similar densities (two dwellings per acre) initially sold for similar prices. Over a 20-year period, the conservation development homes (built on quarter-acre lots) sold for an average $17,000 more than their counterparts (built on half-acre lots). This resulted in a 13% price differential attributable to the 36-acre open space amenity available at the grouped development (Arendt 1999).
  - ◊ In an Ohio conservation designed subdivision, open space and lot buffering added a 10% price premium over other homes within the same subdivision. Further, these homes (on 0.6-acre lots) had a 3% price premium over larger 1-acre lots in a nearby conventional subdivision. Home buyers in this case were willing to pay a premium for smaller lots when the value of open space was associated with a home purchase (The Countryside Program 1998).
  - ◊ A variety of real estate appraisal studies across the country have found that real estate values of individual properties are higher the closer they are to open space. For example, in 1974 a study was conducted in Philadelphia of properties located near a 1,300-acre park. The study found that properties at a distance of 2,500 feet from the park had values that were 4.2% higher than properties located farther away. Properties located 1,000 feet from the park had values that were 9% higher, and a property only 40 feet from the park had a 33% higher value. The study also concluded that each acre of parkland generated about $2,600 in increased property values (Brabec 1992).
  - ◊ Similarly, a 1978 study in Boulder, Colorado, found that house prices declined by an average of $4.20 for each foot of distance away from a greenway. Homes adjacent to the greenway were found to be valued 32% higher than similar residences located 3,000 feet away (Brabec 1992).
- Enhances access to recreational opportunities is enhanced, as more natural areas are created.
  - ◊ Home buyers value the social and recreational amenities associated with the open space. This creates an additional economic benefit to households by reducing automotive transportation that would otherwise be needed to travel to social and recreational opportunities (Arendt 1999).
- Reduces landscape maintenance needs. (See Principle B, below, for specific examples.)

Developer Benefits

- Increases predictability of development approval process.
- Enhances marketability of homes.
- Lowers development costs.
  - ◊ The primary economic benefits of grouping homes are the reduced construction costs associated with developments. In general, construction cost savings of 25% or more have been realized throughout the

country when grouping large lot (1 acre or more) developments. These cost savings are not as great when smaller, half-acre lots are grouped, where a cost savings of about 10% has been realized (CWP 1995).
  - ◊ In 1992, CH2MHill found that as the distance between individual dwelling units decreases, the total cost of subdivision infrastructure declines proportionally (CWP 1995).
  - ◊ Depending on how open space is incorporated into residential site design and how stormwater is managed, construction/ infrastructure cost savings of between 11% and 66% can be realized (CWP 1998).
- Enhances design flexibility.
- Saves development costs when natural areas are transferred to the community.

Benefits of Principle B–Protect and Create Natural Landscapes and Drainage Systems

Practice 4. Natural Area Protection and Conservation
Practice 5. Natural Landscape Sensitivity
Practice 6. Natural Landscaping
Practice 7. Open Space Management

Community Benefits

- Reduces flooding and stormwater management costs.
  - ◊ Buffers provide temporary storage of floodwaters in headwater streams, which reduces the height of a flood crest and the subsequent cost damages to downstream communities (CWP 1995).
- Reduces long-term maintenance costs.
  - ◊ Unlike storm sewers, curbs, gutters, and sewer inlets, swales and filter strips theoretically never need to incur replacement costs (except in cases of extreme erosion), but rather require periodic maintenance consisting of sediment or debris removal and general cleaning (NIPC 1997a).
  - ◊ Filter strips may reduce maintenance costs for components of downstream drainage systems because they remove sediment and other pollutants (NIPC 1997a).
  - ◊ Swale maintenance costs can be reduced if upstream sources of sediment—particularly from construction activities—are well controlled, and if local ordinances are enforced prohibiting homeowners from dumping materials into swales (NIPC 1997a).
- Meets increasing demand for public open space.
  - ◊ Natural landscaping can serve as a buffer to existing preserved natural areas, thereby increasing the size of the natural area. This provides a continuous natural ecosystem setting and enhances the "connection to nature" that is important to communities (The Countryside Program 1998).
- Allows connections to existing natural areas, open space, greenways, and trails.
- Reduces soil erosion.
- Reduces need for fertilizer and pesticides.
- Conserves local, often rural, areas of biodiversity.
- Preserves rare, threatened, and endangered species.
- Increases opportunity for passive recreational and educational activities – fosters health and fitness of residents.

- Improves air and water quality, and controls urban heat.
  - ◊ The Chicago urban forest canopy covers about 11 percent of the city's total land area. This canopy removes 15 metric tons of carbon monoxide, 84 metric tons of sulfur dioxide, 89 metric tons of nitrogen dioxide, 191 metric tons of ozone, and 212 metric tons of particulates. This saves the municipal government more than $1 million annually in what would otherwise be spent on traditional pollution mitigation efforts (Scheer 2002).

Homeowner Benefits

- Increases property values. (See Principle A, above.)
- Decreases maintenance costs. (Also see community benefits, above.)
  - ◊ Turf grasses require fertilizers, water, pesticides and other measures annually to keep lawns in quality condition (The Countryside Program 1998). Native landscapes require weed control and minimal watering in the first few years to get established, then occasional mowing or controlled burns for long-term management (Pizzo & Associates 2001).
  - ◊ Smaller yards that have natural landscaping require less maintenance thereby not only reducing costs but also allowing people more free time to spend enjoying the open space amenities located around them (Arendt 1999).
- Enhances aesthetics.
- Maintains productive land uses.
  - ◊ Natural area protection can conserve highly productive agricultural land. For example, Prairie Crossing has a 10-acre, community-supported organic farm from which 100 member families receive a bushel of fresh produce and cut flowers each week during the 20-week growing season for an annual subscription of $400. Thus, the conservation effort is able to generate revenues (Brabec 1992).

Developer Benefits

- Reduces landscaping and other installation costs.
  - ◊ Installation and maintenance costs are lower for natural (native) landscaping compared with common turf grasses. Pizzo compared the installation and maintenance costs of new turf grass lawn from seed with the costs of native landscaping with seed in an area less than one acre. He found that installation costs were $5,330 for native landscaping and $8,190 for turf grass. Thus, native landscaping installation showed a 35 percent cost savings over turf grass. Over a 10-year period, the cost to install and maintain native plantings came to $14,152. The same costs for turf grass came to $47,497. Thus, native landscaping installation and long-term O&M costs showed a 70 percent cost savings over turf grass (Pizzo & Associates 2001).
  - ◊ In a 1996 study, the cost to install and maintain native plantings over a 10-year period came to $9,800 per acre. The same costs for Kentucky blue grass came to $59,400 per acre. Thus, native landscaping installation and long-term O&M costs showed an 83 percent cost savings over turf grass (NIPC 1997b).
  - ◊ A comparison of annual maintenance costs found that open space costs about $75 per acre to manage, lawns cost about $255 per acre, and passive recreation areas (trails, bike paths, etc.) cost about $200 per acre (CWP 1998).
- In a California development, virtually all the runoff flows into a gravel-filled infiltration trench meandering through open areas behind most of the homes. This natural stormwater management design saved approximately $800 per household in engineering and construction costs, which enabled the developer to increase the landscaping budget by a like amount.
- Enhances marketing potential.
  - ◊ The marketability of a development in enhanced by the lower maintenance aspects associated with native landscaping and smaller lawns. A 1995 Newsweek survey found that two-income families prefer smaller lawns in order to reduce their lawn maintenance activities (CWP 1998).
- Enhances developer reputation for innovative development.

Benefits of Principle C–Reduce Impervious Surface Areas

Practice 8. Roadway Design
Practice 9. Parking Lot Design
Practice 10. Vegetated Swales
Practice 11. Walkways
Practice 12. Driveway Design
Practice 13. Roof Runoff Management

Community Benefits

- Decreases demand for stormwater runoff management.
- Reduces municipal maintenance costs.
  - ◊ Reduced residential street widths and lengths reduce the associated long-term operation and maintenance costs of local infrastructure (CWP 1998). These costs include 1) road repair and replacement, 2) utility repair and replacement, 3) snow removal, 4) inspections, and 5) street sweeping.
- Reduces municipal energy costs.
  - ◊ Impervious surfaces such as roads and roofs are known to create heat islands, trigger chemical reactions that produce smog, and boost energy demand. Reduced impervious surfaces (along with natural area landscaping with trees) can reduce energy costs (American City & County 2000).
- Improves water quality and quantity.
  - ◊ In the Chicagoland area, Lake Michigan water is not available to most newly developing areas, and water rates are increasing to the existing populations served. Reducing impervious surface area allows more stormwater to infiltrate into the ground and recharge groundwater aquifers. This provides a valuable natural resource, which could lead to greater water supplies in developing areas.

Homeowner Benefits

- Increases chances of friendly interaction with neighbors, since compact transportation network boosts proximity to neighbors.
- Increases biodiversity in nearby wetlands and water bodies, since impervious areas are reduced, saving habitats.
- Reduces residential street widths that allow parking tend to slow drivers down, creating safer roads.
  - ◊ A 1998 study by Peter Swift illustrates that as street width widens, accidents per mile per year increases exponentially, and that the safest residential street width is 24 feet (Swift 1998).

Developer Benefits

- Decreases development costs.
  - ◊ Reduced impervious surface area immediately results in reduced infrastructure engineering and construction costs. To the extent that street pavement is reduced, the size and cost of stormwater management facilities also can be lessened (Arendt 1999). For each increment of impervious cover that is reduced, developers gain a proportional reduction in infrastructure construction costs (CWP 1995).
  - ◊ The cost of a curb-and-gutter/ storm drain pipe system ranges from $40 to $50 per running foot in 1990 dollars, which is about 2 to 3 times more expensive than an engineered swale (CWP 1998).
  - ◊ Roadside swales with culverts at road and driveway crossings are generally less costly to construct than curb-and-gutter storm sewers. In a Lake County, Illinois study the cost savings were about $70,000 per mile of road for a typical residential subdivision with half-acre lots, or nearly $800 per residence (NIPC 1997a).

◊ Construction costs for paving are approximately $15 per square yard in 1998 dollars. Reducing the width of a 300 foot long residential street from 28 feet to 18 feet would reduce overall imperviousness by 35% and construction costs by $5,000 (CWP 1998).

◊ The cost savings associated with eliminating just one parking space is about $1,100 (in 1990 dollars). Additional cost savings can be realized in the form of lower costs for storm drains, Best Management Practices (BMPs), and associated maintenance (CWP 1995).

Benefits of Principle D–Implement Sustainable Stormwater Management Techniques

Urban Runoff Mitigation Plan

- Increases marketability - developments with improved stormwater management facilities are more marketable because they provide aesthetic features such as rain gardens, wet detention basins, and natural drainage areas that attract wildlife.
- Because stormwater management benefits cross the various principles and practices, only the above economic benefit is listed here. Other benefits related to stormwater management are distributed throughout Principles A, B, and C.

Chapter 3
Integrating Conservation Design Principles into Local Plans and Ordinances

We recognize that the communities that choose to enable conservation design in local ordinances will have a variety of regulatory environments. For that reason, this resource manual is structured to offer ordinance language for various site design techniques. Each community will choose which practices to adopt, and then through review of existing ordinances may find it necessary to update the most relevant sections of zoning, subdivision, or other regulations.

A few concepts will apply to nearly every regulatory environment. These are given here as preparatory work to be undertaken by any community embarking on the process of updating local ordinances for conservation design.

For communities looking for a more in-depth discussion of the processes involved in planning and enabling conservation design, refer to Randall Arendt's books *Growing Greener* and *Conservation Design for Subdivisions*.

The sections that follow will address Conservation Design as it relates to:

- Comprehensive Plans
- Zoning Ordinances
- Subdivision Ordinances
- Other Existing Ordinances
- Other Local Departments and Agencies

A. Comprehensive Plans

Update the community comprehensive plan to reflect a commitment to conservation design goals.

A comprehensive plan establishes a community's goals, objectives, and policies, and shows an overall pattern of land use that a community believes will help achieve these goals. Updating and maintaining a current comprehensive plan is an important way to maintain communication between the many stakeholders in the development of your community. The comprehensive plan sets the tone for the type of improvements and developments that your community is seeking, and gives cues to residents and developers about the kinds of projects that are likely to be supported.

For those communities interested in protecting unique local natural, agricultural, cultural and historical elements through conservation design practices, the comprehensive plan provides an opportunity to create a strong foundation for regulatory changes.

Strategies

1. Provide background information, including information about the heritage of the community, and the natural, agricultural, historical, and cultural resources that define the quality of life for community residents.
2. Include conservation goals and objectives in the goals and objectives section of the plan. These may include protection of sensitive natural areas, habitat protection, sustainable water resource management, and other goals.

3. Complete a community resource inventory and include this information in the plan.
4. Include a greenway or green infrastructure plan for the community within the comprehensive plan.
5. Be certain that the plan is formally adopted as a blueprint to guide future development in the community.
6. Wherever possible, repeat language from the comprehensive plan in the regulatory ordinances. (Arendt 1999, 20).

For more technical information, NIPC's *Environmental Considerations in Comprehensive Planning* and *Protecting Nature in Your Community* provide detailed practical advice for updating the community comprehensive plan to include environmental considerations. Copies of these documents are available from NIPC's publications department; call (312) 454-0400 with inquiries. *Protecting Nature* also is available on the web at http://www.nipc.cog.il.us/protecting_2001%20.htm.

B. Zoning Ordinances

Ensure that conservation design is encouraged under the community zoning ordinance.

Zoning ordinances must be reviewed and updated to allow conservation design in appropriate districts. In most communities, conservation design currently can be accomplished only through the Planned Unit Development (PUD) process. The PUD process has some major advantages. By requiring unconventional developments to go through this process, the community maintains a high level of control. Also, the public has a greater opportunity to review and comment on proposals. However, one of the primary reasons developers give for avoiding conservation design is the time consuming and uncertain nature of this process. In most cases, no special review or approval is required to build conventional developments, while it is complicated and time intensive to build conservation developments. With regulations like these in place, communities may inadvertently create obstacles to progressive growth strategies such as conservation design.

The minimum goal of updating the zoning ordinance is to create a level 'playing field,' where conservation design enjoys regulatory support equivalent to conventional development. Communities that are committed to the outcomes of conservation design may wish to strengthen the language even more, enough to tilt the 'playing field' toward conservation. The recommended approach is to allow conservation development **by right** in the zoning, so that no special approvals are required.

The following are three recommended approaches to including conservation design in a local zoning ordinance. Any of these zoning options creates a regulatory environment where conservation design is permitted by right. In all cases, the conservation zoning is in place, and the conservation design option is available for the property owner to utilize. Since no additional time or expense is needed to legislatively create the enabling conservation zoning, there is greater opportunity that this option will be selected over the standard subdivision option. Additionally, the community has indicated to its residents where and under what conditions conservation design is appropriate. In each option, once the property is zoned, subsequent project review occurs administratively by the planning department or similar administrative body. In some cases communities may choose to combine two or more of these options to meet the conservation needs of different areas of the community.

Option 1:
The municipality or county adds conservation design (in conjunction with a particular set of land uses) to the list of permitted uses in an existing district.

Option 2:
The municipality or county creates a Conservation Design District and applies it as an "overlay" district to those selected locations that the community deems suitable for conservation design. In this option, the property owner has the option of developing the land according to the underlying standard district regulations or the overlay conservation design option. With the overlay district, conservation design is only an option in those locations with the overlay designation. (See Appendix C, *Conservation Design* Incentives, for a discussion of how developers might be encouraged to choose to exercise the conservation design option.)

Option 3:
The municipality or county designates certain districts on the zoning map as Conservation Design Districts; conservation design is the required design practice in these areas. This more aggressive strategy requires conservation design practices to be utilized in designated areas.

Other strategies exist, but the above three are recommended. Strategies not recommended include creating a conservation design district that can be utilized at the request of the property owner and establishing conservation design as a conditional use in some districts. These strategies do not allow conservation design as a permitted use and as such are not suggested as long term solutions.

To determine where conservation zoning should be applied, each community will consider the following questions through the comprehensive planning process:

1. What resources in the community are most important to conserve?
2. Where is the application of conservation design most beneficial?
3. What standards are appropriate in the conservation design regulations to conserve the natural resources and otherwise achieve the community's objectives?

Conservation Design in Every Project
Whatever decision is made regarding conservation zoning, some combination of the site design practices outlined in Chapter 4 is appropriate for all types of development. Whether or not a proposed development is formally considered a conservation design under the zoning code, all of the practices should be encouraged or required where appropriate. For this reason, as each community reviews its ordinances, many practices may be enacted for all development, regardless of zoning classification.

The following model zoning ordinance language can be adapted to add conservation design to the existing zoning ordinance in conjunction with particular land uses in appropriate zoning districts. This language allows conservation design as outlined in Option 1, above. Introductory language is also provided that can be adapted to formally introduce the community's commitment to conservation principles.

Model Zoning Ordinance Language
(Adapted from the Countryside Program)

Commentary

Purpose

The primary objective of conservation design zoning is to promote the health and safety of the community through the application of flexible land development techniques in the arrangement and construction of dwelling units, roads, surface drainage, and underground improvements. Such flexibility is intended to retain for the property owner the development rights (the number of residential dwelling units) that are permitted under the existing conventional zoning for the property while encouraging environmentally responsible development.

These objectives should be carefully worded to include the specific characteristics within the community that have been determined to be priorities for conservation.

These regulations are intended to achieve these corollary purposes:

A. To maximize protection of the community's natural resources by recognizing the following goals:
   1. Protect and enhance biodiversity as stated in the Chicago Wilderness Biodiversity Recovery Plan;
   2. Minimize development on and destruction of sensitive natural resource areas and wildlife habitats;
   3. Reduce the quantity and improve the quality of stormwater runoff from expected development;
   4. Provide a wider range of feasible sites to locate stormwater Best Management Practices (BMPs);
   5. Minimize impervious surface area;
   6. Reduce potential pressure to encroach on resource buffer areas;
   7. Reduce soil erosion potential;
   8. Reduce the capital cost of development;
   9. Reduce the cost of public services required by the development; and
   10. Increase future property values.

Points 1-10 are examples of the types of conservation goals a community may wish to set. Each community can select the goals that best match its own, or can draft new statements better suited to community goals and intentions. (Note: Because of road and stormwater design, these goals should be listed in the subdivision ordinance language as well; it is strongly suggested to repeat the language in both places and to make the list of goals identical.)

B. To reduce the time and effort required for administrative review of conservation design proposals, for the benefit of both the planning department and the developer.

Model Zoning Ordinance Language (continued)

Permitted Uses

The following uses shall be permitted based on the type of development proposed:

A. Conservation design in accordance with the regulations set forth in Sections ___ through ___, inclusive:
   1. Detached single-family dwellings;
   2. Single-family cluster dwellings;
   3. Single-family attached dwellings;
   4. Multi-family dwellings;
   5. Recreation facilities;
   6. Commercial, industrial, and office facilities;
   7. Natural areas;
   8. Combinations of the above, known as mixed-use development.

B. [OTHER PERMITTED USE]

C. [OTHER PERMITTED USE]

Commentary

The section references here should be completed with numbers of the sections of the zoning or subdivision ordinances that define conservation design.

See definition of "dwelling" for more information, or use community's existing land use definitions. The more flexibility the applicant has in the arrangement of units, the greater the ability to effectively group the units and conserve meaningful natural areas and environmental resources, thus achieving the conservation objectives. Attached units are strongly suggested when the permitted density is two units per acre or higher, otherwise it may not be possible to achieve significant open space or to aggregate the natural areas in a desirable manner.

Depending on the zoning district, some of the uses listed here may not be appropriate.

Conservation design is added to the list of permitted uses if used in conjunction with a specific set of land uses within designated zones. The other permitted uses (single-family residential, mixed-use, agriculture, etc.) remain in effect as well.

C. Subdivision Ordinances

Rewrite sections of the subdivision ordinance to ensure sufficient flexibility for conservation design.

Language is offered in Chapter 4 for updating ordinances with regard to specific site design practices. The following model ordinance language can be incorporated into the subdivision ordinance to formally introduce the community's commitment to conservation design.

Model Subdivision Preamble Language
(Adapted from the Countryside Program)

Commentary

Purpose

The [Municipality or County] has established (or may establish) conservation design standards and procedures within [Municipality or County] zoning resolutions. Therefore, it is intended that subdivision regulations are sufficiently flexible to carry out the conservation design objectives while ensuring that such development is consistent with the underlying purposes of these subdivision regulations.

This statement of purpose is offered as an example. Language should be adapted and revised to suit the goals of each community.

Conservation design is intended to encourage more efficient use of land and public services through unified development that is principally intended to protect biodiversity, conserve community resources, preserve natural areas, and protect the health and safety of the community. These objectives are accomplished through land development techniques set forth in municipality or county zoning resolutions that permit flexibility in the arrangement and construction of dwelling units, roads, and other built elements. Therefore, this Chapter establishes reasonable standards and criteria to likewise permit sufficient flexibility in the development of subdivisions to be consistent with municipality or county conservation design regulations, to maximize the achievement of conservation design objectives and to promote the following corollary purposes:

1. Protect and enhance biodiversity as stated in the Chicago Wilderness Biodiversity Recovery Plan;
2. Minimize development on and destruction of sensitive natural resource areas and wildlife habitats;
3. Reduce the quantity and improve the quality of stormwater runoff from expected development;
4. Provide a wider range of feasible sites to locate stormwater Best Management Practices (BMPs);
5. Minimize impervious surface area;
6. Reduce potential pressure to encroach on resource buffer areas;
7. Reduce soil erosion potential;
8. Reduce the capital cost of development;
9. Reduce the cost of public services required by the development; and
10. Increase future property values.

Similar to the introductory language above, points 1-10 are examples of the types of conservation goals a community may wish to set. Each community can select the goals that best match its own, or can draft new statements better suited to community goals and intentions. (Note: These goals may be listed in the zoning ordinance language as well; it is strongly suggested to repeat the language in both places and to make the list of goals identical.)

D. Additional Local Ordinances to Review for Compatibility and Conflicts

Review all relevant municipal development ordinances for consistency with conservation design goals.

In the process of updating zoning and subdivision ordinances, it is beneficial to review other existing municipal ordinances for consistency. Work with your municipal attorney to determine if changes should be made to other ordinances. While it may be challenging to address the various ordinances in place in the community, this is an important step for the success of conservation design. Working with these ordinances will require working with the various boards and agencies that administer them.

For example, if you have added a section to your subdivision ordinance encouraging or requiring natural landscaping, review any existing landscaping or weed ordinances. Do these contain language contradictory to the revised subdivision ordinance? Similarly, community stormwater ordinances often encourage natural drainage Best Management Practices (BMPs), but often the subdivision ordinances of these same communities require curb and gutter construction and storm sewers. Remove any of these types of contradictions or obstacles to conservation design. Replace these sections with updated language. Consider consolidating ordinances that are repetitious.

Ordinances to consider

- Landscaping ordinance
- Weed ordinance
- Stormwater ordinance
- Floodplain and wetland ordinances
- Highway access control ordinance
- Roadway design standards
- Wastewater ordinance
- Historic preservation ordinance
- On-street parking ordinance
- Soil erosion and sediment control ordinance
- Tree preservation ordinance
- Fire code
- Building code

E. Working with Other Local Agencies

Work closely with other agencies and departments.

It is important for planning departments to be aware of the effect that ordinance changes such as the ones suggested here have on other municipal departments.

For example

- as street width and turning radius requirements are adjusted, the fire department may express concerns about safe passage in case of emergency,
- the engineering department will be substantially affected when stormwater management practices are changed,
- the local Health Department should be consulted if developments include innovative wastewater treatment practices.

For these reasons, it is important to encourage wide involvement in the update processes. Through communication and cooperation, most concerns can be effectively addressed and resolved. Conversely, if other departments are not included in the revision process, you may find that your revised ordinances will not pass final review.

Chapter 4
Principles And Practices For Conservation Design

Principle A. Develop Flexible Lot Design Standards

Flexible lot design standards can lead to attractive, comfortable developments while simultaneously optimizing the protection of natural systems and conserving natural areas.

Discussion

Standard requirements for lot size, density, dispersion, and lot setbacks often put up inadvertent barriers to environmentally responsible conservation development. This is especially true of zoning and subdivision regulations pertaining to residential subdivisions, but this discussion is pertinent for all types of development. Often, traditional regulations lead to developments where all the land is divided into building lots and streets. Natural areas in such developments are often limited to strictly undevelopable wetlands, steep slopes, floodplains, and stormwater management areas.

Conventional lot design requirements are based on the idea that homeowners require large expanses of lawn (in the form of private front, back, and sideyards) between themselves and their neighbors, and that the more spacious the individual lot, the more desirable the property will be. In fact, comfortable home sites do not require large lots, long setbacks, and wide spacing between buildings. When lot design is approached with new flexibility, it becomes possible to design developments that maximize both the number and the attractiveness of buildings while simultaneously optimizing the protection of natural systems and conserving natural areas. These results can be achieved with very simple changes to local zoning and subdivision ordinances. The three practices described in this section offer technical suggestions for modifying these local codes to increase design flexibility.

Here we introduce the concept of density neutral development. Developers and landowners unfamiliar with conservation design often express concern that natural area and open space set-asides translate to an overall reduction in buildable lots. In reality, however, a major aim of conservation design is to conserve the total number of buildable lots. (See Appendix B, Determining the Allowable Density for Conservation Design.) The flexible lot design standards outlined in this section are the tools that make density neutral conservation design possible; for this reason, these practices are particularly important to the economic viability of conservation design and should be included in any ordinance updates.

Benefits, Examples, and Resources

Updating lot design standards and regulations can be beneficial to the local community, future homeowners, and the developer of the site. See Chapter 2 for a full discussion of the economic benefits of this principle.

Community Benefits

- Stormwater runoff and its negative impacts are minimized.
- Natural resources and features are preserved.

Homeowner Benefits

- Property values increase.
- Access to recreational opportunities is enhanced by increased natural areas.

Developer Benefits

- Increased predictability of development approval process.
- Marketability of homes is enhanced.

Practice 1: Lot Size, Density, and Suggested Open Space

Eliminate minimum lot size requirements; rather, regulate overall density of development.

Rather than controlling density by increasing lot size requirements, conservation design experts recommend implementing standards for overall density on a given site without regulating the lot size. With this method, the developer is permitted to construct a fixed number of housing units regardless of lot size. In other words, conservation design is density neutral. (For a detailed discussion of density in conservation developments, see the Appendix B, Determining the Allowable Density for Conservation Design.)

By eliminating minimum lot size requirements, communities encourage creative developments designed to be both profitable and sensitive to the pre-development character of the development site and the community at large. Ordinances without minimum lot size requirements make way for increased natural areas within developments. These natural areas provide opportunity for recreation, maintain habitats, preserve scenic views, and enhance community open space networks.

Figures 3 and 4, below, (Teska Associates, Inc., 2000) show example configurations that can be used to arrange the same number of housing units on a development site, with the resulting differences in building massing and natural areas.

Figure 3: Conventional Layout on Development Site
Teska Associates, Inc. - 2000

Figure 4: Conservation Design Layout on Development Site Teska Associates, Inc. - 2000

Some conservation design experts recommend the implementation of a maximum lot size to impose an absolute limit on oversized lots. This resource manual, however, advocates that all lot size restrictions be removed from the zoning ordinance, to make way for creative solutions such as a single lot development with all housing managed as condominiums.

Lot Size, Density, and Open Space

The basic principle underlying the practice of conservation design is the protection of natural and cultural resources through design flexibility. This flexibility involves the reduction of lot sizes in a development in exchange for setting aside the remainder of the property as significant amounts of natural, open space land.

In addition to allowing design flexibility, some experts argue that communities should mandate ambitious open space set asides as well. For example, to meet the definition of conservation design, a development would be required to have a certain percentage of the development site set aside as open space. The open space requirement for conservation design would likely be higher than open space requirements elsewhere in the community.

There are two approaches to mandating the open space percentage. The first is to look to the community plan to determine a reasonable set aside for a development site, based on the features and characteristics of the site. The second is to mandate a percentage open space for all developments. For convenience, both approaches are addressed in the model ordinance language.

Residential Wastewater Treatment and Conservation Design

Standard septic leach fields, particularly in areas of poor soils such as those in some areas of northeastern Illinois, require a relatively substantial amount of land in order to function properly and meet minimum spacing standards. Standard large-lot subdivisions have become the norm in order to meet the necessary requirements for wastewater disposal via standard septic leachfields, limiting the ability to conserve resources.

For many areas in northeastern Illinois, the extension of public sewer facilities is not desirable or cost effective. Standard septic systems are in place and some alternatives are owned and operated by public agencies such as park systems. Small community wastewater alternatives treat wastewater near the location where it is generated, reducing the need for costly pipe networks and mechanical / chemical based solutions.

There are several alternatives to the standard septic leach field that would permit more flexible project layouts. Some of them require less space; others serve several units at once, and can be located in common areas. Many of these alternatives are capable of reducing the environmental impact of wastewater disposal while meeting water quality standards. Although technology has produced system alternatives which would be effective in our region, critical issues regarding system design, ownership, management, and approval still need to be developed and clarified at the local, county, and state levels.

For the purposes of conservation design practices, the most useful technologies for small scale sewage treatment facilities are those that perform effectively with the minimum amount of necessary attention. The low-maintenance, alternative systems available rely on biological rather than highly mechanized or chemical treatment, followed by various forms of land application. Cost is often greater than the standard septic leach field but higher treatment standards can be achieved, which increases the environmental quality of a project with regard to water resources.

A detailed discussion of these alternative wastewater treatment strategies is beyond the scope of this project. For more information, coordinate with the local health department, or see NIPC's publication Protecting Nature in *Your Community* (Chapter 7).

(The bulk of the material in this discussion of wastewater treatment was adapted from material prepared by the Countryside Program. (http://www.countrysideprogram.org))

Model Ordinance Language

The following model ordinance language can be adapted to modify existing local codes and ordinances. Blanks and bracketed ([ ]) sections should be filled in with language appropriate for each community.

Model Ordinance Language
(Adapted from the Countryside Program)

Either

A 1. The minimum open space / natural area for a given development shall be determined by looking to the community comprehensive plan to determine existing standards for open space.

Or

A 2. At least _____ % of the development shall be set aside as natural area / open space. (See recommended requirements in commentary.) The natural area counted toward this set-aside shall not include parkways, landscape islands, or similar features and should meet the definition of natural area given in [Appendix A]. The natural area set-aside shall not include wetlands, floodplains, or other inherently unbuildable areas.

Commentary

The amount of natural area that can realistically be set aside is related to the density and type of units permitted. The higher the density, the more difficult it is to achieve a large percentage of natural areas unless sufficient flexibility is available in terms of dwelling types and setback requirements (i.e., allowing attached single-family units). It also should be noted that a minimum open space requirement may not be appropriate in all zones. In residential zones with low to moderate density, the requirement will likely be helpful. In commercial zones or zones with intentionally high residential density, an open space requirement may constitute enforced sprawl. Two options are give below for addressing the open space requirement.

The first option assumes that flexible lot design will lead to open space set asides without a mandated percentage. In order to create a truly noticeable difference between a standard subdivision and a conservation design, in no case should the open space requirement be less than is required in similar zones elsewhere in the community. Beyond this guideline, this option assumes that no restriction is necessary since natural areas will naturally expand as lot sizes are reduced and other conservation design practices are introduced. This option is preferred for non-residential zones.

If a mandated open space percentage is selected, the community must decide the appropriate percentage. This may vary by residential zone, and is recommended for residential areas only. Some examples of recommended percentages are given below.

Kane County's 2020 Land Resource Management Plan (p. 79) calls for the preservation of 40% open space in all new development.

Lake County's Unified Development Ordinance (http://www.co.lake.il.us/elibrary/ordinances/planning/Complete_UDO.PDF) requires 30% in most residential zones, and 40% in zones with .45 du/acre or lower density.

Model Ordinance Language (continued)

B. The real property described herein must be maintained in perpetuity for [tailor to local purpose] only and shall not be improved with any building, structure, or appurtenant facility. This restriction shall run with the land and be binding on successors and assigns of Grantee.

C. No minimum or maximum lot size shall be imposed.

D. The maximum density shall be that of the underlying or pre-existing zoning, in dwelling units per acre.

E. The maximum number of dwelling units permitted in a conservation development shall be calculated by:

1. Deducting the following from the total project area:

   a. Any public right-of-way within the project boundary existing at the time the development plan is submitted; and

   b. The area of land within a floodplain, designated wetland, or existing waterbody that exceeds the minimum acreage required for restricted open space (if such a requirement exists). Where floodplains and wetlands overlap, they shall be counted only once.

2. Multiplying the result of Subsection 1 by the maximum density permitted per acre as set forth in this Section above.

Commentary

Will County's Land Resource Management Plan (http://www.willcountylanduse.com/lrmp/lrmpmain.html) sets an overall goal of 20% of the land in the county being set aside as open space.

Language should be included to restrict future development of the open space, to ensure that the open space remains undeveloped in perpetuity.

Lot size restrictions are eliminated completely to make way for creative design solutions.

Each municipality or county must establish the precise density for conservation design based on the prevailing characteristics in the municipality or county. Normally, this will be the net density of the zoning district now in place in the areas where conservation design is desired. The net density of a subdivision is usually lower than the gross density (which is derived from the minimum lot area divided by one acre or 43,560 square feet) because of land area devoted to roads and the fact that some of the lots are larger than the minimum required. (A detailed discussion of the distinctions between the net density and the gross density is included in Appendix B, Determining the Allowable Density for Conservation Design.*)*

One of the principles of conservation design is to be density neutral when comparing the number of potential units under conservation design to the number of potential units under conventional development. However, it is recognized that floodplains, wetlands, and waterbodies are natural features that affect the development capacity of a site. At the same time, it is possible that in a standard subdivision, especially a larger lot subdivision, much of the area within floodplains, wetlands and smaller ponds could be included in the rear yards of individual lots, thereby not reducing or only moderately reducing the overall development capacity of the site. Therefore, the Model recommends that there be a reduction in density for projects that are substantially impacted by floodways, wetlands, and/or waterbodies. When the area of these key environmental open space components exceeds the number of open space acres that are required to

Model Ordinance Language (continued)	Commentary
	be set aside, the acreage that is in excess of the open space requirement is to be deducted from the total project area, and the density is to be based on the net area. (See Appendix B for an example of how this deduction is calculated.) Additional natural resource characteristics (i.e. steep slopes, prime farmland, drainage courses outside designated floodways, etc.) could also be deducted depending on the priorities of the community.
3. Development incentives may be granted at the discretion of the community.	*See* Appendix C, Conservation Design Incentives, *for a detailed discussion of development incentives and when they are appropriate.*

Practice 2: Arranging the Development Site

Maintain critical natural areas by designing the site with sensitivity. Group buildable lots together to maximize the area of undisturbed land.

How should the buildable lots be arranged on a development site? The process of laying out lots, roads, and natural areas is one of the most important aspects of conservation design. Conservation design advocates for a sensitive approach to the landscape, an approach which treats each development site as a unique challenge to be approached with the complementary goals of developing the maximum allowable number of lots AND conserving natural lands and processes to the greatest possible extent. (Note: This practice is most applicable to large development sites on previously undeveloped land. However, even on smaller development sites or sites which have existing development, the basic strategy of seeking to conserve and restore the most valuable natural resource areas can be employed.)

Each community will benefit from a comprehensive planning process that identifies and maps the natural features of the community. With such an inventory in place, the community can quickly identify whether proposed developments meet community conservation goals. Comprehensive planning is discussed briefly in Chapter 3. More in depth information about community comprehensive planning can be found in NIPC's *Environmental Considerations in Comprehensive Planning and Protecting Nature in Your Community*. These publications provide detailed practical advice for updating the community comprehensive plan to include environmental considerations. Copies are available from NIPC's publications department; call (312) 454-0400 with inquiries. Protecting Nature is also available on the web at http://www.nipc.cog.il.us/protecting_2001%20.htm.

Randall Arendt, a national expert in conservation design, outlines the following four step process for arranging the development site (Arendt 1996).

1. **Identify all Potential Conservation Areas.** This will include all inherently unbuildable areas (floodplains, wetlands, steep slopes) and also buildable areas that are sensitive environmentally (natural areas, stream and wetland buffer areas, woodlands, etc.), significant historically and culturally, or important for conservation for some other reason. The developer will be responsible for identifying the conservation areas; a community resource inventory or comprehensive plan can be a valuable tool in monitoring the protection of conservation areas.

2. **Locate the House (or other building) Sites.** At this point, only the specific sites for buildings to be constructed should be located. To maximize the revenue potential of the sites, the developer will take care to locate the sites to maximize views and access to natural areas and other amenities.

3. **Design the Street and Trail Systems.** Determine how to most efficiently lay out the street system to access every home. Similarly, homes should have easy access to walkways and trail systems within the development.

4. **Draw in the Lot Lines.** This is the final step and should be almost trivial once the building sites and street system have been identified.

For a more in depth discussion of Arendt's suggested design process, refer to *Conservation Design for Subdivisions*, pages 41-48.

Although not explicitly stated in Arendt's model, an important characteristic of nearly any conservation development is the grouping of building sites. Certainly, grouping alone does not lead to conservation. It is an important element, however, of most conservation developments, and should result naturally from the employment of Arendt's design process. Grouping the buildings together allows for the creation of contiguous natural areas. Grouping also ensures the development of compact neighborhoods that are amenable to walking, cycling, and interaction between neighbors.

Model Ordinance Language

The following model ordinance language can be adapted to modify existing local codes and ordinances. Blanks and bracketed ([ ]) sections should be filled in with language appropriate for each community.

Model Ordinance Language
(Adapted from UW Extension Model Ordinance)

A. Lots and buildings should be grouped.

B. Groups should be located to minimize negative impacts on the natural, scenic, and cultural resources of the site and conflicts between incompatible uses.

C. Groups should avoid encroaching on rare plant communities, high quality habitats, or endangered species identified by the Illinois Department of Natural Resources.

D. Whenever possible, open space should connect with existing or potential open space lands on adjoining parcels and local or regional recreational trails.

E. Groups should be sited to achieve the following goals:

1. Minimize disturbance to woodlands, wetlands, grasslands, mature trees, and steep slopes.

2. Prevent downstream impacts due to runoff through adequate on-site storm water management practices.

3. Protect scenic views of open land from adjacent roads. Visual impact should be minimized through use of landscaping or other features.

4. Protect archaeological sites and existing historic buildings or incorporate them through adaptive reuse.

5. Encourage sense of community.

6. Minimize impacts to prime farmland soils and large tracts of land in agricultural use, and avoid interference with normal agricultural practices.

F. Landscaping around the building group may be necessary to reduce off site views of buildings. Landscaping around the group should utilize native plant species, ideally based on pre-settlement vegetation communities found on the site.

Commentary

Practice 3: Building Setbacks

Eliminate setback requirements for the interior of development sites while maintaining expectations on the perimeter.

Conventional ordinances generally require large setback distances between homes and adjacent homes, streets, and lot lines. In order to meet conventional requirements, lots must be of substantial size, where the house is located at the center with generous spaces on all sides.

Conservation design discourages this approach to configuring homes and lots. Rather than having large front, back and side yards for individual homes, conservation design calls for smaller yards in exchange for larger expanses of contiguous natural areas. To accomplish this, most setback requirements must be substantially reduced or eliminated.

The ordinance language offered here differentiates between requirements for the perimeter of the development site and requirements for the interior of the site or individual lots. In general, it is recommended that the perimeter of the site be developed in such a way that consistency with surrounding development is maximized. For most communities, a priority in approving new development is to minimize complaints or opposition from existing residents and neighbors. By developing conservation sites with sensitive perimeter setbacks, context is respected and conflict with neighboring developments is reduced.

In contrast, setback requirements for the interior of the development site can be extremely permissive. This model ordinance recommends eliminating minimum lot sizes altogether, allowing for creative solutions to site design such as condominium arrangements where the entire site is commonly owned. Further, because existing building codes address health and safety requirements for the spacing between buildings, it is not necessary to address this spacing in the zoning ordinance. In fact, setback requirements in conventional zoning ordinances often serve to enforce large-lot developments which are built in opposition to many conservation design principles.

Model Ordinance Language

The following model ordinance language can be adapted to modify existing local codes and ordinances. Blanks and bracketed ([ ]) sections should be filled in with language appropriate for each community.

Model Ordinance Language (Adapted from the Countryside Program)	**Commentary**
Buildings, structures, pavement, and streets shall be located in compliance with the following development and site planning standards.	
A. Lot Requirements	
1. Dwelling units are not required to be on lots. However, when lots for standard detached single-family dwellings or sublots for single-family group or attached dwelling units are included as part of a conservation development, such lots or sublots shall be of sufficient size and shape to accommodate dwelling units in compliance with the spacing requirements of this section.	*A key to successful conservation design is flexibility in area and yard standards. If the municipality or county chooses to include minimum lot and yard standards, sufficient reductions from the existing lot area, width, and yard requirements must be made in order to achieve goals of conservation design. If lots are not used, buildings will be managed condominium style, where owners own the building but not the underlying land.*
B. Perimeter Building Regulations	***Perimeter Setback**: The perimeter regulations apply to the exterior boundary (the perimeter) of the development site.*
1. The minimum setback from an existing public street shall be that which is previously established in the zoning ordinance or subdivision regulations.	*The setback from existing public streets AT THE PERIMETER OF THE SITE should be the same as the front yard setback in the standard single-family district zoning regulations (to maintain consistency). Acceptance of conservation design is increased when expectations are maintained on the perimeter.*
2. The minimum setback from the project boundary shall be that which is previously established in the zoning ordinance or subdivision regulations.	*Similar to setbacks from existing streets, setbacks from the project boundary should maintain the status quo established by subdivision regulations and existing development.*
C. Interior Building Setback/ Spacing Regulations	***Interior Setback**: The interior setback requirements apply to setbacks from streets, lot lines (if using), and other buildings on the INTERIOR of the development site (as opposed to on the perimeter).*
1. Interior setbacks are left to the discretion of the developer, but must meet all existing building and fire code requirements.	*The municipality or county is encouraged to eliminate interior setback or separation requirements above and beyond building and fire code requirements. However, it is also recommended that any approvable development plan be required to indicate what those setbacks and separations will be.*

Principle B. Protect and Create Natural Landscapes and Drainage Systems

Facilitating conservation design and fostering stewardship of natural areas and natural communities is critical to achieving regional biodiversity goals.

Discussion

The northeastern Illinois landscape has been dramatically transformed from its original pre-settlement form to be made suitable for agriculture. Today a great deal of new construction involves the conversion of former agricultural lands into residential subdivisions and commercial areas. If the land is still fertile and active in production, there may be great value in maintaining its current condition. A second vital consideration is the restoration of the natural landscape, and/or preservation of natural landscape remnants through conscientious design practices. Conservation design facilitates these practices to a far greater degree than conventional development due to the amount and contiguous nature of the natural resource areas potentially preserved.

As the primary decision makers on land development, local officials and staff can play a lead role in the conservation and restoration of natural areas and landscapes. Facilitating conservation design and fostering stewardship of natural areas and natural communities, which are the foundation of the region's environmental health, is critical to achieving the short and long term goals outlined in the regionally adopted Biodiversity Recovery Plan. The overall goal of this Plan is "to protect the natural communities of the Chicago region and to restore them to long-term viability, in order to enrich the quality of life of its citizens and to contribute to the preservation of global biodiversity."

Benefits, Examples, and Resources

Protecting and creating natural landscapes and drainage systems can be beneficial to the local community, future homeowners, and the developer of the site. See Chapter 2 for a full discussion of the economic benefits of this principle.

Community Benefits
- Reduces flooding and stormwater management costs.
- Reduces long-term maintenance costs.

Homeowner Benefits
- Increases property values.
- Decreases maintenance costs.

Developer Benefits
- Reduces landscaping and other installation costs.
- Enhances marketing potential.

Results of a study conducted in 1994 for the real estate industry showed that 77.7 per cent of all home buyers and shoppers in the study rated natural open space as either "essential" or "very important" in planned communities. Walking and bicycling paths ranked third. A research spokesperson noted that consumers are increasingly putting a higher premium on interaction with the environment through inclusion of natural, open space and nature paths. These findings differ greatly from the 1980's preferences, which included tennis courts, swimming pools, and golf courses (San Francisco Chronicle, January 8, 1995).

From: "Economic Impacts of Protecting Rivers, Trails and Greenway Corridors" National Park Service, 1995, Washington DC page 1-3

Additional Resources

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Practice 4: Natural Area Protection and Resource Conservation

Update ordinances to substantially restrict development on or near natural areas, and require or encourage undeveloped buffers around these areas.

Conservation design encourages the dedication of open space on a site that will protect and restore natural areas and resources, and provide for passive recreation where appropriate. Through a conscientious site design process, the development can be configured to maximize the areas that are protected and conserved.

Possible areas to evaluate for protection include hydric soils, streams, lakes, wetlands, floodplains, steep slopes, significant wildlife habitats, remnant prairies, woodlands, farmland, and sensitive aquifers and their recharge areas (Arendt 1996). Certain sensitive areas, including floodways, flood fringes, non-isolated wetlands, isolated wetlands, and threatened and endangered species habitats may be protected by federal, state, and local statute, but each community must decide the extent to which it will protect natural areas that do not benefit from legal protection.

Natural area buffers are an important strategy for protecting sensitive natural areas. The model ordinance language given in this section enables the use of buffers around natural areas. The following list enumerates several benefits resulting from the use of buffers:

- Slows water runoff.
- Removes up to 50% or more of nutrients and pesticides in runoff.
- Removes up to 60% or more of pathogens in runoff.
- Removes up to 75% or more of sediment in runoff.
- Reduces noise and odor.
- Serves as a source of food, nesting cover, and shelter for wildlife.
- Stabilizes streambanks and reduce water temperature in stream.
- Reduce downstream flooding.

Greenways, or linear corridors of green, can function to preserve natural resources and in some cases define or link a trail system. Linking and providing connections to existing and proposed trails and greenways provides additional benefits to natural resource protection. Existing local greenways may be protected by municipal, park, forest preserve, or conservation districts, and county transportation departments. Regional, state, and federal greenways and trails are documented in NIPC's 1997 *Northeastern Illinois Regional Greenways and Trails Plan* map. Communities also may decide to include significant historic and cultural assets in designated open space areas. Through the comprehensive planning process, communities will determine which of these areas are most relevant and important for conservation.

Model Ordinance Language

The following model ordinance language can be adapted to modify existing local codes and ordinances. Blanks and bracketed ([ ]) sections should be filled in with language appropriate for each community.

Model Ordinance Language

Commentary

Natural Area and Buffer Protection and Conservation

The [Municipality or County] recognizes the ecological, geological, educational, scenic, economic, and aesthetic importance of preserving natural areas in public or private ownership. A **natural area** is an area of land, not necessarily undisturbed, which either retains or has been substantially restored to its original natural or native character.

The natural area definition is partly adapted from the "Illinois Natural Areas Preservation Act" (525 ILCS 30/3.10). The act establishes state policy to protect and maintain a register of natural areas and buffer areas, provides certain forms of protection and control, and encourages and assists in the preservation of natural areas and features.

The [Municipality or County] recognizes the importance of **buffers** that preserve, provide access to, or otherwise serve as necessary adjuncts to natural areas by protecting streams, lakes, and wetlands. Buffers include, but are not limited to, areas of predominantly deeply rooted native vegetated land adjacent to channels, wetlands, or lakes for the purpose of stabilizing banks, reducing contaminants including sediments in storm water that flows to such areas.

Selected language on buffers, buffer widths, and buffer averaging is adapted from the Kane County Code. (http://www.co.kane.il.us)

The function of the buffer is to create a transition to the area targeted for protection. The buffer absorbs and withstands the impact of harming activity. For this reason, the ongoing healthy function of the buffer must be assured. Accordingly, the harmful activity cannot be allowed to overpower the buffer.

Strategically placed buffer strips in the landscape can effectively mitigate the movement of sediment, nutrients, pesticides, and other pollutants.

Natural areas and buffers shall be preserved on the site, including, without limitation, native vegetation, wetlands, natural floodplain storage, or other valuable environmental and biological resources.

A. An area designated for natural area and buffer protection purposes may be:

   1. preserved or restored to its natural state,

   2. designed and intended for the passive use and/or enjoyment of residents of the proposed development, or

Model Ordinance Language (continued)

3. preserved in order to expand and extend the usefulness of existing preserved open space and natural areas.

B. Dedicated buffers and natural areas shall be designed and located to conserve significant natural features located on the site.

C. Dedicated natural areas shall be interconnected with open space areas, greenways, and trails on abutting parcels where possible and appropriate.

Commentary

Greenways, or linear corridors of green, can function to preserve natural resources and in some cases define or link a trail system. Linking and providing connections to existing and proposed greenways and trails provides additional benefits to natural resource protection. Existing local greenways may be protected by municipal, park, forest preserve, or conservation districts, and county transportation departments. Regional, state, and federal greenways and trails are documented in NIPC's 1997 Northeastern Illinois Regional Greenways and Trails Plan *map.*

Practice 5: Land Compatible Design

Encourage developers to design sites to fit the topography, features, and soils of the natural landscape.

Excess stormwater runoff, and the resultant flooding and erosion, arise from development and alteration of the natural landscape. For this reason, it is highly desirable to preserve or restore features of the natural, pre-development landscape whenever possible. Careful consideration of the pre-development landscape can vastly improve the drainage and stormwater runoff performance of a development.

On sites that have been altered through grading, engineered drainage systems, and agricultural conversions, developers should be encouraged to study the original landscape and design the landscape using the original as a guide. On sites that have not been substantially altered from their natural form, developers should be encouraged to preserve this form.

Generally, substantial alteration of the existing site landscape is discouraged. Special consideration should be given, however, to proposals which seek to restore a site to its original natural form through careful and conscientious study. Restoration of the natural landscape will not be appropriate in all cases, but should be permitted unless there is a compelling agricultural or ecological reason to avoid it.

Much of the language pertaining to natural landscape sensitivity may be currently addressed in other existing regulations. If not, NIPC's model ordinances for *Soil Erosion and Sedimentation Control, Stormwater Management*, and *Streams, Lakes, and Wetlands Protection* will be of assistance in developing language for an ordinance. (Full citations for these documents are given in the bibliography. To obtain copies, contact NIPC's publications department, (312) 454-0400.)

Model Ordinance Language

The model ordinance language given in this section is adapted from the City of Napa Valley, California, Riparian Habitat Areas section of their ordinance. It can be adapted to modify existing local codes and ordinances to require land compatible design for all developments or for conservation developments only. Blanks and bracketed ([ ]) sections should be filled in with language appropriate for each community.