Conservation Design in the Bluffwood Neighborhood

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Prepared for
Iowa City Planning and Community Development

by
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Derick Mitchell
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Suwanna Plungpongpan

Field Problems in Planning 102:210
Graduate Program in Urban and Regional Planning
The University of Iowa
May, 1999

Property of Urban and Regional Planning
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Preface

This report is for the project of the Field Problems in Planning, which is the final course of the core curriculum of the Graduate Program in Urban and Regional Planning at the University of Iowa. The project is created by a team of students applying their knowledge and experiences in the area of interest. This course also provides an opportunity for students dealing with planning issues in a team environment setting.

The purpose of our study is to explore an alternative approach to subdivision design. In particular, we have considered the appropriateness of conservation design for the Bluffwood Neighborhood. We chose conservation design in part because the City of Iowa City’s Northeast District Plan Draft identifies it as a key feature of the future land use scenario for much of the Bluffwood Neighborhood. We have asked the following questions: What would conservation design look like in the Bluffwood Neighborhood? How well would it work? How different would such a subdivision be from a conventionally designed subdivision for the same site?

Our project has benefited considerably from the input of many professionals. Thanks go to Professor Peter Fisher and Professor David Forkenbrock for their valuable advice, as well as Professor Alan Peters for helping us solve the technical problems. Thanks also go to Professor Heather MacDonald for providing us with numerous resources.

Special thanks go to Mace Braverman, Greg Downes, Scott Kugler, Larry Schnittjer, and Chris Stephan.

We would also like to thank Jeff Davidson, Kevin Hostetler, Dean Oakes, Melody Rockwell and Gary Watts.

Finally, we would like to thank the Iowa City Area Association of Realtors and numerous local realtors who took a moment away from their busy schedules to help us.
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EXECUTIVE SUMMARY

This project is a feasibility study of a conservation-designed subdivision in the Bluffwood Neighborhood. The study analyzes the differences between a conventional and conservation design in order to determine whether conservation design is feasible. The Bluffwood neighborhood is one of the four neighborhoods in the Northeast District of Iowa City. Bluffwood has the potential for the earliest development because of its location to current city infrastructure projects. According to the City of Iowa City’s Northeast District Plan Draft, the proposed street network (the captain Irish Parkway, Scott Boulevard, and First Avenue extension) will certainly increase the overall accessibility of the area and expand development. In this plan, conservation design is defined as a key feature of the future land use scenario for the Bluffwood Neighborhood. Conservation design is intended to preserve a portion of the developable land as open space, while maintaining overall density by reducing lot sizes (clustering) on the land that is built upon and providing mixed housing types.

The Bluffwood Neighborhood is in the northwest quadrant of the Northeast District. It has a residential neighborhood in the southwest and major employment centers in the northwest. The rest of the area consists of farms and pastureland. The topography for the region includes rolling hills, deep wooded ravines, and stream corridors. The project site is located east of First Avenue and south of Captain Irish Parkway; a stream corridor bounds the site on the west and south. The area has three deep wooded ravines that divide the developable land into three distinct sections.

The appropriate or likely zoning for the site is RS-5 and RM-12 based on inspection of the neighboring zoning. RS-5 “is primarily intended to provide for a single-family residential development.” RM-12 “is intended to provide for high-density single-family residential development and low-density multi-family residential development.” The subdivision design should be consistent with the Iowa City housing market where, in general, homebuyers want low to moderate-cost homes. Projections for the Iowa City market indicate that between 1997 and 2002, one-half of the single-family development will be priced between $140,000 and $180,000 and the other half will be priced above $180,000. Analysis of the housing market also indicates that homebuyers are not driven solely by the size of the home. Homebuyers are willing to trade the size of the home for more amenities.

The subdivision design should also be consistent with the Sensitive Areas Ordinance. Specifically, there should be a buffer extending back fifty feet from the top of all “steep” or “critical” slopes. The Sensitive Areas Ordinance also relaxes some of the requirements of the zoning code. The greater flexibility should be a useful tool for preserving rural character in a conservation design.

The site has striking natural features that should, to the extent possible, be protected and enhanced by the subdivision design. These include trees and stands of trees, vistas looking into and out of the site, and the grasslands that cover most of the site.
The most important design decision is deciding how much of the developable land to set aside as open space. That design decision has a significant impact on some important variables, including the size and price of the lots on the site, the size and style of the houses or condominiums that can be put on the lots, and the features available to residents. The contrast of the conventional subdivision and the conservation design subdivision is suggestive; the former has 100 quarter-acre house lots, the latter 64 one-fifth to one-sixth acre house lots and 9 one-third acre condominium lots. The house lots of the conservation design would cost the developer about 22% more each to develop. The conservation design subdivision offers two amenities missing from the conventional design: a linear park that runs on a north-south axis through the middle of the development and a border that follows the contours of the ravines in and out along the east boundary of the site. Many residences would front on the park. Most residences would be a short walk away from both the park and the border.

It is possible to create a subdivision design for a site in the Bluffwood Neighborhood in which many of the best features of the land are preserved and many of the residents are able to enjoy these features. But to create a subdivision design that does not diminish the character of the landscape requires that a large proportion of the developable land be set aside as open space. That, in turn, requires that lot sizes be reduced significantly: for this site, lot sizes of one-twelfth an acre were necessary. These lots are not compatible with the single-family homes typically sold in Iowa City. Instead, they are more appropriate for town homes and condominiums, that is, for residences that are deeper rather wide; that probably lack attached garages, and that may be smaller – but possibly higher quality. Therefore, buyers of single-family homes selling for $180,000 and above would have to be willing to pay the same price for a different product. Or lower-cost housing could be sold, and the developer and builder would make a lower profit than they could have with a conventional subdivision. Most likely higher- and lower-cost housing would be mixed in the subdivision. This is a practice that developers and builders appear to be resisting.

We offer the following recommendations:

1) Most of the land in the Bluffwood Neighborhood will have to be rezoned before it is developed. We recommend that the City of Iowa City consider trading higher density limits on a project for a commitment by the developer to set aside a given number of acres and to follow the principles of conservation design in developing the subdivision.

2) Iowa City planning staff should research and promote techniques that have been used in other jurisdictions to facilitate the mixing of housing types, that is, higher and lower-cost housing. These include designs for low or moderate-cost housing that focus on quality over square footage, especially with regard to the façade, and the use of landscaping to separate housing types.
3) Iowa City planning staff should also take the long view, and focus its efforts on educating the public about conservation design. That way, perhaps, a base of support for these ideas could be built in the community.
I. Introduction

If nothing unusual happened, the Bluffwood Neighborhood would be developed the way subdivisions are typically developed in Iowa City. All the developable land that was not taken for streets would be converted to lots. The Iowa City Sensitive Areas Ordinance would protect the steep slopes, wooded ravines, and wetlands from development.

The purpose of our study is to explore an alternative approach to subdivision design. In particular, we have considered the appropriateness of conservation design for the Bluffwood Neighborhood. We chose conservation design in part because the City of Iowa City's Northeast District Plan Draft identifies it as a key feature of the future land use scenario for much of the Bluffwood Neighborhood. We have asked the following questions: What would conservation design look like in the Bluffwood Neighborhood? How well would it work? How different would such a subdivision be from a conventionally designed subdivision for the same site?

In our study, we created a subdivision design for a 40-acre site in the Bluffwood Neighborhood by following the ideas of conservation design. We have also created a conventional subdivision and analyzed what appear to be the tradeoffs involved for developers and residents. We think there is a case to be made that the conservation design would compete favorably with the conventional design in the marketplace -- but we do not try to prove that -- nor could we. Instead, we try to lay out the contrasts in some detail as evidence so that others may decide for themselves. We also look at the impact of local conditions -- the Iowa City housing market and the topography of the Bluffwood Neighborhood -- on the form that a conservation design subdivision would take in the Bluffwood Neighborhood.

II. Description of Bluffwood Neighborhood and the Site

The Northeast District of Iowa City is destined for substantial development in the near future. The region is located east of Hickory Hill Park, north of Court Street, and south of Interstate 80. The construction of Captain Irish Parkway and the First Avenue extension is going to increase access to the area and open it up for development. The Northeast District consists of the Bluffwood, Hunter Heights, Pheasant Hill, and Lindemann Hills neighborhoods. The Bluffwood Neighborhood has the potential for the earliest development because of its proximity to current city infrastructure projects. Figure 1 shows the Bluffwood neighborhood and major arterial streets.

As shown in Figure 1, the Bluffwood Neighborhood is in the northwest quadrant of the Northeast District. It is located north of Rochester Road and west of Scott Boulevard. The Bluffwood Neighborhood has a residential subdivision in the southeast and major employment centers in the northwest. The rest of the Bluffwood Neighborhood consists of farms and pastureland. Three landowners have properties that are larger than 150 acres, and a handful of others have properties that range in size from 20 to 30 acres. The
topography of much of the Bluffwood Neighborhood is characterized by rolling hills, deep wooded ravines, and stream corridors. Figure 2 shows a topographical map of the area.

The site that we selected as the location of our subdivision is located east of First Avenue and south of Captain Irish Parkway; a network of ravines bounds the site on the south and the west. The site measures approximately 40 acres, and the network of ravines takes up approximately 12 acres. The ravines are steeply sloped and also support a number of mature woods (See Pictures 1 and 2). Three deep wooded ravines divide up site; the
Figure 2. Topography for the Bluffwood Neighborhood Area
grasslands surrounding them are gently sloping and represent the developable land of the site. The developable areas vary in size and shape. Picture 3 shows a White Oak that stands above the northern-most ravine and serves as a landmark.

![Picture 3. The Big Tree as a Landmark in the Northeast Ravine](image)

### III. Comparison of Conventional and Conservation Design

With conventional residential development all the developable land is converted to either lots or streets. The only open land is nondevelopable land such as wetlands, steep slopes, floodplains, and stormwater management areas, and that land is usually uninhabitable. As a result, there is seldom land available for recreation and socializing.

With conservation design, a portion of the developable land is set aside as open space. The underlying dwelling unit density stays the same; lot sizes are reduced on the land that is developed. Housing is clustered and the open space that has been set aside is owned in common, usually by a neighborhood association to which all residents belong. The purpose of all these measures is to preserve the natural beauty of the landscape, increase the enjoyment of residents, and add value for the developer.

### IV. Design of the Study and Methodology

**Methodology**

We began by researching the conceptual differences between the conservation and conventional designs. The Iowa City Zoning Ordinance provided information on various restrictions and codes that the city has for residential developments. The housing market demand was an essential indicator on homeowner preferences. Information on housing demand was gathered from *Housing Market Analysis and Demand Estimates for the Iowa City Urban Area* studied by Maxfield Research Inc. These sources were used to assure that the designs were consistent with city zoning and other related ordinances, and the Iowa City housing market. Developers were also interviewed in order to obtain their views on both designs and the costs associated with the project. We also visited several
subdivisions in Iowa City where at least a few of the concepts of conservation design had been tried. Also, AutoCAD, a drafting computer program, was used to illustrate the physical differences between conservation and conventional design. City staff and a subdivision designer critiqued the designs. They provided advice on whether the designs could actually be implemented. We also estimated the impact of setting aside open space on the price of a lot.

Design Considerations

The two designs stay true to several realistic limitations. These limitations include the following: 1) topography, 2) expected zoning for the site, 3) the Iowa City housing market, and 4) the Sensitive Areas Ordinance. We purposely overlooked some other limitations, which are described at the end of this section.

Topography. There is a deep wooded ravine in the northeast corner of the site; there are also three smaller north-south wooded ravines. These ravines divide the site into four areas. There is also a relatively level area in the north. All together there are five developable areas in the site.

Expected Zoning for the Site. Iowa City Zoning Ordinance 1994 provides a guideline for future developments in Iowa City. According to the Zoning Ordinance, the site is currently zoned ID-RS and ID-ORP. These designations mean that the site is zoned for agriculture but open for rezoning. Detailed zone designation is shown in Figure 3. The appropriate or likely zoning for the site may be determined by reviewing the zoning for adjacent neighborhoods. These neighborhoods consist mostly of single family homes but include a modest number of multi-family units as well. They are zoned either RS-5 (low density single-family residential zone), or RM-12 (low density multi-family residential zone.) According to the Zoning Ordinance, RS-5 “is primarily intended to provide for single-family residential development consistent with the predominantly single-family residential character of Iowa City.” (p.14-6D-2). Permitted uses include detached single-family dwellings. A minimum lot area for RS-5 is 8,000 square feet and a minimum lot width is 60 feet. RM-12 “is intended to provide for high density single-family residential development and low density multi-family residential development.” (p.14-6D-7). Permitted uses include: 1) detached single-family dwellings, 2) duplexes and 3) multi-family dwellings. A minimum lot area for RM-12 is 5,000 square feet and a minimum lot width is 45 feet.

Permitted uses of RS-8 include detached single-family dwellings, while provisional uses include duplexes, zero lot line dwellings and townhouses. A minimum lot area is 5,000 square feet and a minimum lot width is 45 feet. Dimensional requirements for different housing types in different residential zones are summarized in Table 1.
Figure 3. Zoning Map for the Bluffwood Neighborhood and the Surrounding Area
Table 1. Dimensional Requirements for Different Housing Types in Different Residential Zones

<table>
<thead>
<tr>
<th></th>
<th>RS-5</th>
<th>RS-8</th>
<th>RM-12</th>
<th>Duplexes &amp; other uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Family (non zero-lot line)</td>
<td>Single-Family (non zero-lot line)</td>
<td>Single-Family (non zero-lot line)</td>
<td>Single-Family (zero-lot line)</td>
<td>6,000</td>
</tr>
<tr>
<td>Minimum lot area sf</td>
<td>8,000</td>
<td>5,000</td>
<td>4,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Minimum lot area per unit sf</td>
<td>8,000</td>
<td>5,000</td>
<td>4,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Minimum lot width ft</td>
<td>60</td>
<td>45</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>Minimum lot frontage on a public street or an officially approved place</td>
<td>35</td>
<td>25</td>
<td>20</td>
<td>45</td>
</tr>
</tbody>
</table>

Source: Iowa City Zoning Ordinance 1994.

Housing Market Analysis. Iowa City will continue to experience housing market growth in the next decade. A vast amount of growth will occur from household growth. (Housing Market Analysis p.155) Household growth requires additions to the stock of housing to accommodate a larger base of households. The Housing Market Analysis and Demand Estimates for the Iowa City Urban Area suggests that Iowa City has a potential demand for 600 single-family and 550 multifamily homes by the year 2005. (p.1) The housing market analysis also indicated the types of homes that are currently in demand. Between 1994 and 1997, single-family homes accounted for 75 percent of home sales in Iowa City. Condominiums accounted for 20 percent of home sales during the same time period. The homes that demonstrate the largest demand are small condominiums in the range of $60,000 and newly constructed homes priced at $100,000 to $120,000. Table 2 shows the sales of homes in Iowa City for 1997.

Table 2. Iowa City Home Sale Summary for 1997

<table>
<thead>
<tr>
<th>House Type</th>
<th>Number of Sales</th>
<th>Percent of Sales</th>
<th>Sale Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Average</td>
</tr>
<tr>
<td>Single-Family</td>
<td>553</td>
<td>73%</td>
<td>$139,466</td>
</tr>
<tr>
<td>Zero-Lot-Line*</td>
<td>32</td>
<td>4%</td>
<td>$109,555</td>
</tr>
<tr>
<td>Condominiums</td>
<td>176</td>
<td>23%</td>
<td>$ 87,026</td>
</tr>
<tr>
<td>Total</td>
<td>761</td>
<td>100%</td>
<td>$336,047</td>
</tr>
</tbody>
</table>

Note: Iowa City home sale figures include University Heights home sales. *Duplexes are included. Source: Housing Market Analysis and Demand Estimates for the Iowa City Urban Area Iowa City Association of Realtors, Maxfield Research, Inc., p.76.
In general, homebuyers want low to moderately priced homes. The projections for the Iowa City market indicate that between 1997 and 2002, one-half of the single-family development will be priced between $140,000 and $180,000 and the other half will be priced above $180,000. (Housing Market Analysis, P.181)

Income and age are essential factors in purchasing a home. Individuals increase their income as they grow older and gain experience. Therefore, the household income according to age is critical to the study because it determines two issues: 1) who is the target market, 2) how much a household can spend on a home. The largest age group ranges from 25 to 34. This group represents the first-time homebuyers. First-time homebuyers have little equity and a small amount to spend on a home. The second largest age group ranges from 35 to 44. They represent the second-time homebuyers. This group has the higher percentage of household income. They are established and can afford to pay more for a home. In order to provide homes on the housing market it is important to discover the amount households can pay for a home. Table 3 shows the household income by the age of the householder.

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Age 25-34</th>
<th>Age 35-44</th>
<th>Age 45-54</th>
<th>Age 55-64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below $25,000</td>
<td>2,483</td>
<td>1,096</td>
<td>423</td>
<td>190</td>
</tr>
<tr>
<td>$25,000 to $34,999</td>
<td>934</td>
<td>616</td>
<td>259</td>
<td>147</td>
</tr>
<tr>
<td>$35,000 to $49,999</td>
<td>1,017</td>
<td>911</td>
<td>446</td>
<td>239</td>
</tr>
<tr>
<td>$50,000 to $74,999</td>
<td>847</td>
<td>1,161</td>
<td>718</td>
<td>328</td>
</tr>
<tr>
<td>$75,000 to $99,999</td>
<td>422</td>
<td>766</td>
<td>604</td>
<td>282</td>
</tr>
<tr>
<td>$100,000 to $149,999</td>
<td>163</td>
<td>512</td>
<td>559</td>
<td>255</td>
</tr>
<tr>
<td>$150,000 or above</td>
<td>40</td>
<td>280</td>
<td>296</td>
<td>168</td>
</tr>
<tr>
<td>Total</td>
<td>5,906</td>
<td>5,342</td>
<td>3,305</td>
<td>1,609</td>
</tr>
</tbody>
</table>


The household income for the age group of 25 to 34 is low due to University of Iowa. This group consists of a large percentage of graduate and professional students that have low incomes. Graduate and professional students are a significant factor for the high percentage of households that earn below $25,000. There is still a significant percent of Iowa City households that can afford the new housing. The households that have incomes ranging from $35,000 to $49,000 can afford homes priced around $120,000. Households with incomes between $50,000 and $74,999 and $75,000 and $99,999 can afford homes priced in the range of $150,000 to $180,000 and above $180,000, respectively.

The homes in Iowa City may also be more expensive in the future because the level land in Iowa City is becoming limited. More homes are constructed on hilly terrain. Homes may be constructed differently due to this condition. According to the market, the
average home is approximately 1,750 to 2,000 square feet. The homes have three bedrooms, two and one half bathrooms, and a two car garage. Homes may be built smaller. The housing market also indicated that homebuyers are not driven solely by the size of the home. Homebuyers are willing to trade the size of the home for more amenities. The analysis refers to internal amenities such as hardwood floors, and fireplaces. External amenities are also desired. External amenities include features such as open space, trails, and parks. The market indicates a future demand for smaller homes with an increase in amenities.

**Sensitive Areas Ordinance.** The study site contains several sensitive features which are subject to protection in Iowa City Sensitive Areas Ordinance such as wooded ravines with critical slopes (25%+), highly erodible soil with a slope between 18% and 25%, or greater than 25%, and woodlands with an area greater than 2 acres. Figure 4 shows the location of these areas. The Sensitive Areas Ordinance describes three types of slopes. The three types of slopes are steep slopes (slopes between 18% and 24%), critical slopes (slopes between 25% to 39%), and protected slopes (slopes greater than 40%). In order to protect the steep slope, “a buffer will be required around all protected slopes”. “Two feet of buffer will be provided for each foot of vertical rise of the protected slope, up to a maximum buffer of 50 feet”. The area of the buffer is measured “from the top, toe and sides of the protected slope.” (Sensitive Areas Ordinance, p.13). In order to protect woodlands; “buffer an area by measuring fifty feet outward from the trunks of trees intended to be preserved”. “No development activity, including removal of trees and other vegetation, shall be allowed within the buffer” (Sensitive Areas Ordinance, p.13).

For purposes of our designs, the Sensitive Areas Ordinance has two practical impacts: 1) it requires that we establish a buffer which will not be built upon at a distance back from the tops of all relevant slopes, and 2) it grants a more flexible array of design guidelines. The flexibility afforded by the Sensitive Areas ordinance is described in section VI. The requirement for a buffer applies to both designs. Specifically, a buffer of two horizontal feet back from the top edge of the ravine for every vertical foot of height is required, up to a maximum of 50 feet. Almost all the ravines on the site are deep enough that the required buffer would be 50 feet. Figure 5 illustrates buffer requirements for protected slopes.
Ignored Factors. There are several factors that the study ignored. First, this study does not have a detailed analysis of the area topography. Topographical maps were used to distinguish where development should occur on the site. Therefore, areas that were planned for development of certain homes may not be suitable. In addition, environmental studies were not performed on the land. The soil was not tested to evaluate the type of construction that is permissible under the given conditions. Second, the actual density of the subdivision was developed through our research. The planning staff recommended a density of 7 to 8 units per acre of developable land. The designs have a density of 4 units per acre of developable land. The city planning staff was not consulted further about the appropriate density for the subdivision. Third, the lot sizes do not reflect highest and the best use of the site. They are similar to the average sizes for the area housing market. The lot and home sizes, home models, and their profitability were not maximized due to our time constraints, current knowledge, and limited resources. Lastly, the current landowners were not consulted on the future plans for their land. We simply assumed away this consideration.

V. The Elements of Conservation Design

Identifying and Mapping Features

In this phase, we looked for the site’s most striking natural features. These included trees and stands of trees, vistas looking into and out of the site, and the grasslands that cover most of the site. We identified the following features that we wanted to preserve in our design:
Trees and Stands of Trees. Several impressive white oak trees in the northeast corner of the site. Two stands of trees at the top of the second ravine.

Vistas. East into the site from First Avenue
South into the site from Captain Irish Parkway
South into the passages between the ravines.
North out of the site, hills and pasture land in the distance.
Into the wooded ravines from grasslands above.

Grasslands. Most of the site not given over to ravines is covered by a wild perennial grass.

Once these features were identified, the next step was to map them on the site.

Flexibility from the Sensitive Areas Ordinance

The Sensitive Areas Ordinance relaxes some of the requirements of the zoning code. The greater flexibility should be a useful tool for preserving rural character in a conservation design. Relevant design guidelines are identified below:

Street Design. Street rights of way may be reduced. Pavement widths of local streets may also be reduced to 25 feet. Further reductions of street pavement width may be considered. (Standard street pavement for a neighborhood street is 28 feet.)

Alley Design. The use of alleys to provide for vehicular access to individual lots and an alternative location for utility easements can enhance the livability of compact neighborhoods. Alleys should have a minimum pavement width of sixteen feet (16').

Land uses. The mixing of housing types within a subdivision is allowed and encouraged. Housing types that may be mixed include the following: detached single-family dwellings, duplexes, zero-lot line dwellings and townhouses, multi-family buildings.

Dimensional Requirements. Minimum lot area, lot width, lot frontage and yards may be reduced provided that sufficient yards are incorporated for each dwelling unit. The overall dwelling unit density shall not exceed the maximum density permitted in the underlying zone.

VI. Description of the Two Designs

The site plan for the conventional design is shown in Figure 6. Before doing conservation design, we mapped features of the site as shown in Figure 7. The site plan for the conservation design is shown in Figure 8. Both conventional and conservation subdivisions have lots for 100 dwelling units but the sizes of the lots are not the same, that is, the mix of housing types would not be the same.
Mapping the Features of the Site

A: A view south into the site from Capitain Irish Parkway.
B: A view north out of the site, hills in the distance.
C: A view south of the ravines and surrounding slopes.
D: Stands of trees.
E: White oak trees.

Legend

- Street
- Contour Line
- Tree
- Stream

Scale: 0 125 250 500
The conventional subdivision has 100 one-fourth acre single-family house lots. The conservation subdivision has 64 one-fifth acre single-family house lots, and 9 one-third acre condominium lots. We are assuming that the condominiums built on the lots would have four units each. In the conventional subdivision, the 100 house lots would be owned by individual residents. The 12 acres of nondevelopable land would also be owned by individual residents. In the conservation design subdivision, the 64 houselots would be owned by individual residents. There are 19 acres of open space (12 acres of nondevelopable land and 7 acres of developable land that has been set aside) that would be owned by a neighborhood association; the deeds for the houselots would require that residents belong to the neighborhood association. The condominium lots would also be owned by the neighborhood association. The conservation design subdivision would also be an OPDH overlay zone. Figure 9 shows the Bluffwood Neighborhood with the conservation design in the study area.

There are three different areas to compare between the two designs: open space and trails, street network, and housing types and location.

**Open Space and Trails**

In the conventional subdivision, all the developable areas are either streets or private yards, and the only open space is the 12 acres of ravines. In the conservation subdivision, the cul-de-sacs that penetrate the areas between the ravines have single-loaded streets. As a result, there is a generous border of connected open space running along most of the ravine network. There is also a long, rectangular commons that runs north-south in the middle of the site. It offers a view down into the depths of the ravines from the level land above. In both subdivisions, several impressive white oaks are preserved in the northeast corner of the site.

In the conservation subdivision, within the open space, there is a main trail running continuing from north to south, with some minor trails that dip in and out of the areas between the ravines. There is access to the trail system at each end from a public street.

**Street Network**

The overall street network for the two types of developments is almost the same. For both, there is a main street that starts from the middle of First Avenue, runs from west to east, then turns to the north parallel to First Avenue, until it reaches Captain Irish Parkway. For the conventional design, there are six cul-de-sac streets for five residential units, with four streets parallel to the three corresponding ravines. The other two parallel First Avenue, one in the north and another in the south.

For the conservation design, there are three cul-de-sac streets, and one minor street connecting the major street from north to south. Among the three cul-de-sac streets, one is in the south parallel to First Avenue, serving as a single-loaded driveway, while the other two parallel to the corresponding ravines serve as single-loaded streets. For those
condominiums, there is a separate street providing access for these condos to First Avenue.

**Lot Sizes and Location**

In the conventional subdivision, the single-family house lots vary in size from roughly 72 to 85 feet wide by 120 to 145 feet deep. In the conservation subdivision, the single-family lots vary in size from 55 to 70 feet wide by 110 to 135 feet deep. The condominium lots vary in size from 110 feet wide by 120 to 135 feet deep. The condominium lots are located in the northwest corner of the site, which is near the intersection of First Avenue and Captain Irish Parkway. Table 4 shows the location and lot size for single family and condominium units in the conservation subdivision.

**Table 4. Location and Lot Size for Single Family and Condominium Units in the Conservation Subdivision**

<table>
<thead>
<tr>
<th>Housing Type</th>
<th>Location</th>
<th>Width (ft.)</th>
<th>Depth (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condominium</td>
<td>Along Captain Irish Parkway</td>
<td>110</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>Along the Corner of First</td>
<td>120</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>Ave/Captain Irish Parkway</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Along First Ave.</td>
<td>110</td>
<td>130</td>
</tr>
<tr>
<td>Single family</td>
<td>Along First Ave.</td>
<td>55</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>Along the two south Ravines</td>
<td>70</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Along the Northeast Ravine</td>
<td>65</td>
<td>135</td>
</tr>
</tbody>
</table>

**VII. Analysis of the Two Designs**

In this section, we identify the explicit design choices of the conservation design and discuss their impact on several variables. We also contrast the two designs as part of the analysis. The variables discussed include 1) the price of a lot, 2) lot sizes, 3) housing types and, most importantly, 4) features. At the end of the section, we consider other design choices that could have been made and the tradeoffs that they would have involved.

**Statistics**

Because so much of the land is given over to steep sloped ravines that are protected by the Sensitive Areas Ordinance, each of the designs has at least 12 acres of open space. In the conservation design, 19 acres or about half the site has been preserved as open space.
Table 5. Statistic Summary for the Two Designs

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Conventional</th>
<th>Conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nondevelopable</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Developable but not</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total open space</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>Developed</td>
<td>25</td>
<td>18</td>
</tr>
<tr>
<td>Streets</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Developed + Streets</td>
<td>28</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

The Price of a Lot

We wanted to try to find out how much more a lot would sell for in the conservation design because we had set aside some of the land as open space. Whether or not all the developable land is developed, it and the improvements to the land that is developed have to be paid for. That is, the developer has to meet all of his costs and still make the desired profit. It is the costs involved in acquiring and improving the land, plus profit, that he must recoup. We have made several simplifying assumptions in our calculations:

Cost of land. This is the cost (per acre) of acquiring unimproved land. We are using a range of $15,000 to $18,000 per acre for the Bluffwood neighborhood. (The upper bound is used in the calculation.) The figure is based on informal conversations with professionals with knowledge of the local land market. The figure may be higher or lower in other parts of Bluffwood depending on the proportion of land that is developable.

Infrastructure and Other Costs. These costs are based on those for an Iowa City residential development site constructed on gently rolling land that resembles that of Bluffwood. The costs for the other site are expressed as a dollar amount per acre; to estimate the costs for our site, we are multiplying the aggregated per acre costs by the relevant acreage figure for our site.

Table 6. Land, Infrastructure and Other Costs Per Acre

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Grading and Erosion Control</td>
<td>$4,508</td>
</tr>
<tr>
<td>Stormwater Management Facilities</td>
<td>1,473</td>
</tr>
<tr>
<td>Sanitary Sewer</td>
<td>8,360</td>
</tr>
<tr>
<td>Storm Sewer</td>
<td>2,206</td>
</tr>
<tr>
<td>Water Main</td>
<td>1,915</td>
</tr>
<tr>
<td>Paving &amp; Intakes</td>
<td>8,164</td>
</tr>
<tr>
<td>10% Construction Cost Contingency</td>
<td>2,663</td>
</tr>
<tr>
<td>Other Costs</td>
<td>8,316</td>
</tr>
</tbody>
</table>
Developer Profit. We are assuming developer profit of 35% on the capital investment. That figure is in the mid-range of the ranges suggested by three different professionals with whom we spoke. That profit is after the payment of interest on a capital loan.

Rate of Absorption and Interest. Most of the professionals described interest as an important and dangerous wildcard. Interest mounts when lots are not sold; it depends heavily on the absorption rate of houses/ lots into the market. We made the following assumptions in regard to the absorption rate of the two subdivisions: We assumed that the first half of the house/condo lots would be sold after one year, and the second half after two years. For bookkeeping convenience, we assumed that all the lots were sold on the last days of these years. We also assumed that the construction loan was made at 9% annual, simple interest. Finally, we did not discount future cash flows, either interest payments or revenue. The following formula was used to calculate the interest on the loan:

$$\text{INTEREST} = \text{PRINCIPAL} \times (1.09) + \text{PRINCIPAL}/2 \times (1.09)^2$$

The Price of a Lot. Developer costs for the site are summed in Table 7.

Table 7. Developer Capital Costs, Profit, and Interest

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>$720,000</td>
</tr>
<tr>
<td>Infrastructure and Other</td>
<td>940,000</td>
</tr>
<tr>
<td>Total capital costs</td>
<td>$1,660,000</td>
</tr>
<tr>
<td>Profit</td>
<td>580,000</td>
</tr>
<tr>
<td>Interest</td>
<td>310,000</td>
</tr>
<tr>
<td>Total</td>
<td>$2,550,000</td>
</tr>
</tbody>
</table>

The cost per house lot for the conventional subdivision = $2,550,000/100 = $25,500. To calculate the cost per house lot for the conservation design subdivision, we first have to assign some of the costs to the condominium lots. We are assigning 60 percent of the cost per house lot (from the conventional design) to each condominium unit, or 240 percent to each condominium lot:

$$9 \text{ condominium lots} \times 2.4 \times \$25,500 = \$550,800.$$  

Subtracting yields, $2,550,000 - $550,800 = $1,999,200. This amount is then assigned to the 64 house lots:

$$\$1,999,200/64 = \$31,238,$$ or about $31,200.

This represents an increase of about 22 percent over the house lots in the conventional subdivision. The important point to keep in mind is that the differential represents a
design decision. Had we opted for 100 one-fifth acre house lots in the conservation design subdivision, then the house lots would cost the same, but there would be fewer open space for the residents.

**House Lot Size and Housing Types**

The value of a lot depends in part on the size of the house that can be built on it. So in comparing house lots, that is, in comparing the one-quarter and the one-fifth acre lots from the two designs, it makes sense to consider whether the smaller lot will hold the house that would have been built on the larger. The only consideration is frontage; given that they have the same frontage, the difference in depth between a one-quarter and a one-fifth acre lot has no practical significance. For example, assuming the frontage equals 80 feet, the depth of the one-quarter acre lot is about 135 feet and the depth of the one-fifth acre lot about 110 feet. The minimum frontage for the one-quarter acre lots is about 70 feet, for the one-fifth acre lots about 60 feet. Actually, 22 of the 64 one-fifth acre lots are just 60 feet wide. Also, 10 of the 100 one-quarter acre lots are wider than 90 feet but no one-fifth acre lots are. What conclusion should be drawn from this litany of lot dimensions? That on average the houses in the two subdivisions would be the same size but different designs; the houses on the one-quarter acre lots will be narrower and deeper.

The larger issue is that the developer of the conservation design has choices regarding how he will reach the underlying dwelling unit density of the site (which, again, is four units/acre in the two designs). That choice involves the selection of housing types and the choice of house lot size. We have reduced house lots modestly (from one-quarter acre to one-fifth acre) but there were other possibilities. For example, we could have reduced half of the house lots to one-eighth acre. That would have led to a subdivision that mixed single-family houses that were designed for two different markets. At that point, the developer would have to consider the mix of housing types that he could mix successfully.

The same point applies to our conservation design. The 64 house lots and 9 condominium lots in the design would obviously become 64 single-family homes and 36 condominiums in the real world. The difficulty, according to some local developers, is that buyers will not buy high-priced homes that are located next to low-priced homes. We assume that some mixing is possible. We do not pretend to any expertise in the local housing market, but we assumed that single-family houses priced at around $220,000 and up would be built on the house lots and that condominiums selling for around $140,000 would be built on the condominium lots. There is strong demand in both these markets. We also separated the house lots and the condominium lots consciously (some would say crassly) as a means of dealing with these apparent "market realities."

**Features**

There are two issues: 1) the features that exist for the enjoyment of residents and 2) the number of residents who have access to these features. We do not try to put a dollar
value on trees and vistas. We understand that two people can look at the same picture and form different opinions. We leave it to professionals who know the market to make those judgements. Instead, we are simply trying to be a little more precise about the options that are available to the buyer (and the developer) in each design.

Many of the lots in the conventional design look out into a wooded ravine. It is reasonable to assume that these lots have privacy and quiet. The conservation design preserves some of the natural features that were identified above, and other features have also been created. Several swathes of open space have been left in both the middle of the site and on the edges. The most striking feature is a north-south commons that runs almost the length of the site. It merges into and surrounds the southern-most ravine. Where the commons end, a border begins; it follows the contours of the ravine network from the south, in and out along the eastern edge, to the northern-most ravine. Both designs preserve the view of the rolling countryside to the northwest.

VIII. The Design Reconsidered

This study has been about the character of the landscape all along. In its purest form, conservation design seeks to preserve the character of the landscape. In its impure form, it contents itself with saving a few features and catering enjoyment for residents: places to gather or to play. The conservation design subdivision was a compromise; it was a suburb with many open spaces. This last section is about the difficulties of doing better than we did with our subdivision.

The Tradeoffs Involved in Conservation Design

The following questions and their relationships to each offer a structure for understanding the tradeoffs involved in designing a subdivision for the Bluffwood Neighborhood site: What happens when more or less open space is set aside? What should be done with open space? The more open space there is the more that can be done, clearly. But what should be done? Should there be sloping grasslands among the ravines or a park among the residences? Also, setting aside open space means reducing the size of individual lots. (We assume that the underlying dwelling unit density is the same across the subdivision designs: four dwelling units/acre = 100 dwelling units/site). What does that mean for the house or condominium that is going to be built on the lot? Maybe the house has to be smaller. Or maybe it has to be a different style. We assume that these questions matter to the developer because the value of a lot depends in part on the house or condominium that can be put on it. (The house that would be built in a conventional subdivision is a useful benchmark.) Finally, how does the amount of open space and its configuration impact the character of the subdivision and the landscape?
To begin to answer these questions, three alternative conservation design subdivisions were created. Alternative 1 has one-fifth acre house lots, Alternative 2 one-eighth acre house lots, and Alternative 3 one-twelfth acre town home/condo lots. (Lot sizes were kept homogenous to simplify the analysis.) These subdivisions have not been rendered with streets and lot lines drawn in; instead, the maps are schematics.

**Three Alternative Conservation Design Subdivisions**

**Alternative 1: One-Fifth Acre House Lots**

**Proportion of Open Space.** Seventeen of the forty acres would be set aside as open space. The open space would consist of five acres of developable land and twelve acres of nondevelopable land.

**Location of Open Space.** Because Alternative 1 would cover the site with residential development, it is tempting to preserve some natural feature on the site, for example the sloping grasslands between the ravines in the south. But there is not enough open space for it to be used this way. The landscape would no longer define the site; instead it would become an attraction. A second strategy would be to use the open space as a public park. A north-south linear park would connect the neighborhood physically and visually. Figure 10 shows a possible configuration of the open space; the rest of the design is assumed to be a conventional subdivision.

**Impact of Lot Size.** There would be almost no impact. The typical Iowa City house that would be built on a one-quarter acre lot could also be built on a one-fifth acre lot. The typical Iowa City house is wider than it is deep. Residents would have large yards and access to five acres of open space would be owned in common.

**The Character of the Subdivision.** The privacy and peacefulness of a conventional subdivision are enhanced by the wooded ravines on the site. Many houses back on the woods. The residents also enjoy a modest amenity -- probably a linear park -- but the goal of saving the character of the landscape has been forgone; the site has been turned into suburbia.

**Alternative 2: One-Eighth Acre House Lots**

**Proportion of Open Space.** Twenty-four of the forty acres would be set aside as open space. The open space would consist of twelve acres of developable land and twelve acres of nondevelopable land.

**Location of Open Space.** As much as possible the residential development should be located on the level land in the northwest corner of the site. One strategy would be to segregate the residential development and the open space completely. The open space, including the ravines, would be on the south and east ends of the site. Yet it's unlikely
Figure 10
Alternative 1: Configuration of Open Space

Legend
- Street
- Contour Line
- Tree
- Stream

0 125 250 500
that the landscape of the south and east would seem like it was in its natural state. The 100 houses, which would fill up the middle of the site, would intrude on the scene. With one-eighth acre lots, it is not possible to cluster the houses and hide them -- and therefore not possible to create an area that is separated physically and visually from the residential development.

The best strategy may be to mix residential development and open space freely. A north-south linear park -- like that mentioned under Alternative 1 -- could connect the residential development physically and visually to the surrounding open space. Figure 11 shows a possible configuration of the residential development; the rest of the design is assumed to be open space.

**Impact of Lot Size.** It is possible to build a large house on a one-eighth acre lot but it must be a house that is deeper than it is wide. The change of orientation would probably disallow a two-car attached garage; a one-car attached garage or a detached garage would be necessary. The detached garage, which would be located at the back of the lot, would be accessed by either a driveway or an alley. Unfortunately, deep lots, detached garages and back alleys are not favored by most Iowa City developers and builders. The actual preferences of buyers are unknown.

The other tradeoff involves the yard, which has almost disappeared. There may be room for a polite front lawn and for a patio and a garden in the back. In exchange, as noted above, the residents have common ownership of twenty-four acres of open space.

**The Character of the Subdivision.** Under the second strategy discussed under "Location of Open Space," Alternative 2, with eight houses per acre, would have the feel of a small town with a generous municipal park. Yet the residents would have little more than the residents of Alternative 1 in the way of amenities. Individual lots in Alternative 2 would be half the size of lots in Alternative 1, but it does not seem possible to configure the extra open space of Alternative 2 in a way that creates value for the residents.

**Alternative 3: One-Twelfth Acre Town Home/Condo Lots**

**Proportion of Open Space.** Twenty-nine of the forty acres would be set aside as open space. The open space would consist of fifteen acres of developable land and twelve acres of nondevelopable land.

**Location of Open Space.** In contrast to Alternative 2, the best strategy for Alternative 3 seems to be segregating residential development and open space completely. That is accomplished by locating the residential development in a broad east-west arc at the north end of the site. That is, residential development would occupy some of the large grassland in the northeast corner of the site. It would be possible to wander the lower half of the site and not see houses to the north. This strategy would also open up a rectangle of level land immediately south of the residential development. The land could become a park or a recreational area. Figure 12 shows a possible configuration of the residential development; the rest of the design is assumed to be open space.
Figure 11
Alternative 2: Configuration of Development

Legend
- Street
- Contour Line
- Tree
- Stream

N
Figure 12
Alternative 3: Configuration of Development

Legend
- Street
- Contour Line
- Tree
- Stream

Distance Scale:
0 125 250 500
Impact of Lot Size. Town homes or condominiums would probably have to be built on one-twelfth acre lots. Residents would have little or no private realm once they ventured outside their homes. In exchange, as noted above, they would have common ownership of twenty-nine acres of open space.

The Character of the Subdivision. This is the only design in which there is visual separation of residential development and open space so that they can be experienced as two different realms. In the open space, the character of the land is not marred. Yet the private realm of the residents has been -- or at least is in danger of being -- diminished.

Table 8. Summary of Land Uses by Alternative (in acres)

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nondevelopable</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Developable but not developed</td>
<td>5</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Total open space</td>
<td>17</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>Developed</td>
<td>20</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>Streets</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Developed + streets</td>
<td>23</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Summary

The most satisfying results may come from the designs on the extremes, that is, Alternatives 1 and 3. Alternative 1 works well because the wooded ravines on the site nicely complement a conventional subdivision. Cul-de-sacs are ideal for penetrating the contours of the ravine and many houses back on the woods. The residences offer quite a lot of privacy. On the other extreme, Alternative 3 works well because it also uses the topography of the site to advantage. It takes advantage of the varying elevations of the site and the wooded ravines to hide the residential development and create a secluded natural realm.

IX. Conclusion

It is possible to create a subdivision design for a site in the Bluffwood Neighborhood in which many of the best features of the land are preserved and many of the residents are able to enjoy these features. But to create a subdivision design that does not diminish the character of the landscape requires that a large proportion of the developable land be set aside as open space. That, in turn, requires that lot sizes be reduced significantly: for this site, lot sizes of one-twelfth an acre were necessary. These lots are not compatible with the single-family homes typically sold in Iowa City. Instead, they are more appropriate for town homes and condominiums, that is, for residences that are deeper rather wide; that probably lack attached garages, and that may be smaller -- but possibly higher quality. Therefore, buyers of single-family homes selling for $180,000 and up would
have to be willing to pay the same price for a different product. Or lower-priced housing could be sold, and the developer and builder would make a lower profit than they could have with a conventional subdivision. Most likely higher- and lower-priced housing would be mixed in the subdivision. This is a practice that developers and builders appear to be resisting.

X. Recommendations

1) Most of the land in the Bluffwood Neighborhood will have to be rezoned before it is developed. We recommend that the City of Iowa City consider trading higher density limits on a project for a commitment by the developer to set aside a given number of acres and to follow the principles of conservation design in developing the subdivision.

2) Iowa City planning staff should research and promote techniques that have been used in other jurisdictions to facilitate the mixing of housing types, that is, lower- and higher-cost housing. These include designs for low- or moderate-cost housing that focus on quality over square footage, especially with regard to the façade, and the use of landscaping to separate housing types.

3) Iowa City planning staff should also take the long view, and focus its efforts on educating the public about conservation design. That way, perhaps, a base of support for these ideas could be built in the community.
XI. References:


City of Iowa City. 1995. *Iowa City Sensitive Areas Ordinance.* Department of Planning and Community Development.

City of Iowa City. 1994. *Iowa City Zoning Ordinance.* Department of Planning and Community Development.