

**An Alternative Planting Treatment
for Turf
Open Spaces
in Conservation Subdivisions**

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Thesis submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

MASTER OF LANDSCAPE ARCHITECTURE
IN
LANDSCAPE ARCHITECTURE

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April 13, 2001
Blacksburg, Virginia

Keywords: Ecological planting design, meadows, conservation subdivisions, cost comparison

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(ABSTRACT)

As conservation subdivisions increase in popularity, large tracts of community open spaces are being created. The typical landscape treatment is usually reminiscent of the English Landscape School: acres of turf providing little wildlife habitat or environmental benefits. Many homeowners are sold on the idea of great expanses of turf similar to a golf course. The open spaces are generally left to the homeowners association to maintain. In some cases it is donated to local municipalities. Maintenance is often expensive and places a burden on local governments. This study will show that creating more sustainable open spaces can correct this problem. This can be accomplished through the use of an ecologically based planting design. The following thesis project focuses on an alternative landscape planting treatment for these large open spaces, a treatment that has a significant cost savings and offers a different experience.

Dedication:

I am truly grateful to the support of my fiancée, Margaret Virginia Staylor, for giving me support and encouragement over the past three years. You have been a blessing. I can't wait to spend the rest of my life with you. I am also grateful for all the support that my parents William and Barbara Krueger have provided throughout my lifetime. Thank you, Mom and Dad, for giving me the support to stick it out and finish. Though many would object, I must thank Otis my dog for providing me with excuses to go hiking and enjoy the outdoors.

Acknowledgements:

I would like to acknowledge Margaret Bryant as my chair, for all the help and guidance she has given me on this project. This project was a new experience for everyone in the department and has provided a great learning experience to me. I would also like to thank Rick Hollender, Bill Chaddock, Matt Martini, and Dave Harper. Without the help of these individuals, most of the work in this project would not have been accomplished.

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Chapter 1-Introduction

Planting design is an integral part of the field of landscape architecture. Traditional planting design focuses on creating spaces, edges, and lines in the landscape. Plants often become just another material in the landscape used to beautify the site. With few exceptions we rarely design landscapes for plants. Our landscapes are usually designed for people. Trees and shrubs become ornaments in seas of grass. As landscape architecture advances into the 21st century, ecological design is becoming an alternative aesthetic treatment-one that reflects ecological rather than purely ornamental considerations. No longer are plants placed in ones and threes in the landscape, but rather, plantings are becoming richer in biodiversity and increasing wildlife habitat. Though not applicable on every site, an ecologically based design can provide an alternative landscape treatment.

The goal of this project is to apply an ecologically based planting design to a community open space in a conservation subdivision. As conservation subdivisions become a viable alternative to traditional tract development, the management and design of the open space is becoming an issue. Current community open spaces are usually dominated by traditional planting design and require weekly mowing and maintenance. The fees associated with this maintenance are often quite expensive. As environmental awareness increases, these open spaces can become excellent areas to apply alternative planting treatments. The following is a summary of the major goals addressed in this project.

Summary of Project Goals

- To explore the use of alternate landscape treatments for community open spaces.
- To compare the costs of maintaining traditional landscape treatments and alternative solutions.
- To study design ideas associated with alternative landscape treatments.

Chapter 2-Position Paper

“Planting Design: Maybe it’s the name we have given it that is the problem. But somehow, planting design has taken on connotations of being an insipid ornamentation of the landscape, an innocuous add-on.” (Morrison 1999, p.94)

Introduction

The American landscape as most people know it today is a combination of natural and man-made elements in a built environment comprised of industrial, urban, and suburban patches. Our landscape is a product of human activity. It is an environment that has imposed man’s need to control nature rather than living in harmony with it. Land that once supported large stands of forests or prairie grasslands has been turned into shopping malls, golf courses, and large-scale suburban developments. The environmental effects of these man-made settings have been dramatic - from the loss of biodiversity to the fragmentation of land. Many of the remaining native ecosystems are under stress from increased runoff and erosion caused by the impervious surfaces of nearby development. These problems have been plaguing the American landscape for decades.

Many of the environmental problems are a result of one-sided thinking: that anything beautiful is successful. However, this beauty sometimes is only skin deep. Our artificial environments rarely address environmental problems such as soil erosion, loss of biodiversity, or water pollution.

As the field of landscape architecture enters the 21st century, we are increasingly faced with challenges in our designs. Many in the profession see landscape architecture as an artistic expression, while others approach it through science. In either circumstance, as designers we have an opportunity and an obligation to improve our surroundings. One way to do this is by integrating ecological planting methods into our everyday environments. They can improve the quality of life around us and shape our

environment. As landscape architects, we need to create a balance between ecological and conventional planting design.

The Conventional Approach

What is a conventional approach to planting design? It may be described as the use of landscape plants that we most often see in our everyday, man-made environments. This includes but is not limited to the endless expanses of manicured turf, non-native trees, shrubs, and perennial beds that dot our cultural landscape. These landscapes have become an American icon and the expected norm. But, inherent in the conventional planting approach are good intentions and adverse effects.

The conventional approach relies heavily on the picturesque and aesthetics. Naussauer describes our fascination with picturesque landscapes as being drawn from eighteenth century England, in which the power of nature began to be seen as beautiful, as long as it was controlled (Naussauer 1997). Times have changed dramatically since the picturesque landscape was first envisioned. The population of the United States has increased, considerably, and the resulting expansion of our built environment has left many of our natural landscapes fragmented. The picturesque has been forced upon the land, and we have been left with nothing but seas of green grass and foundation plantings.

The care that we invest in our landscapes has become very important to us. We have become so fascinated with our lawns that local ordinances enforce conformity if we fail to keep them neatly trimmed and tidy (Naussauer 1997). This value is seen across America from suburb to suburb in our daily ritual of mowing the grass or raking the leaves. “The aesthetic of care is laden with good intentions and social meaning: stewardship, a work ethic, personal pride, contributing to community. But like many other ways that we improve our lives or our surroundings, landscape care can cause unintended and unexamined harm” (Naussauer 1997, p. 68). Some of these unintentional harms are apparent in the use of chemicals on our lawns and the use of exotic and invasive plant species.

One of the major problems with the conventional approach is maintenance. In order to ensure our landscapes remain as they were intended, a great deal of time and

energy is needed to sustain them. Turf is continually bombarded with chemical applications and continuously mowed. Without this input, natural succession would take over our residential yards and corporate complexes. Our conventional landscapes would revert to pre-settlement forms of forests and grasslands. As a culture we have accepted our static landscapes as normal. Those that have suggested change have often been met with resistance.

Ecological Approach to Planting Design

In order to grasp a better understanding of an ecologically based planting design, we must first explain and define it. An ecological approach is not a new concept to landscape architects and has been slowly gaining acceptance in the last half century. For the purpose of this paper, ecological design borrows on both the ideas described by Owen Manning (Manning 1982) and the approach to sustainable design described by Carol Franklin (Thompson and Steiner 1997).

Manning describes ecological design as an “approach which seeks to substitute for the restricted, artificial and expensive creations of conventional design, a looser and apparently more natural landscape marked by species-diversity, structural complexity and freedom of growth achieved above all by indigenous vegetation sensitively managed in order to exploit natural growth processes (especially successional) and the natural potential of the site” (Manning 1982, p. 30). He goes on to say that ecological design should not be seen as an alternative to conventional design but rather as an enrichment to what has previously been done (Manning 1982). The idea of a balance between conventional and ecological becomes apparent. Obviously, we cannot create ecological or naturalistic landscapes in every situation. A forest system and a football field simply cannot exist in the same location. Compatibility plays an important role in implementing ecological planting techniques.

In addition, the idea of sustainability plays a crucial role in an ecologically based planting design. Franklin, a strong advocate of ecologically based design and a principal of Andropogon and Associates, suggests that sustainability plays an integral part in planting design. Her approach is to design landscapes that fit the land and allow the natural processes of the site to remain intact and functional with development. She not

only advocates minimizing site destruction but also believes that designers have an obligation to re-establish natural systems on the site (Thompson and Steiner 1997). If we apply this to ecological planting design, then we are prescribing plant communities that require minimum input and intervention in order to exist.

Natural vegetation as we know it today has been subdued and placed on our urban fringe. To see a natural forest, one must often drive to it. An example is the native grasslands that once dominated the Midwest that have become agriculture fields required to support our growing population. As a result of removing nature from our everyday lives, we have suppressed and often forgotten it (Patchett and Wilhelm 1999). Water is often seen as a waste product in our built environments. Our stormwater management systems have become so efficient that every drop of rainwater is often removed instantaneously from a given site. An ecologically based planting design approaches this problem by bringing nature back to the cultural landscape. Vegetation can play a critical role in re-establishing soil formation, species biodiversity, and the hydrologic cycle.

A Possible Solution

One alternative to conventional planting design is the use of native plant communities. Landscape architects and designers have used native plants in their designs for centuries. Native have often been incorporated with non-native plants to form the plant palette of a design. However, in this sense, native plants have simply been used for their ability to adapt to local conditions. They are rarely used to benefit the natural environment or wildlife. The only benefit is a reduction in maintenance costs, energy, water, etc. We simply cannot expect a few native shrubs or trees to have the same benefit of a natural woodland or meadow. Using native plants as simply objects in the landscape merely becomes another conventional planting approach. Examples of this include the use of native trees and plants in non-native conditions such as street plantings or urban tree wells. Many of these non-native conditions require extensive soil amendments and maintenance to prolong the lives of these plants. As a result, our plants are continually dependent on the conventional planting approach for survival.

An ecologically based approach uses native plants to restore natural ecosystems and creates living plant systems that will replenish themselves. “Natural ecosystems, like

a forest or a prairie, do not require external management because the organisms are adapted to the physical and chemical conditions of the site and the circulation of nutrients between the living and the nonliving is fairly complete” (Bormann, Belmori, and Gabelle 1993, p.88). Natural ecosystems have evolved over time and have become self-sustaining.

Yet we simply cannot stop taking care of our contemporary landscapes and expect healthy forest systems to grow in our front yards or vacant lots. Countless generations of mowing, watering, and fertilizing have eliminated many of the plant and animal species necessary for a return to a healthy natural ecosystem (Patchett and Wilhelm 1999). These new or created ecosystems will need to be planned and designed with natural processes in mind. Unlike the highly intensive maintenance schedules associated with conventional planting designs, an ecological approach will require stewardship and time for the appropriate outcome to be achieved. A forest system or prairie simply cannot be created overnight and does not belong in every landscape.

A Need for a Changing Landscape

In order to apply native restoration and the ideas of ecologically based planting design, we need to re-evaluate our current landscapes. Many of our landscapes are simply not compatible. However, a residential landscape is the perfect opportunity to test and evaluate an ecological approach. Large communities and individual residential lots make up a considerable portion of the American landscape. It is estimated that lawns cover approximately 20 million acres in the United States, making turf the single largest crop in the American landscape (Bormann, Belmori, and Geballe 1993). Patchett describes this as the “outdoor rug” phenomenon (Patchett and Wilhelm 1999). Turf has become the primary treatment of our ground plain, but it is not needed in every instance.

In residential landscapes, we can reduce our dependence on turf by applying the ideas of ecologically based planting design to our everyday landscape treatments. This is not to suggest that we eliminate turf altogether, but that we re-evaluate spaces in our landscapes that we do not actively use. A balance is needed between ecological and conventional planting approaches. Instead of an entire lawn or subdivision devoted to a sea of grass, we could suggest alternatives that would benefit plant and wildlife diversity.

Alternatives could include restoring patches and corridors of meadows or woodlands. Large residential lots could be connected together by tree plantings and meadows.

A Design Experiment

In order to explore the benefits associated with ecologically based planting design, I would like to test the idea through a design project. I chose the Ponds of Woodward, a 12-year-old conservation subdivision in Pennsylvania, as my site.

The primary goal of the original design was to preserve a large amount of the property as community open space. Like many other conventional planting designs, the open space is primarily turf, perennial beds, and street trees. In order to sustain this non-native landscape, the following are required: irrigation, weekly mowing, and fertilizers. The open space is viewed as a golf course without the golf. Like many other community open spaces across the country, a homeowners association is usually responsible for management. Maintenance costs are split among the individual homeowners and are often quite expensive. Not only do the homeowners take care of their own property but they also share the responsibility in maintaining the open space.

Given the cost of maintaining these community open spaces, an alternative solution is needed. This solution would use the ideas suggested by ecologically based planting design, particularly native plant communities, and apply them to the community open space. By restoring this open space to a more natural landscape, we may be able to improve the hydrologic cycle, reduce the dependence on chemicals, and improve the overall health of the landscape.

Like any new idea, gaining support and approval is often difficult. Conventional planting design has been the accepted norm for many years, and any deviation from it will be expected to have some opposition by local residents. An ecological approach to planting design is no exception. In the following pages I seek to apply an ecologically based planting design to the open space located at the Ponds of Woodward and compare the cost of installation and maintenance to the already existing conventional landscape. Current dollar values will be assigned to each landscape type based on 2001 standards. A detailed table will be generated showing the installation and maintenance cost over a 10-

year period. In addition, the design aspect of this project will explore some of the issues involved in having an ecologically based planting design accepted.

Chapter 3-Benefits of Native Landscape Plants

Landscape architects often use native landscape plants in their designs. Native plants are often more suitable to local soil and climatic conditions than their exotic counterparts. However, defining what is native and what is not is often difficult. It is not the object of this chapter to discuss the controversy between native and non-native plants but to present the general benefits associated with native plant material. The following list gives a detailed description of the benefits associated with native plant material. Many of the benefits are directly related to using native meadow and grass species while others can be applied to all native plants.

Benefits of Landscaping with Native Plants

- Are adapted to local environments
- Do not require as much pesticides, fertilizers, or watering
- Improve air quality by the reduction of maintenance. (Gas powered garden tools emit such as, lawn mowers, weed eaters, and leaf blowers, contribute to 5% of the nations air pollutants.)
 - Reduction in ozone
 - Reduction in acid-rain-producing-chemicals
 - Nitrous oxides (NO_x)
 - Sulphur oxides (SO_x)
- Help return the site to a healthier ecosystem
 - Greater biological diversity
 - Increase in bird, small mammal, and insect populations
 - Reduce atmospheric CO₂ by taking in CO₂ and converting it to biomass in plants, roots, and soil
 - Increase carbon sink through large root systems as compared to traditional turf
 - Improve soil structure

- Improvement in hydrologic cycle
 - Increased infiltration rates as compared to turf
- Native plants provide an alternative aesthetic to the traditional landscape treatment
 - Increased seasonal color and textures
 - More dynamic landscape creating greater visual pleasure

Chapter 4-Site Analysis

The site chosen for this thesis studio project is the Ponds of Woodward. It is a conservation subdivision located on approximately 118 acres of former agricultural land in Chester County, Pennsylvania. The Ponds of Woodward is located in a culturally rich area known as the Brandywine Valley and is approximately 30 miles west of Philadelphia. The major cultural attractions in the area are the Brandywine River Museum, Longwood Gardens, and Winterthur Museum. The surrounding landscape, once dominated by large farms and estates, is currently experiencing the pressure of modern development.

Initial development of the Ponds of Woodward started approximately 12 years ago and was completed in the late 1990s. The original 118-acre farm, owned by the Woodward family, was set into a conservation easement before development. The Brandywine Conservancy, a local land trust company, and the Woodward family worked in conjunction to develop the easement. The easement set serious restrictions on the future land use of the property. After being sold in the late 1980s, the Brandywine Conservancy and the developer collaborated on creating a design that would maintain the integrity of the site and provide ample space for development. The solution was a conservation subdivision. The current site is divided into four major land uses: agriculture, single-family residential, multi-family residential (townhomes), and community open space.

The agriculture area on the site is approximately 50 acres and is primarily used as an apple and peach orchard. The site is managed by the original developer of the Ponds of Woodward as a hobby and is open to the public during harvesting. Additional features located on the area are the original Woodward farmhouse and one of four stormwater management ponds. The vegetated cover is primarily turf with edge species dominating the south and west property lines. The farm is bordered on the north by single-family residential properties and to the east by townhomes.

The single- and multi-family residential areas are approximately 31 acres combined. The 31 single-family units are situated on approximately half-acre lots and are located on the northern part of the site (see Figure 1). All homes are well landscaped and consist primarily of foundation plantings and some street trees. Turf is the

predominant ground plain. The majority of the lots have a rear view of either the 12-acre woodland or the 50-acre farm.

The multi-family residential area is divided into 8 units of 3 townhomes. The townhomes are located to the east of the farm and to the west of the primary community open space along Route 52 and the main entrance (see Figure 1). Similar to the single-family residential units, the townhomes are landscaped primarily with foundation plantings and street trees. Again the turf is heavily fertilized, and it is assumed that much of this fertilizer runs into the stormwater management ponds.

The community open space is approximately 35 acres. It is subdivided into two major categories, turf and woodland. The 12-acre woodland is located on the northernmost part of the site. The original easement restricts use of this area, and the Brandywine Conservancy is responsible for its management. The woodland is located on the highpoint of the site, and the predominant species are beech, poplar, and oak. A major drainage area begins in the woodland and feeds to the stormwater pond on the farm.

The remaining 25 acres of the site are primarily located along the east side of the townhouse complexes and the main entrance. Smaller open spaces dot the rear entrance along Hillendale Road and a drainage corridor located in the single-family residential area. Along the primary open space is a drainage ditch that drains into the stormwater management ponds located at the southeast corner of the site. Drainage from the stormwater pond on the farm also feeds into these lower ponds. The ponds are almost always at capacity and create a spectacular view for residents. It is not known how effective they are in treating a major storm event. The ponds are dredged periodically and often have a high degree of algae growth present during the warmer months according to residents. A possible reason for this is fertilizer runoff from the residential areas. The ponds cover approximately 2 acres of the turf open space. The homeowners association is directly involved in and responsible for maintaining the remaining 23 acres of community open space. The association also is responsible for maintaining the stormwater ponds.

The topography of the site is gently rolling from north to southeast. The majority of the runoff from the residential sites flows into storm sewers that are fed into the stormwater management ponds and eventually a nearby stream system.

The following summary represents a clearer understanding of the land use in the community. The zones that are indicated below for the turf open space can be found on the Existing Conditions Plan (Figure 1) and Community Land Use Plan (Figure 2). Figure 3 represents a 1995 Regional Land use plan for the surrounding communities.

SUMMARY STATISTICS FOR PONDS OF WOODWARD

Farm and orchard	50 acres
Single-family residential	15.5 acres
Multi-family residential	15.5 acres
Woodland open space	12 acres
Turf open space	25.25 acres
Zone A	.91 acres
Zone B	1.05 acres
Zone C	.43 acres
Zone D	.48 acres
Zone E	2.06 acres
Zone F	<u>20.32 acres</u>
	25.25 acres
Approximate pond coverage along community open space	2.09 acres
Approximate easement size along east property line	.48 acres
Total area the homeowners association is responsible for maintaining	22.68 acres

Figures 4 through 15 are pictures that were taken at the site in mid-October and provide a visual documentation of the site. The pictures are primarily of the turf open spaces but also provide key insights into the typical residential treatment of the landscape.

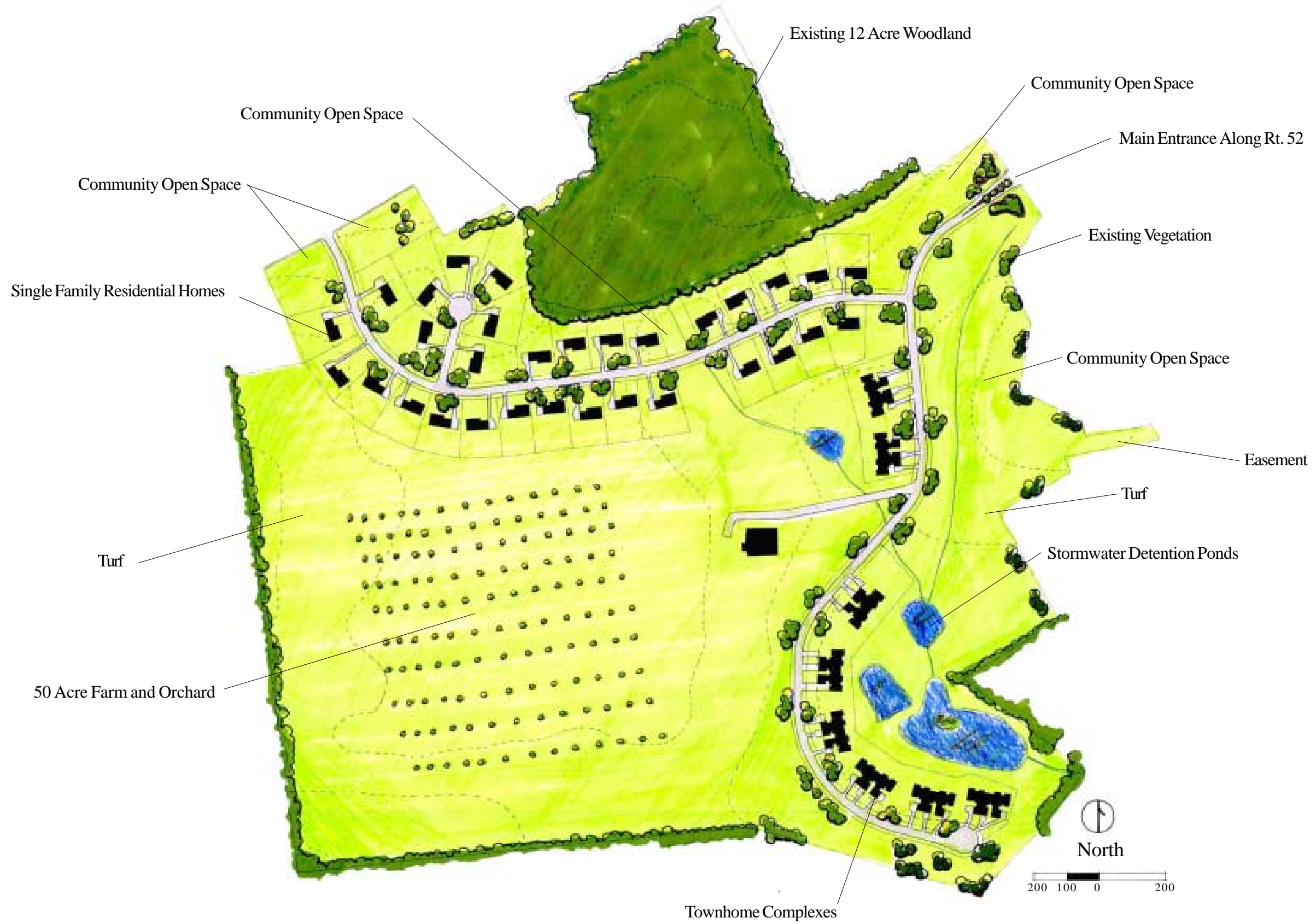


Figure 1

Ponds of Woodward-Existing Conditions Plan



Figure 2

Community Land Use Plan



- Legend:
- Residential-Single Family
 - Wooded
 - Commercial
 - Agriculture
 - Ponds of Woodward



Figure 3

Chester County, PA 1995 Regional Land Use Plan



Figure 4
Existing front entrance along Rt. 52



Figure 5
Open space along right side of entrance drive.



Figure 6
Open space along left side of entrance drive.



Figure 7
Open space along left side of entrance drive.



Figure 8
Open space along right side of townhouse
cul de sac.



Figure 9
Open space along right side of townhouse
cul de sac.



Figure 10
Typical residential landscape treatment on half-acre property.



Figure 11
Open space along the rear of the orchard and farm. Originally intended to be a stormwater detention pond. Later during development it was determined that it was not needed.



Figure 12
A view from the secondary entrance along Hillendale Rd. Notice the orchard in the background.



Figure 13
Rear view of townhouse units and ponds.



Figure 14
Looking northward along the main open space and pond system.



Figure 15
Main open space and pond system.

Chapter 5-Cost Comparison Study

The following chapter examines the cost differences between a conventional and an ecological planting design. It was determined early on in the project that the turf open space at the Ponds of Woodward would be an excellent target site. See below for a detailed summary of the total acreage of the community open space. Currently the open space is dominated by a monoculture of turf species and requires a significant amount of energy and cost to maintain. For this study, turf was consistent with conventional planting design as described in Chapter 2.

SUMMARY STATISTICS FOR TURF OPEN SPACE

Zone A	.91 acres
Zone B	1.05 acres
Zone C	.43 acres
Zone D	.48 acres
Zone E	2.06 acres
Zone F	<u>20.32 acres</u>
	25.25 acres
Approximate pond coverage along community open space	2.09 acres
Approximate size of easement east property line	.48 acres
Total area the homeowners association is responsible for maintaining	22.68 acres

In determining an appropriate ecologically based planting design for the open space, many considerations were taken into account including time to plant maturity, relative cost, and maintenance. Based on these criteria a native meadow landscape was chosen as the alternative approach. A typical planted meadow usually requires approximately three years to reach a desired maturity as opposed to a woodland restoration, which could take decades.

The proper installation of a meadow landscape is debatable. The following is just a general overview of the process. Many professionals suggest a simple procedure of

treating the intended site with a non-selective herbicide such as Round-up to kill the undesirable vegetation. The treatment may take one or more applications depending on the hardness of the existing vegetation. A slit seeder is then recommended to sow the native meadow seed mix into the soil. Most meadow seed mixes can be purchased pre-mixed or customized. The first year is usually the most critical and will require mowing the meadow at least three times. This is intended to destroy any undesirable weeds before they set seed. Subsequent maintenance is performed every other year. The amount of maintenance often depends on local conditions and whether or not invasive plants present a problem. Hand weeding is often performed on small sites; however, on a larger site, where this is not possible, a selective herbicide such as Plateau can be used. In some jurisdictions and parts of the country, fire is an appropriate method to sustain the meadow. For this project, mowing was chosen for cost purposes because of close proximity to residential housing. Some concern has been raised about potential fire hazard in a meadow landscape. However, if managed properly, this can be minimized. Adequate turf buffer strips can be added if this becomes a concern.

The following list is a sample of possible native meadow plants that could be purchased in a pre-mix or customized seed mix.

Sample List of Possible Perennial Plants and Grasses for a Meadow Landscape

<u>Scientific Name</u>	<u>Common Name</u>
Andropogon scoparius	Little Bluestem
Sorghastrum nutans	Indiangrass
Elymus virginicus	Virginia Wild Rye
Bouteloua curipendula	Sideoats Grama
Chamaecrista fasciculata	Partridge Pea
Aster laevis	Smooth Blue Aster
Rudbeckia tirlobia	Brown-Eyed Susan
Aster novae-angliae	New England Aster
Eupatorium perfoliatum	Boneset
Heliopsis helianthoides	Ox-Eye Sunflower
Liatis spicata	Spiked Gayflower
Senna marilandica	Maryland Senna
Verbena hastate	Blue Vervain
Rudbeckia fulgida	Black-Eyed Susan

The first part of the cost comparison study was to determine the per-acre price of a traditional turf and a meadow landscape treatment. Tables 1 and 2 show the installation and maintenance cost for a 10-year period for each landscape type. Based on my initial estimates the meadow landscape treatment is approximately \$9600 less to maintain per-acre. The difference in price is primarily due to the increased maintenance involved in a turf landscape treatment. The turf is mowed approximately 26 times per year where as the meadow is mowed every other year. The installation cost for both landscape treatments is very similar. This is primarily due to the higher cost of the meadow seed mix and the establishment process.

After establishing a per-acre price for both landscape treatments, I was able to apply the figures to the open space at the Ponds of Woodward (Tables 3-8). The most significant cost savings was Table 7, a 100% meadow landscape treatment. The cost savings is approximately \$250,000 over a ten-year period. However, I do not believe that this would be possible. A more realistic goal would be to create a balance between the turf and meadow landscape. Tables 4 through 6 show different design scenarios and their respective prices. By simply converting a small amount of the existing turf open space to a meadow, a cost savings will be apparent. Figure 16 shows a graphical representation of the estimated costs.

During the initial process of pricing the different scenarios, I created a design alternative that would show a proposed meadow treatment. Scenario 6 represents this design attempt and can be seen in Figure 17. The only goal that I was concerned with at the time was providing an adequate buffer zone along the edge of the meadow. The buffer was to remain as turf and was designed at a width of 12.5 feet. AutoCAD was used to calculate the size of different areas. The meadow would create a more dynamic landscape and eliminate a great deal of the turf landscape. A significant cost savings would happen immediately as demonstrated in Table 6. Later investigation into this project revealed that this scenario was unrealistic because it failed to bring the users into the landscape.

Table 1-Traditional Turf Landscape Treatment per-acre price

	1yr.	2yr.	3yr.	4yr.	5yr.	6yr.	7yr.	8yr.	9yr.	10yr.
Installation										
Site Preparation										
Installation \$.03 sq. ft	\$1,306.80									
Price includes seed and labor.										
Herbicide (Roundup Pro)	\$65.00									
Recommended before planting.										
Labor \$80.00/acre	\$80.00									
Annual Maintenance based on 26 cuts/year \$40/cut	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00
Subtotal	\$2,491.80	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00	\$1,040.00
10 yr. Installation and Maintenance Cost \$11,851.80										

Table 2-Meadow Landscape Treatment per-acre price

	1yr.	2yr.	3yr.	4yr.	5yr.	6yr.	7yr.	8yr.	9yr.	10yr.
Site Preparation										
2 applications of herbicide (Plateau/Roundup Pro)	\$130.00									
Labor \$80.00/acre (2 app.)	\$160.00									
Seed and installation 14lbs per acre \$115/lb (Northeast Native US Roadside Mix)	\$1,610.00									
Annual Maintenance \$50.00/cut	\$150.00	\$0.00	\$50.00	\$0.00	\$50.00	\$0.00	\$50.00	\$0.00	\$50.00	\$0.00
Brush Hog										
subtotal	\$2,050.00	\$0.00	\$50.00	\$0.00	\$50.00	\$0.00	\$50.00	\$0.00	\$50.00	\$0.00

Mowing is done 2-3 times the first year to keep invasive and undesirable weeds in check.

The herbicide Plateau may be necessary.

Less frequent mowing is required after 1st year. It is done to mainly keep woody plants in check.

10 yr. Installation and Maintenance Cost \$2,250.00

Table 3

Scenario 1 - 100% Turf

Ponds of Woodward-Turf

Total Open Space 22.68 acres

Estimated Turf Installation cost 22.68 acres X \$1451.00=\$33908.68 10 yr. maintenance \$268,798.82

Total Installation + Maintenance 10 yr. \$302,707.68

Table 4

Scenario 2 - 75% turf / 25% meadow

Ponds of Woodward-Turf Meadow Mix

Total Turf 17.01 acres 17.01 acres X \$1451.00=\$24681.51 10 yr. Maintenance \$176,904.00

Total Meadow 5.67 acres 5.67 acres X \$1900.00=\$10,773.00 10 yr. Maintenance \$1,984.00

Total Installation + Maintenance 10 yr. \$214,343.01

Table 5

Scenario 3 - 50%turf / 50% meadow

Ponds of Woodward-Turf Meadow Mix

Total Turf 11.34 acres 11.34 acres X \$1451.00=\$16,454.34 10 yr. Maintenance \$117,936.00

Total Meadow 11.34 acres 11.34 acres X \$1900.00=\$21,546.00 10 yr. Maintenance \$3,969.00

Total Installation + Maintenance 10 yr. \$159,905.34

Table 6

Scenario 4 - 25%turf / 75% meadow

Ponds of Woodward-Turf Meadow Mix

Total Turf 5.67 acres 5.67 acres X \$1451.00=\$8,227.17 10 yr. Maintenance \$58,968.00

Total Meadow 17.01 acres 17.01 acres X \$1900.00=\$32319.00 10 yr. Maintenance \$5,953.50

Total Installation + Maintenance 10 yr. \$105,467.67

Table 7

Scenario 5 - 100% Meadow

Ponds of Woodward-Meadow

Total Open Space 22.68 acres

Estimated Meadow Installation cost 22.68 acres X \$1900.00=\$43,092.00 10 yr. Maintenance \$7,938.00

Total Installation + Maintenance 10 yr. \$51,030.00

Table 8

Scenario 6 - Design Scenario see drawing 83% Meadow/17% Turf

Ponds of Woodward-Turf Meadow Mix

Total Turf 3.86 acres 3.86 acres X \$1451.00=\$5600.86 10 yr. Maintenance \$38,272.00

Total Meadow 18.82 acres 18.82 acres X \$1900.00=\$35,758.00 10 yr. Maintenance \$6,587.00

Total Installation + Maintenance 10 yr. \$88,089.60

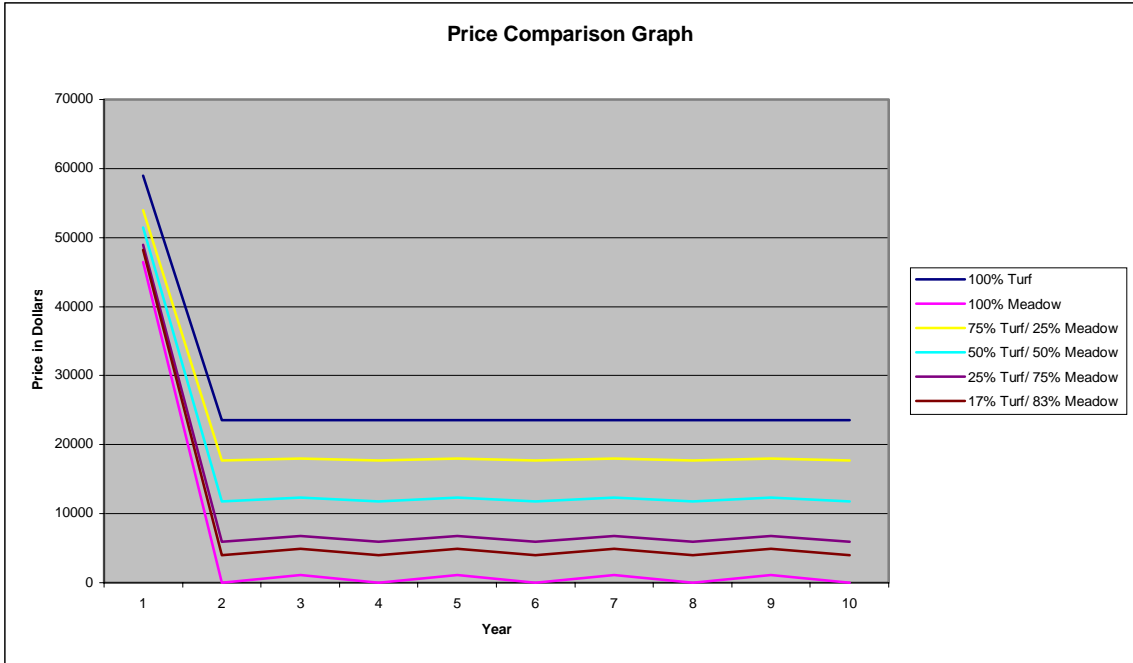


Figure 16-Summary Graph



Figure 17

Design Experiment-83% Meadow/ 17% Turf

Chapter 6-Design Decisions

Determining the cost benefits for a landscape treatment provides an excellent basis for selling a project. Although in most cases, a design is not sold on price alone; cost is merely one factor. Other important factors are design intent, aesthetics, and acceptance. As part of the design component of this project, I was interested in how to get an alternative landscape treatment accepted by residents of the Ponds of Woodward. Some of the design criteria included regional and site connections, improving site hydrology, determining optimal edge conditions, showing human intention, providing wildlife habitat, and bringing people into the landscape. Many of the ideas were based on research conducted by Naussauer (1995).

Regional and Site Connections

The first part of the project focused on making connections to the regional and site scale (see Figure 18). Located along the southern property line is an existing railroad corridor. Currently the railroad is used on a minimal basis and it is proposed that this corridor would become a future rails to trails project. The connection would provide access to local museums to the east and parkland to the west. The future trail would become an asset to the region. To the north of the site, an easement is proposed along adjacent farmland to create a greenway to existing commercial areas and Longwood Gardens. Within the Ponds of Woodward, a community trail system is envisioned to create connections between the fragmented landscapes. The trail system would connect the woodland and turf open space with the farm property. The trail system would provide recreation for the residents of the community.

Improving Site Hydrology-Scenario 1

Site hydrology is important any design work. Managing stormwater runoff is mandatory in all new developments. Stormwater management ponds are the most widely used systems. The Ponds of Woodward is no exception to this case. When the site was originally designed, the four ponds were retrofitted to handle all stormwater. Today, the ponds still adequately treat stormwater, but periodically the ponds must be dredged because of eutrophication. In this case, eutrophication is mostly caused by excess runoff of lawn chemicals. Another source of pollution is the orchard. An initial site inspection

and topography analysis indicated that a majority of the runoff from the pond is not treated at all. It is presumed that the orchard is treated with insecticides, herbicides, and fertilizers. To correctly address this problem, infiltration zones have been placed in areas of major runoff. The infiltration zones will contain native meadow species that will aid in filtering excess nutrients before they reach the stormwater ponds. This process is similar to phytoremediation. In areas where water is not treated in the ponds, the infiltration zones will provide water treatment before the water reaches local watersheds.

Currently in the single-family residential area, stormwater runs along vegetated swales into catch basins. The water eventually runs through pipes into the ponds. A simple and effective proposal is to run the water along the swales to the main meadow along the front of the community. The increased surface area and root structure of the meadow species would act as a giant sponge collecting excess stormwater and chemicals. See Figures 19 and 20 for more detail.

Creating a Realistic Design-Scenario 2

The preceding design that linked the community on a regional scale and improved site hydrology are both excellent goals yet unrealistic given the fact that the community would be responsible for financing these designs. The original goal of this project was to reduce maintenance cost and look at methods for improving the landscape.

Design Scenario 2 (Figure 21) attempts to create a design that would cost a minimal amount to install and still create a dynamic living landscape. Using the ideas presented earlier, a meadow system is proposed in the largest part of the turf open space. The meadow is envisioned to bring residents into a landscape that is currently underused by incorporating trails and bird watching stations. Figures 22 through 31 are sketches that provide further descriptions of this site and alternate edge conditions. The edge condition is important because it physically defines the area and creates human intention. Without the edge, it has been suggested by Naussauer (1995) that the alternate aesthetic landscape will more than likely fail.

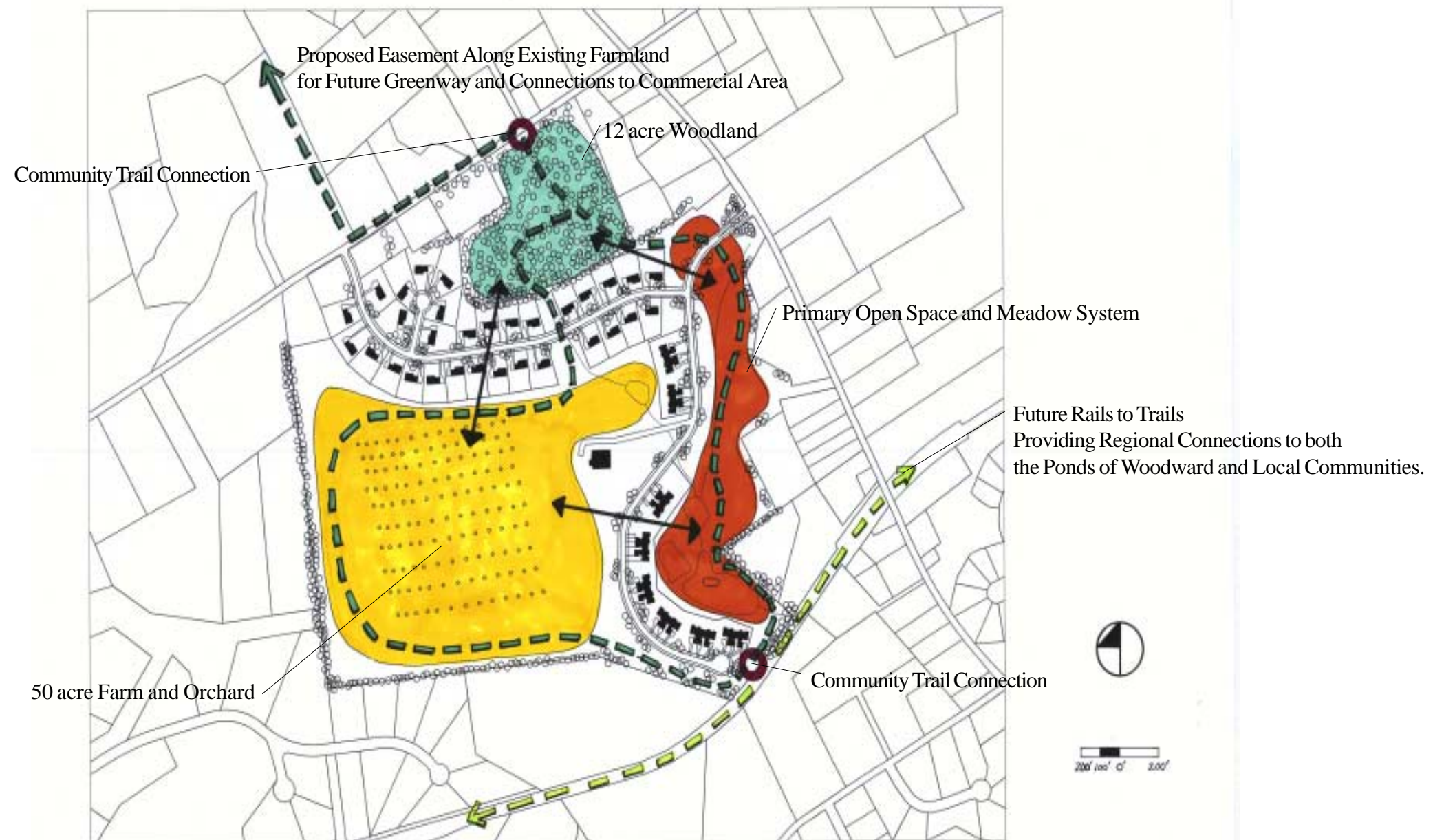


Figure 18

Future Land Use-Connections to Regional Scale



Figure 19

Concept Plan-Site Hydrology Improvements



Figure 20

Scenario 1-Site Hydrology

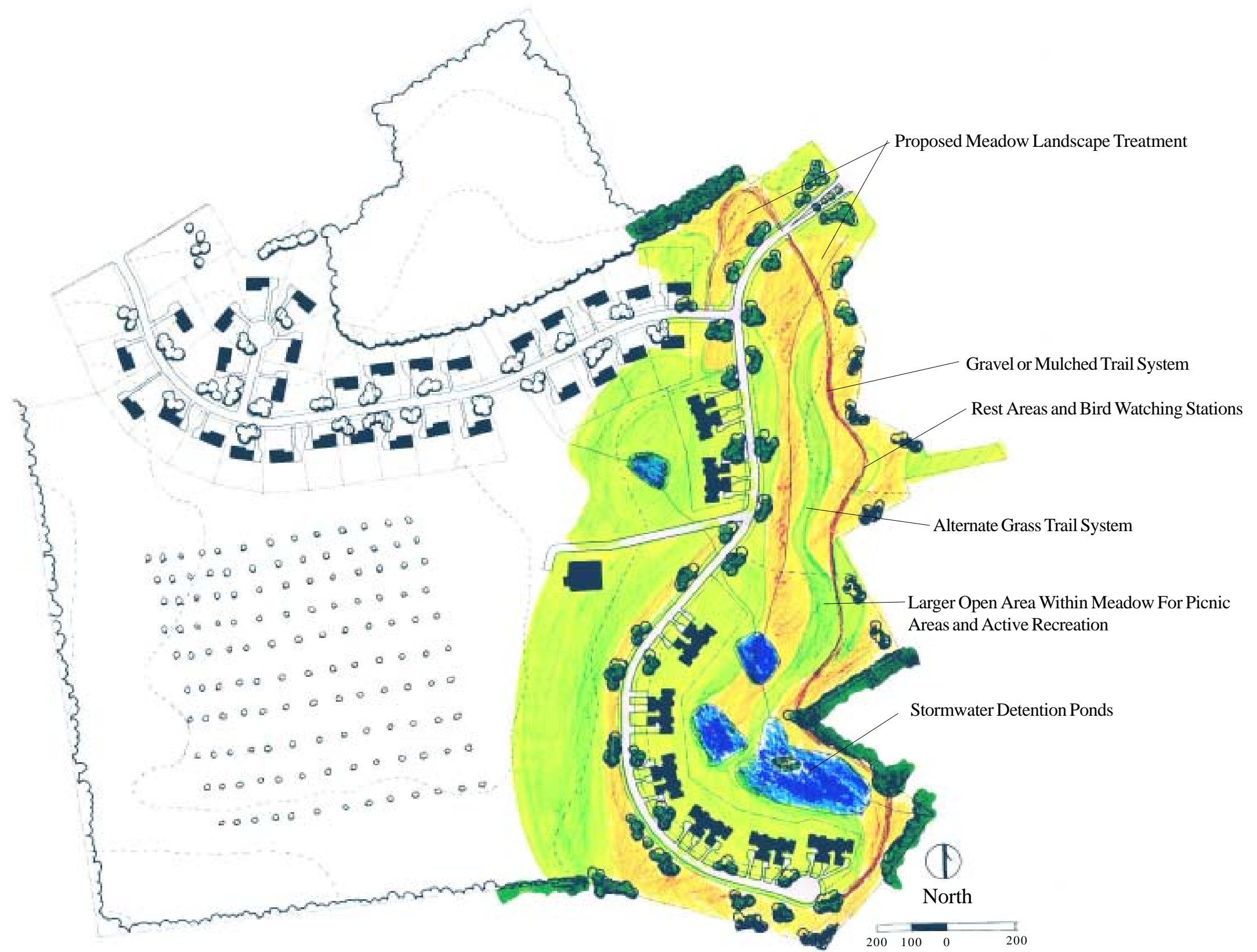


Figure 21

Scenario 3-Primary Open Space

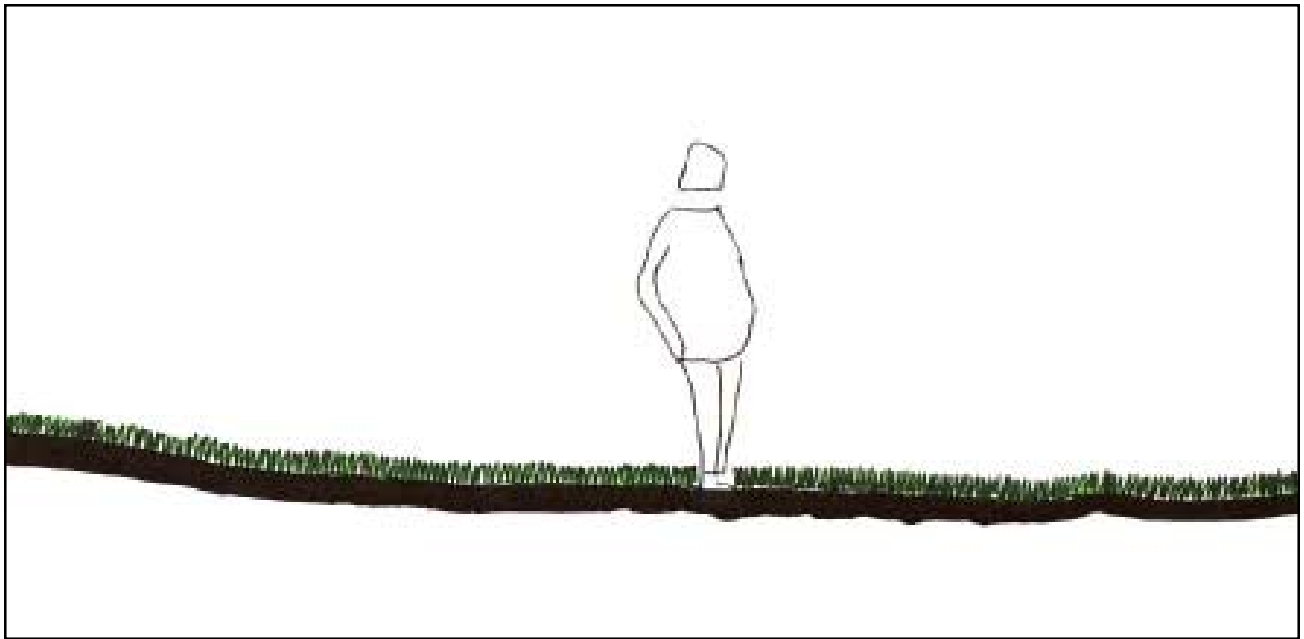


Figure 22
The edge condition as it appears today, undifferentiated by any physical boundaries. A flat ground plain is present.

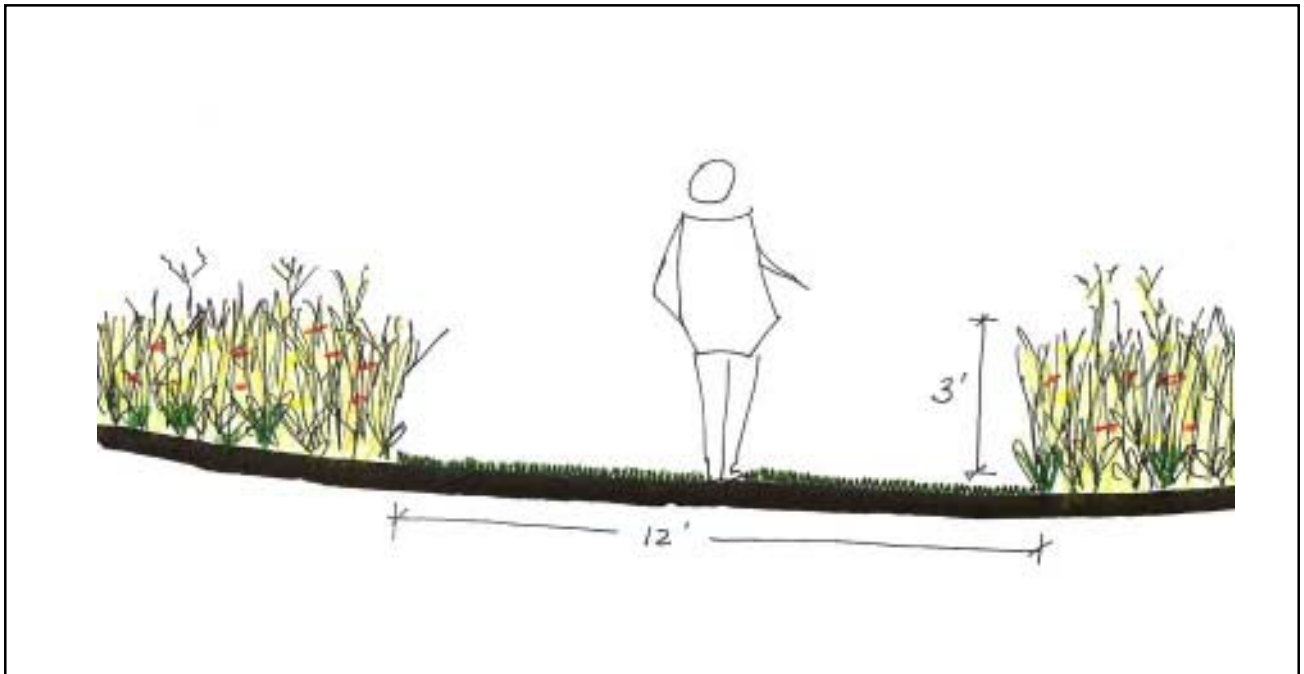


Figure 23
Edge treatment within meadow using a 12' wide trail.

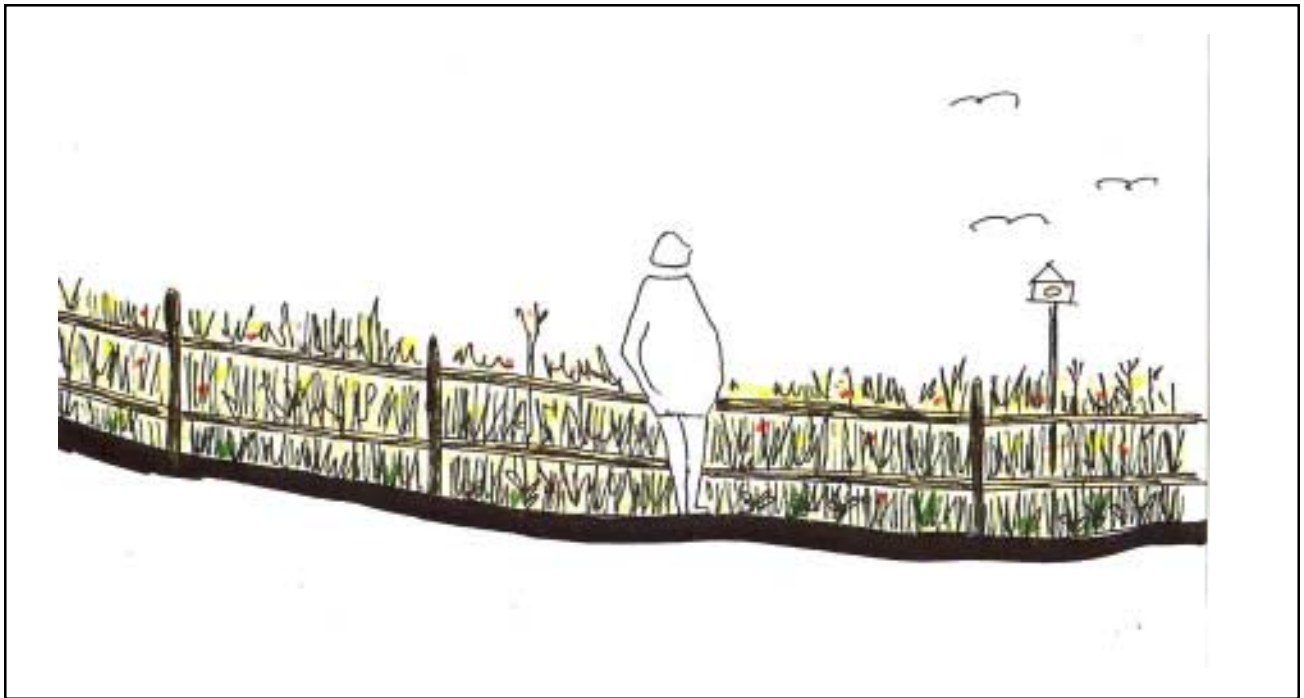


Figure 24
Edge treatment along the outside of the meadow. Objective is to create a physical boundary between the turf and meadow landscape.

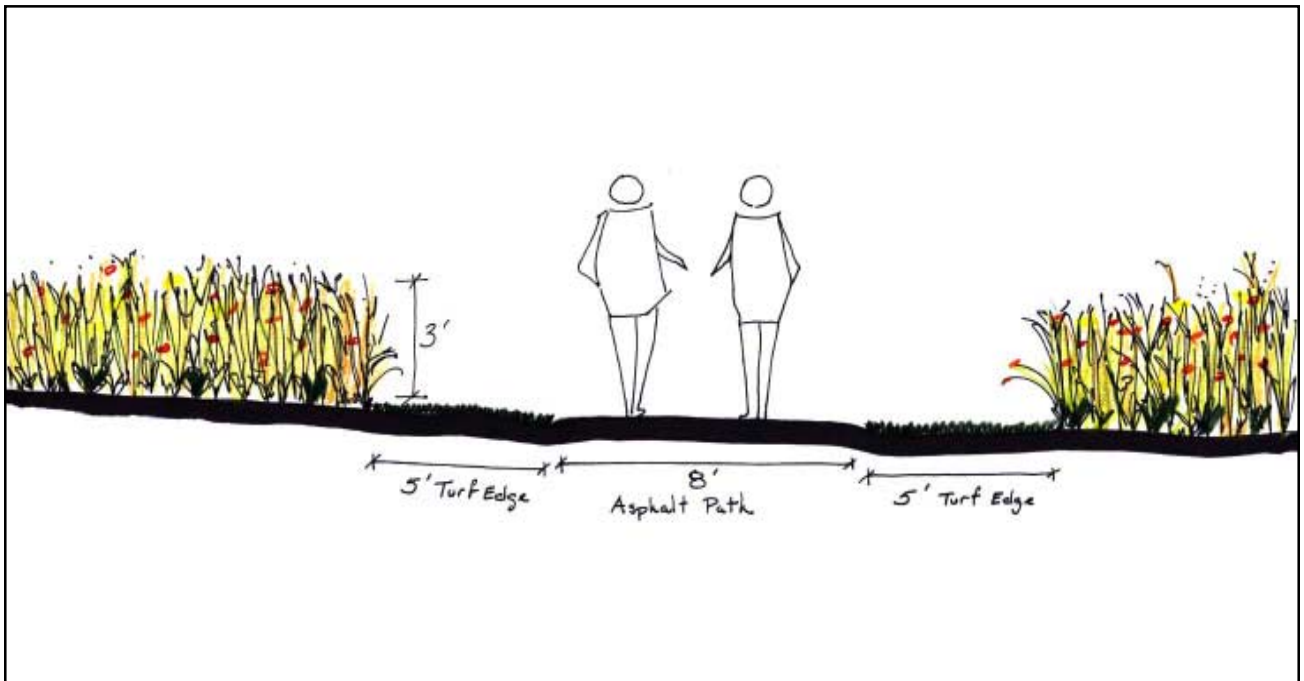


Figure 25
Edge treatment within the meadow using an asphalt, gravel, or mulch trail. A 5' grass buffer on either side provides an extra buffer between the meadow and users. Approximate meadow height is 3'.

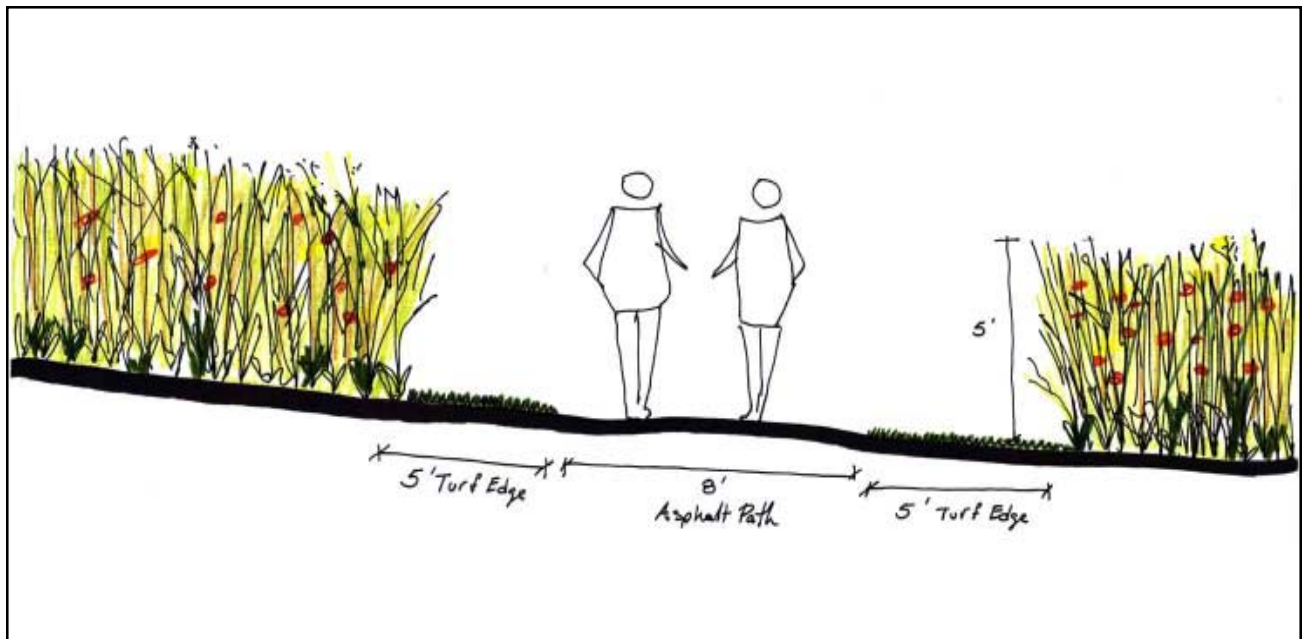


Figure 26
 Edge treatment within the meadow using an asphalt, gravel, or mulch trail. A 5' grass buffer on either side provides an extra buffer between the meadow and users. Approximate meadow height is 5'.

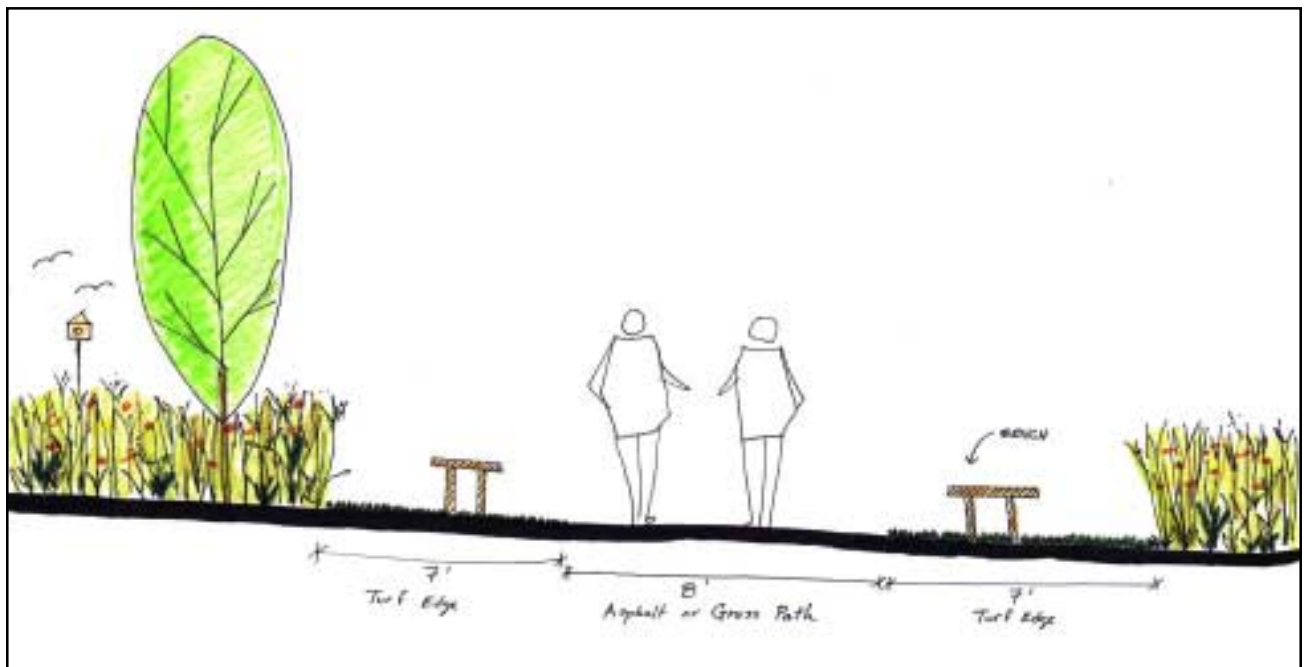


Figure 27
 A major goal of an alternative landscape treatment is getting it accepted. Research has shown that in order to gain acceptance, the landscape must show care and bring the user into the landscape. Benches and bird habitats provide a reason to enjoy the landscape.

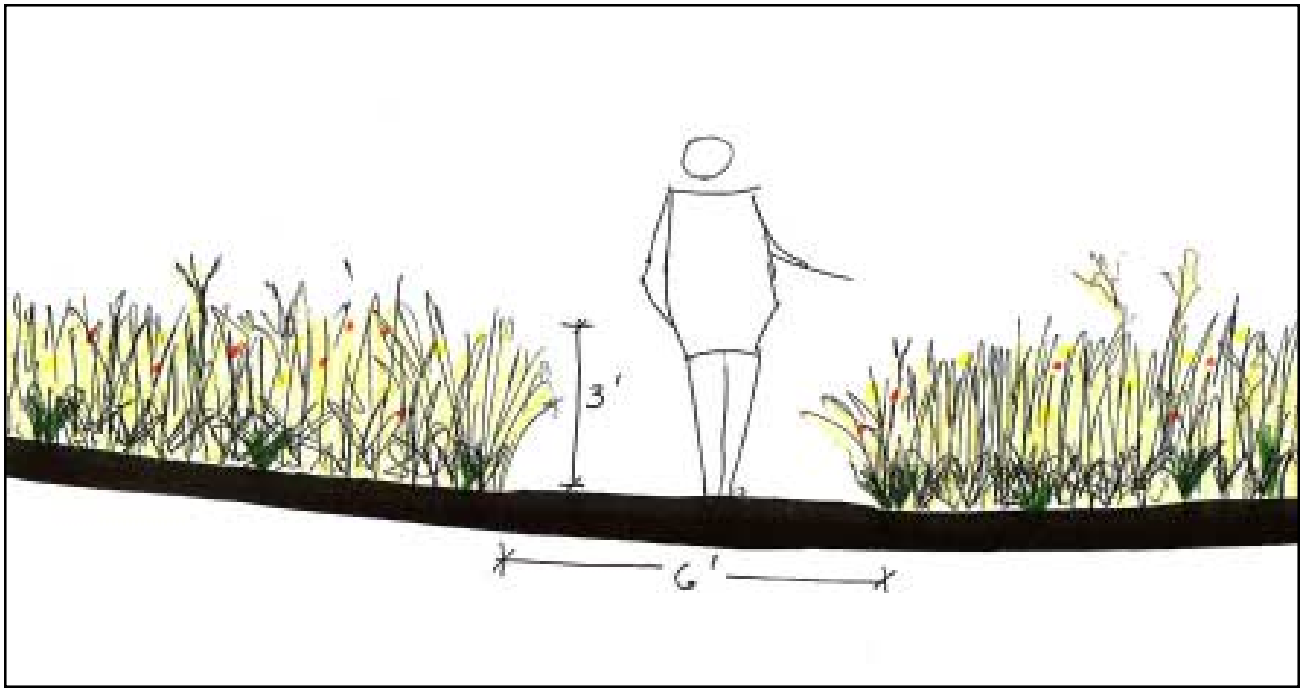


Figure 28
Edge treatment within the meadow using a 6' wide trail. The condition would not likely be successful because the proximity to the user is too close.

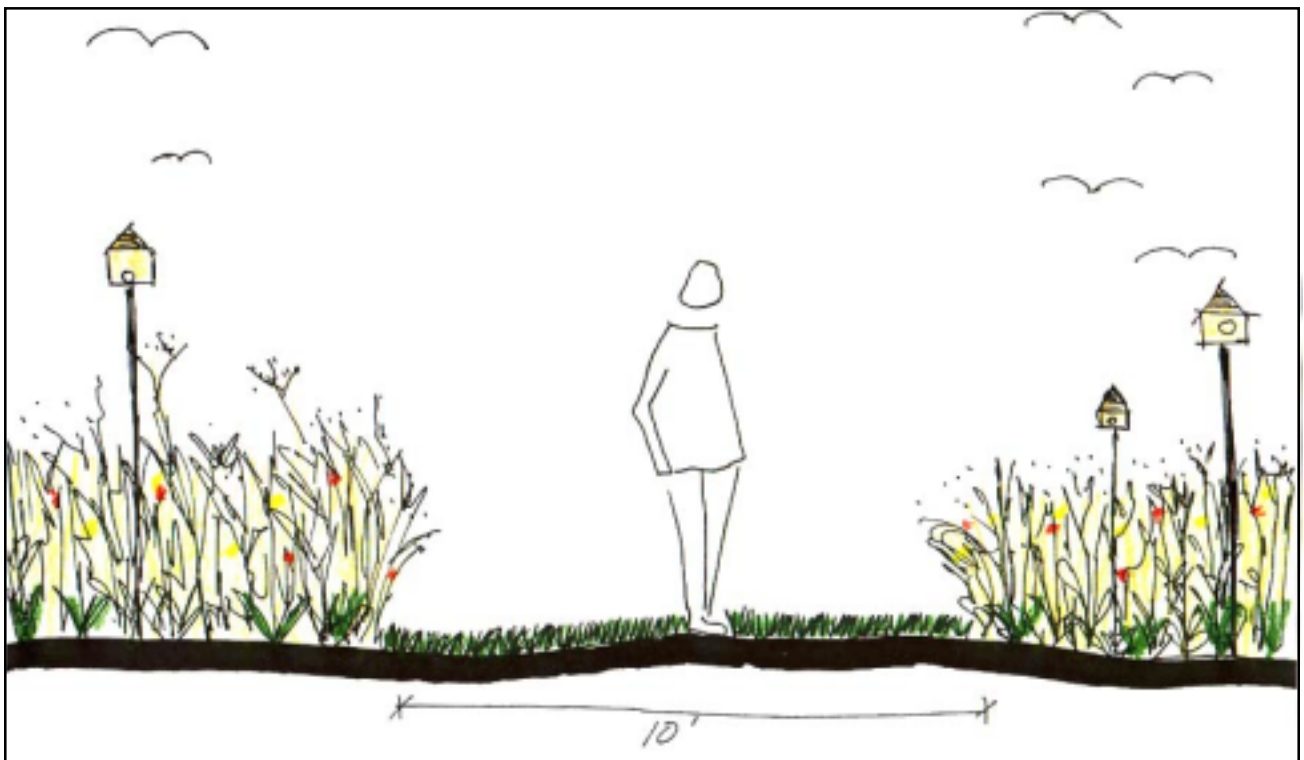


Figure 29
Proposed trail system with walking trail and bird habitats.

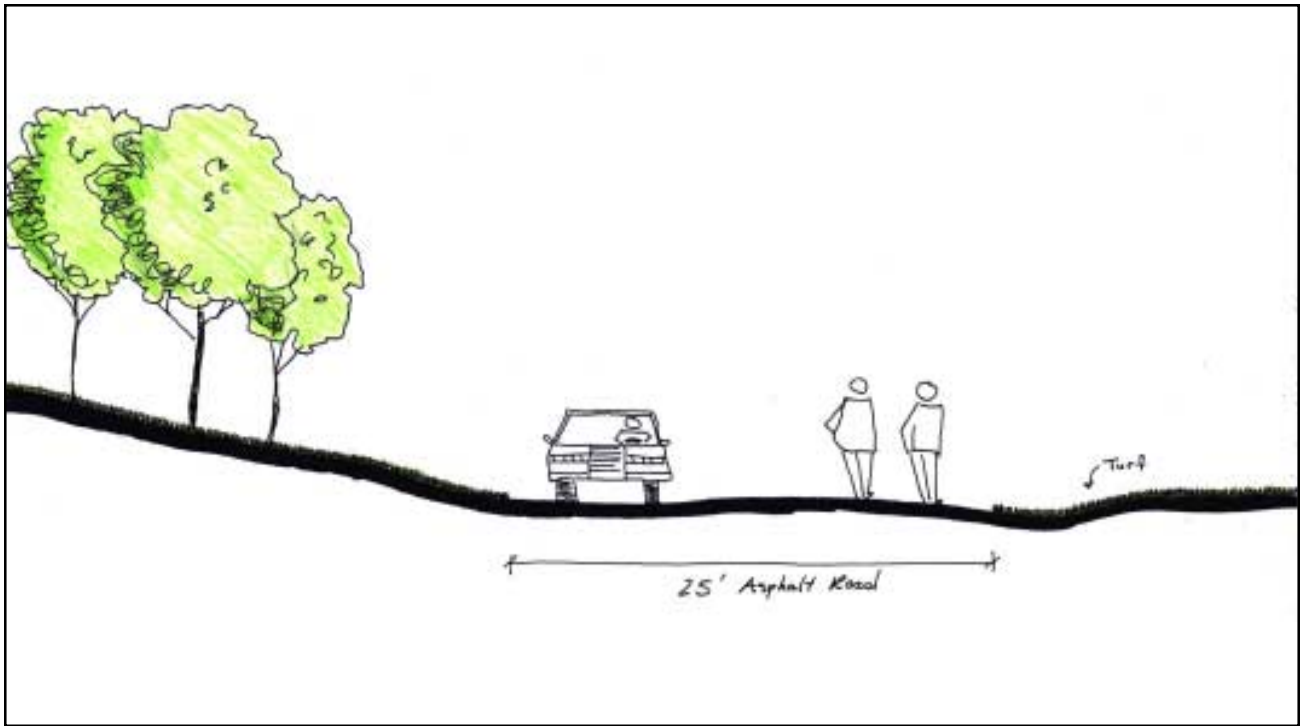


Figure 30
Existing edge treatment along entrance road. Typical landscape treatment is turf.

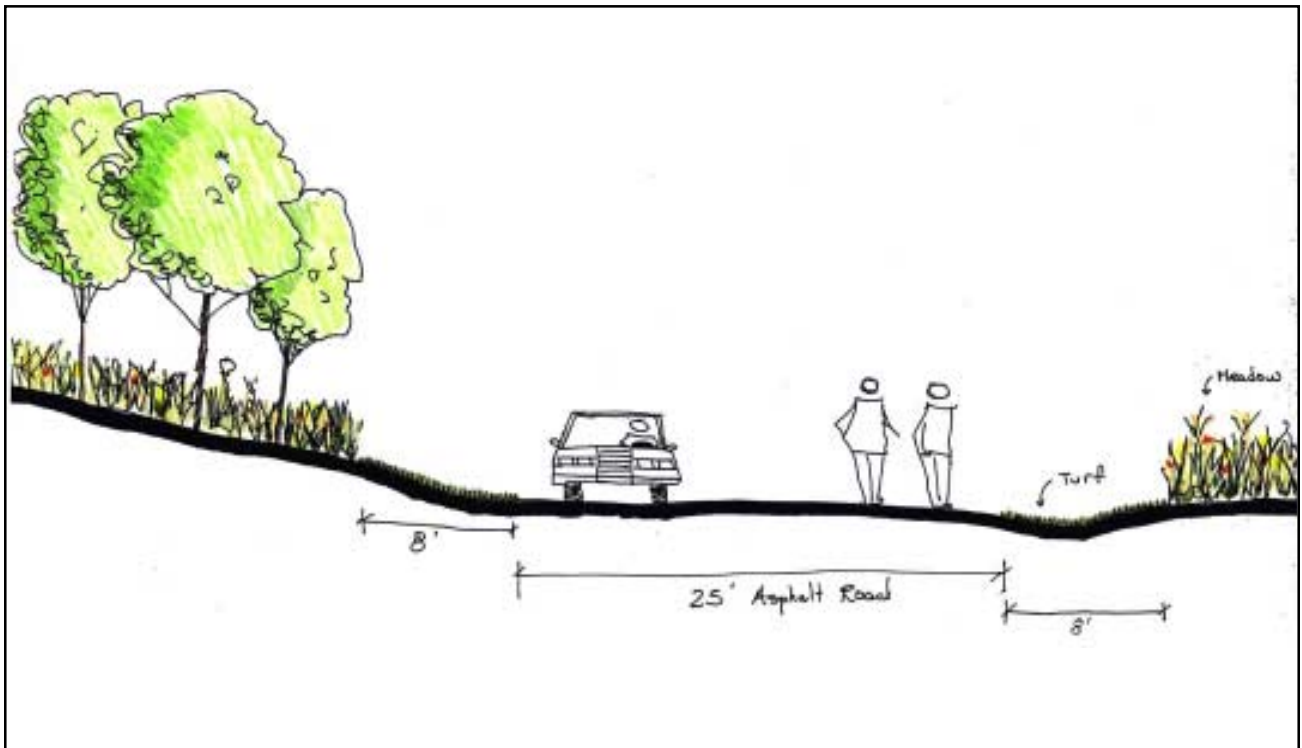


Figure 31
Alternate edge treatment along entrance road using 8' turf edge and then a meadow landscape treatment.

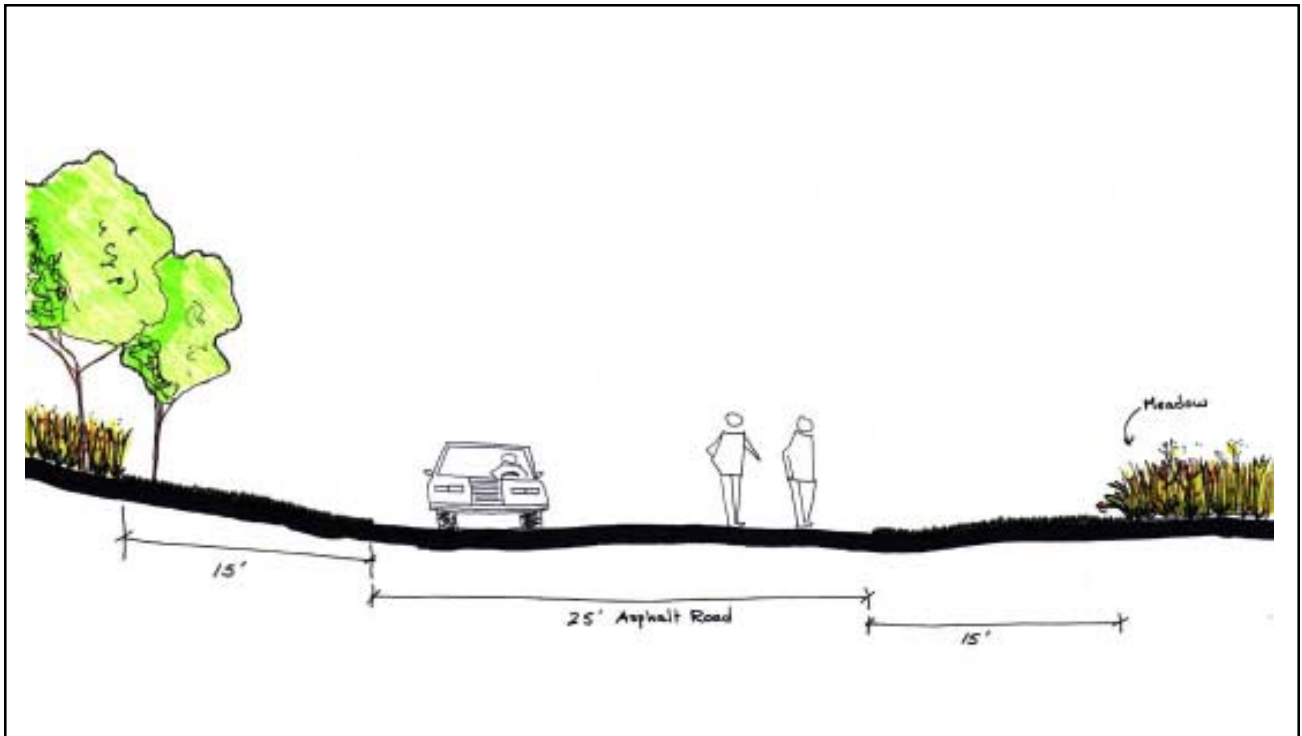


Figure 32
 Alternate edge treatment along entrance road using a 15' turf edge and then a meadow landscape treatment.

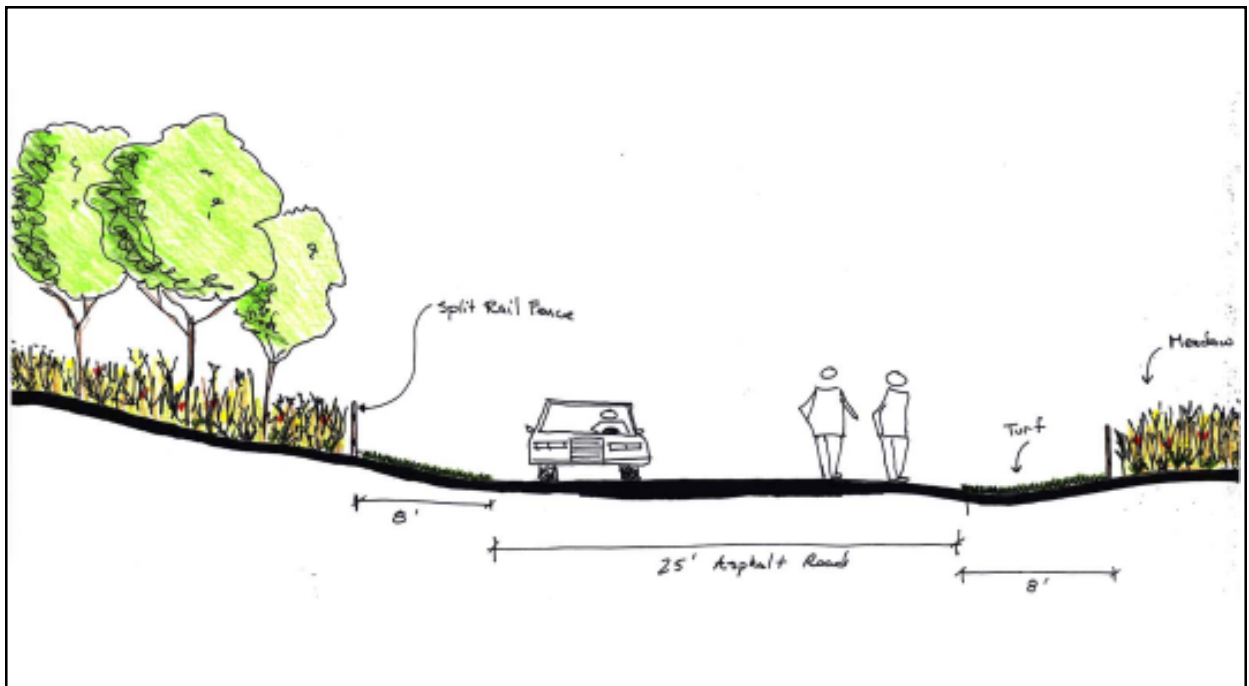


Figure 33
 Alternate edge treatment along entrance road using a 8' turf edge and a split rail fence. Design intent is again to create an actual physical barrier demarcating the meadow.

Chapter 7-Revisiting the Site

In a follow-up to a semester of thesis studio, I decided to revisit the Ponds of Woodward and meet with some of the local residents. I was curious to know whether or not my research and design work would be accepted in the community. No prior contact with the community had been made except to obtain base map information. Before meeting with the residents, a questionnaire was created. The main objectives of the questionnaire were to determine how the residents view nature and how they use their community open space. The questionnaire and a summary of the results are provided below.

The turf open space was the primary target for the questionnaire. The interviews lasted approximately 1 hour and required meeting individual families at their houses. The sample included six families: five of the families live in single-family residences and one family lives in a townhouse complex adjacent to the pond area. The total number of participants was nine.

When I first contacted the residents, very little information was exchanged about my thesis project. The questionnaire was given immediately upon entering the homes, and the results were later compiled. Following the questionnaire, I proceeded to present my alternate design solutions for the community. Everyone seemed quite intrigued. The cost comparison study was also presented as a viable option; however, maintenance cost did not seem to be an issue to residents.

Questionnaire and Results

1. What is your favorite landscape?
 - Natural
 - Natural-streams, wild flowers, trees
 - Natural-wild flowers, pond, trees
 - Woods, open land, water
 - Wooded hills
 - Desert
 - Manicured
 - Golf course-manicured

2. When you think about a meadow, what thoughts come to mind?
 - Serene
 - Open area with grass and wild flowers
 - Wildflowers, grass, birds, fog
 - Wildflowers, birds, tall grass
 - Not manicured, peaceful
 - Quiet, peace, view
 - Great variety of grasses, flowers, and plants
 - Grasses, flowers

3. Please place in order from 1-5 your preference for landscape treatment?

Avg. Value	
• 3.11	Cost to Maintain
• 1.44	Aesthetics
• 4	Neatness
• 3.22	Wildlife Habitat
• 2.88	Water Quality

4. Do you consider the community open space along the front of your development as:
 - 2 Private
 - 5 Semi-Private
 - 2 Public

5. Do you actively use the community open space along the front of the development? If so what is the primary activity?
 - 5 No-do not use it.
 - 3 Walking
 - 1 Only to look at-its great value is the setting it creates, and the barrier it provides.

6. How do you view your community open space?
 - 8 Visual-just to look at.
 - 7 Place to walk and enjoy the outdoors
 - 0 Just another cost that you must help maintain

7. What types of amenities would you like to see in your community open space?
 - 5 None
 - 3 Walking Trails
 - 1 Bench
 - 1 More wildflowers, native grasses, little or no cutting.

Other Comments: "I like it just the way it is."

Additional comments that were noted during the presentation and interviews.

“We really don’t need a community trail system. We can just drive to Longwood Gardens or Winterthur to walk.”

“When are you going to put this trail system in?”

“I enjoy the manicured golf course look but the golf course I play at has a meadow in one area for rough. I really enjoy the meadow when the wind cascades over it, sweeping through the grasses.”

The success of the interviews was largely due to the interest of the participants. As I stated during the meetings, I do not feel that a 100% meadow solution is viable, but a certain percentage of the community open space could be changed quite easily. The meadow is an alternative aesthetic. Many of the residents chose the Ponds of Woodward for its picturesque landscape of neatly trimmed hedges and manicured turf. The country club look was desired and sold to them by the developer. However, given a viable alternative, I feel many of the residents would change this idea.

Currently, the open space is used very little. Many of the residents stated that they never actually walk in it but merely explore the space visually. Based on this visual use a meadow landscape would improve the visual character of the space by providing greater seasonal and temporal change.

An additional comment that was noted during the interview process was the fact that 55 individual households control the open space. Each household is given a vote on how to manage the open space and the majority wins. My reaction is that the reason a turf landscape dominates this community is because it is familiar to most people. The turf landscape is very ordered and the visual quality is consistent. It never really changes.

Chapter 8-Conclusions

Currently, conservation subdivisions are used as a model for many developers. Often developed in conjunction with a conservation easement, the model provides an opportunity to preserve large amounts of open space. While a viable alternative, conservation subdivisions could be improved- not only in how the community open space is designed, but also in the plant material that is specified. A true conservation subdivision should address not only land preservation but also environmental improvement.

Cost Comparison Study

As we enter the 21st century, our designs rarely address the long-term maintenance costs of our landscapes. This project further supports the idea that traditional landscape treatments are extremely expensive to maintain and require continual maintenance. The most significant amount of the cost is labor and equipment. Based on this assumption, we should strive to create landscapes that are more sustainable and less labor intensive. I do not believe we can create landscapes and just walk away. Human care will almost always be required. Since many conservation subdivisions are built on existing agriculture land, a meadow landscape provides an economically affordable alternative to traditional turf.

Design Decisions

Reflecting back on the design work that was connected to this project, I cannot help but think about the dynamic landscapes that were proposed. A meadow landscape is continually in a state of flux and changes with the seasons. Competition between plant species can change the color and the impact from year to year. Varying bloom times of the meadow species can draw the eye through the landscape.

A major obstacle facing ecological planting design is gaining acceptance. Seldom do we need to gain acceptance for a traditional landscape treatment. Most people are already accustomed to the traditional aesthetic of manicured grass and shrubs. A challenge facing many designers today is how to create an ecological design that is

aesthetically pleasing. The designs that were created for the Ponds of Woodward provide examples of how this can be accomplished. A few of the design guidelines that should be followed are a mowed edge, wildlife habitat, and a walking trail.

The edge treatment within the meadow is variable depending on the preference of local residents. In Figures 23 through 29, I was interested in showing just a few of the endless possibilities that could be created along the meadow trail. The ideas ranged from a large turf buffer strip (Figure 23) to a relatively small one (Figure 28). The edge treatment is important because it will bring people into the landscape. A mowed turf edge will allow people to interact with the landscape from a safe distance and provide the familiarity of a traditional landscape treatment. It will also provide the option to get closer if it is desired. Depending on the material used for the trail system, the trail could be in a continual state of flux. New paths could be mowed annually while old ones were left to grow.

In addition to the edge within the meadow, the edge along the entrance road is a significant part of the community. The entrance road provides visual pleasure to the residents as they enter and exit the community. In Figures 31 through 33, I explored the different edge treatments by varying the material and size of the buffer strips. The first two figures are very similar to the edge treatment within the meadow. A mowed buffer strip is proposed. The third figure uses a split rail fence to demarcate the two landscapes. Though the split rail fence would obviously increase the cost, it may have greater acceptance because of the visual aesthetics and physical boundary.

Revisiting the Site

Based on the sample results from the questionnaire, aesthetics seems to be the dominating landscape issue. This was no surprise and was consistent with research by Naussauer (1995). Many of the residents moved to this community for the country club look. The private residences further enforce the aesthetic experience. Well-manicured turf lawns dominate the landscape. The biggest surprise were the answers to question 2, (When you think about a meadow, what thoughts come to mind?). When I wrote the question, I figured that no one really knew what a meadow looked like. I imagined the

answers to be, overgrown, weedy, and ugly. I was wrong. The answers were very consistent and described exactly what I was proposing.

A general conclusion based on the interviews is that the residents were sold on the golf course look. If the developer had created an alternative landscape treatment during the initial phase of development, it may have had more acceptance. The residents had a particular landscape aesthetic already programmed into them. Many of the residents moved from the surrounding suburbs and city where grass dominates the landscape.

Implications

From this research project, it is apparent that there is a need to switch from maintenance-based planting design to one based on stewardship. Many of the homeowners in the Ponds of Woodward treat the community open space the same way they treat their half-acre: mowed and manicured.

One suggestion is to create an easement that would require the homeowners association to work with a land manager in maintaining the community open space. This idea would take the burden off of local residents and allow a stewardship program to evolve. The cost savings of a meadow landscape would provide adequate compensation for a land manager and a significant cost savings for local residents.

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SIGMA LAMBDA ALPHA HONOR SOCIETY, 2000
TORO COMPANY SCHOLARSHIP, 2001

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