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## Creating Conservation Subdivision Designs on Seven Different Sites

This chapter shows how the principles of conservation subdivision design could be applied to seven different kinds of rural property. In the order of their appearance, they are:

- a predominantly open site on sloping terrain in the Piedmont region;
- a mostly wooded site at the base of a small range of foothills;
- an equal mix of farmland and estuarine forest bordering a salt-water bay and two tidal creeks on the coastal plain;
- an upland pasture and water meadows bordering a small creek;
- a waterfront property alongside a small northern lake;
- fields and woodlands containing historic resources pertaining to Civil War battle actions; and
- a mixture of old fields, swamp forest, and a Native American archaeological site located at the edge of a sound.

All but one of these sites are actual places, although certain aspects of several have been modified to present a more challenging set of resource constraints and more interesting opportunities for both conservation and development. These modifications were made so that the sites might serve as better examples of what

could be accomplished under a variety of circumstances, and it is hoped that many aspects of these sites will reflect local conditions in areas where the readers of this handbook reside or do business.

### Site A: GENTLY SLOPING SITE IN THE PIEDMONT REGION

The first site in this series is located in the Piedmont region of southeastern Pennsylvania where farmland still predominates in the local landscape, with woodland found mostly in stream valleys, on the steeper slopes, and in hedgerows between the open fields. Over the last twenty years most of the local farming families have come to rely more and more upon off-farm income to sustain themselves financially, and as the older generation retires few young family members have opted to continue the traditional lifestyle. As the number of farming operations has steadily declined, so have the locally available agricultural support services, such as large animal veterinarians, seed and feed merchants, and equipment dealers. In the context of this downward spiral, the subject property was offered for sale, at full development value, to neighboring farmers.

Not surprisingly, little interest was shown in the land except by real estate developers, most of whom saw this parcel in terms of the township subdivision code that contains standards allowing the land to be sliced into simple two-acre parcels, a pattern illustrated in the "yield plan" shown in Figures 7A-2 and 7A-3. The formula in the zoning ordinance for calculating density produced the same yield (32 lots) as the drawing, which took wetlands, floodplains, and steep slopes into account. Although the site contains 82 acres in total, 17 are either too wet or steep to develop under the ordinance, leaving 65 buildable acres. From that figure, 6.5 more acres (10% of the buildable area) are subtracted for street circulation, leaving 58.5 acres to use for net density purposes. Round-

ing that number up to 59 (the nearest whole number) and dividing by the 80,000 square feet for minimum lot size yields 32 lots.

The more creative approach to developing this property—one that is based upon the central organizing principle of open space conservation—involves a slightly deeper site analysis. In addition to identifying the inherently unbuildable soils and slopes (which are classified as Primary Conservation Areas, shown in Fig. 7A-4), half or more of the remaining land is initially "greenlined" as potential "Secondary Conservation Areas" (Fig. 7A-5). The balance—25 to 30 acres—is then identified as "potential development areas" (Fig. 7A-6). *It is in the selection of the Secondary Conservation Areas that the special features and the natural beauty of the site are preserved, and this part of the first step is arguably the most critical part of the entire four-step development design process.*

After identifying the wetlands and associated hydric soils, and the steep slopes leading down to Hager's Run (shown in Fig. 7A-4), the site designer looked for the property's most notable natural and cultural characteristics. As depicted in Figure 7A-5, these special features consist of the public views into the site from Powelton Falls Road (a vista that is dominated by a huge white oak, 28 inches in diameter, towering above a grassy knoll rising from the surrounding fields), outward views down to the Swift Creek Reservoir, a wildflower meadow, several hedgerows, two small woodlands, a fieldstone spring house dating from the mid-18th century, and a stand of mature tulip poplars marking the site of a former farmstead.

Although the hedgerows are not visually spectacular, they are capable of providing instant buffering between backyards and possess some limited intrinsic habitat value. Tree species found there along a typical 300-foot length include white ash, cockspur hawthorn, wild crabapple, black cherry, shadbush, hackberry, sourwood, and white oak. These trees provide many perching, feeding, and nesting opportunities for a variety of arboreal birds



**Figure 7A-1.** Site A: Before Development



Figure 7A-2. Site A: Yield Plan



**Figure 7A-3.** Site A: With Conventional Development

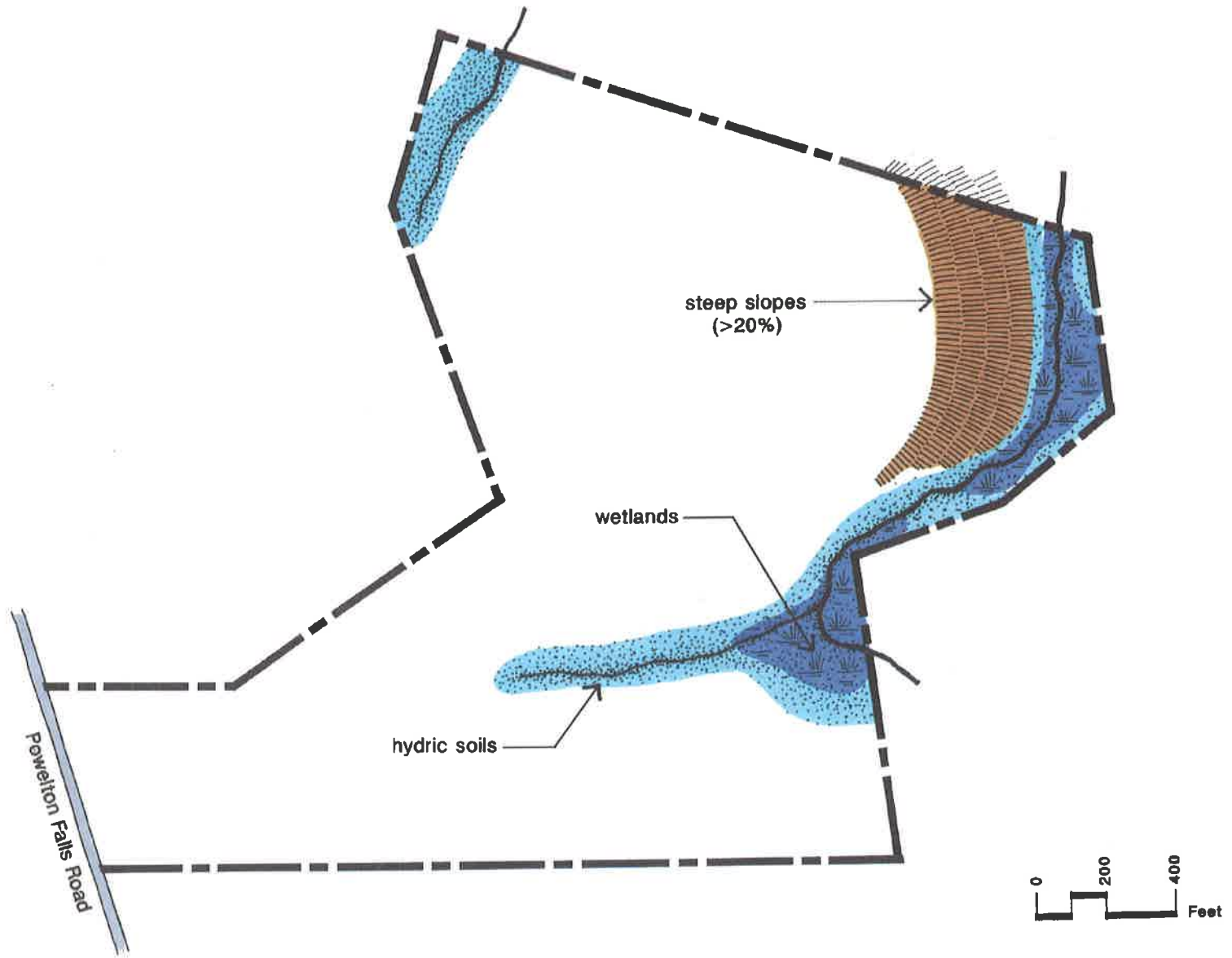


Figure 7A-4. Site A: Identifying Primary Conservation Areas

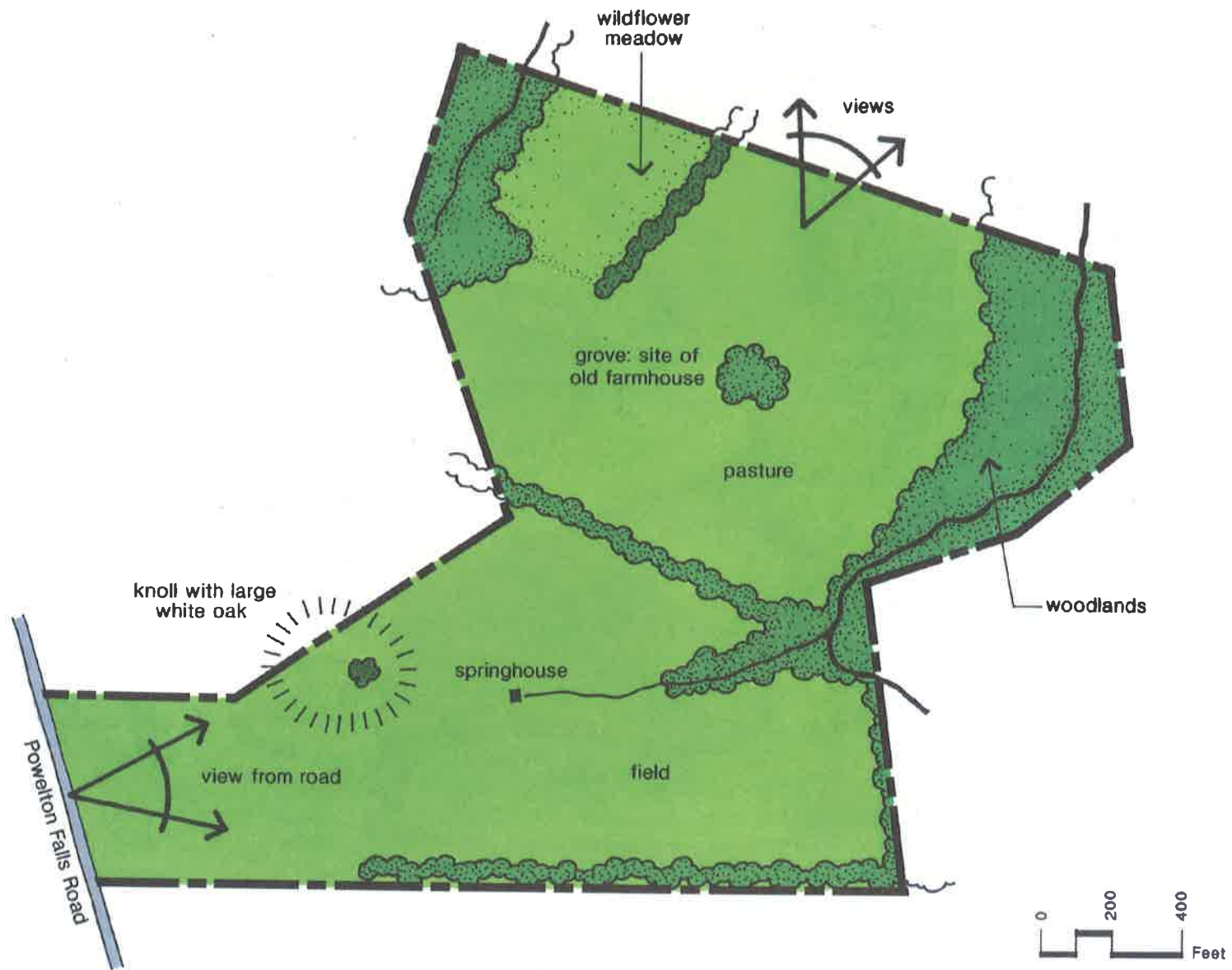


Figure 7A-5. Site A: Identifying Secondary Conservation Areas



Figure 7A-6. Site A: Identifying Potential Development Areas

such as indigo buntings, tree swallows, and bluebirds. Below them grows a dense thicket of shrubs (including black chokeberry, box huckleberry, pin cherry, American hazelnut, viburnum, elderberry and blackberry bramble) that, together with a variety of thick meadow grasses, offers excellent cover for meadow voles and other small rodents, providing abundant food sources for foxes and other carnivores.

The little hollow sheltering the spring house where Hager's Run rises is filled with rue anemone, sweet flag, marsh bellflowers, turtlehead, spearmint, milkweed, silky dogwood, and summersweet or sweet pepperbush, and the wildflower meadow in the northwest corner of the property is noted for its wild strawberry, sleepy catchfly, tall anemone thimbleweed, and broomsedge.

Under normal development circumstances, not one of these features would rate highly enough for it to be designed around and saved, or even noticed by most engineers, surveyors, developers, and realtors, who typically have little or no background in this kind of site analysis. However, taken together, they comprise the very fabric of the low-key elements that define the essential character of rural areas such as this one. More importantly, they provide food and shelter for a myriad of birds, small mammals, amphibians, and insects. (For example, milkweed is an absolutely critical plant in the life cycle of the Monarch butterfly, a species that is currently suffering markedly from the careless destruction of this kind of habitat, which is almost universally being replaced by tidy suburban lawns and conventional herbaceous borders in standard cookie-cutter subdivisions.)

After greenlining both the Primary and Secondary Conservation Areas (which together constitute the first design step), the next task is to identify potential house locations with regard to that open space. This *second step* recognizes the importance, from the standpoints of real estate marketing and homeowner enjoyment, of siting new homes carefully and deliberately to maximize the

number having interesting views of the conservation land at the bottom of the hill. For those lots that directly abut or face onto the open space, area dimensions can often be significantly reduced, as they are psychologically extended in depth by their views and vistas. The average lot size assumed in sketching Figure 7A-7 is 30,000 square feet, which allows sufficient room for wells and septic systems (provided that soils in the designated development areas are suitable for such facilities). Location of individual wells and/or septic systems within the undivided open space would be another option, as discussed in the description of alternative layouts for this site, at the end of this section.

The *last two steps* simply involve defining logical routes for new streets accessing the proposed lots (plus locations for a looped footpath system), and drawing lot lines midway between the houses. In the final layout, each and every one of the 32 lots abuts or is provided with direct views of permanently protected open space, including the informal common at the entranceway, the wetland vegetation in Spring Hollow, the wildflower meadow in the northwest corner, and the rough hillside pasture. Several homes enjoy double exposure, with front and rear views of the conservation land.

Although agriculture will probably never be resumed on the property, the green matrix of conservation land and walking trails preserves much valuable habitat and provides a neighborhood focus to help foster a sense of community, a spirit that is sadly lacking in most "checkerboard" subdivisions where all the land is converted to houselots and streets. The preferred plan also reduces development costs and simplifies the regulatory review process by eliminating the need for an expensive wetland crossing. Although the total street length would be virtually the same in both layouts, the entire street system in this land-conserving alternative is "single-loaded," meaning that practically every house faces open space from its front windows, and that walking or driv-

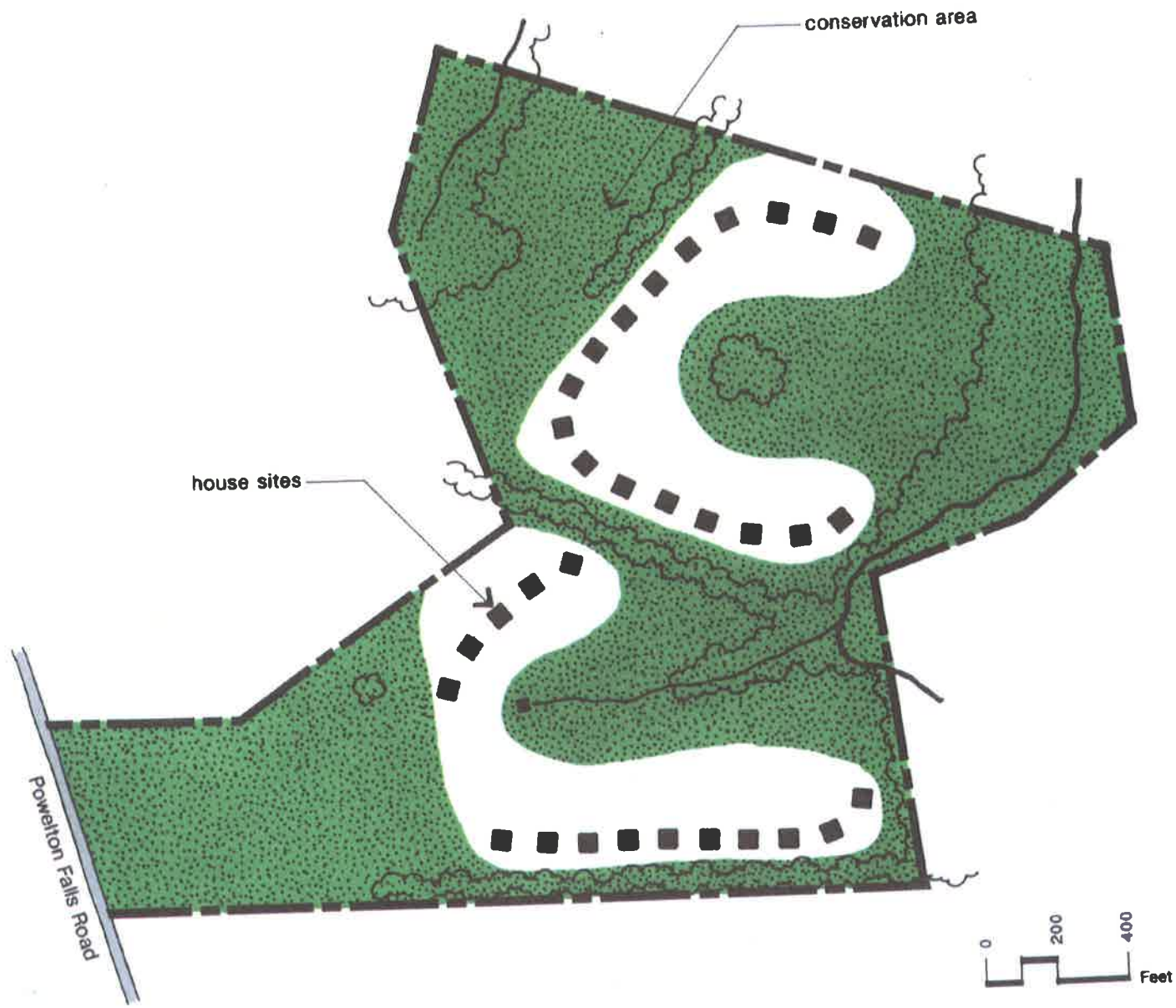


Figure 7A-7. Site A: Locating Potential House Sites

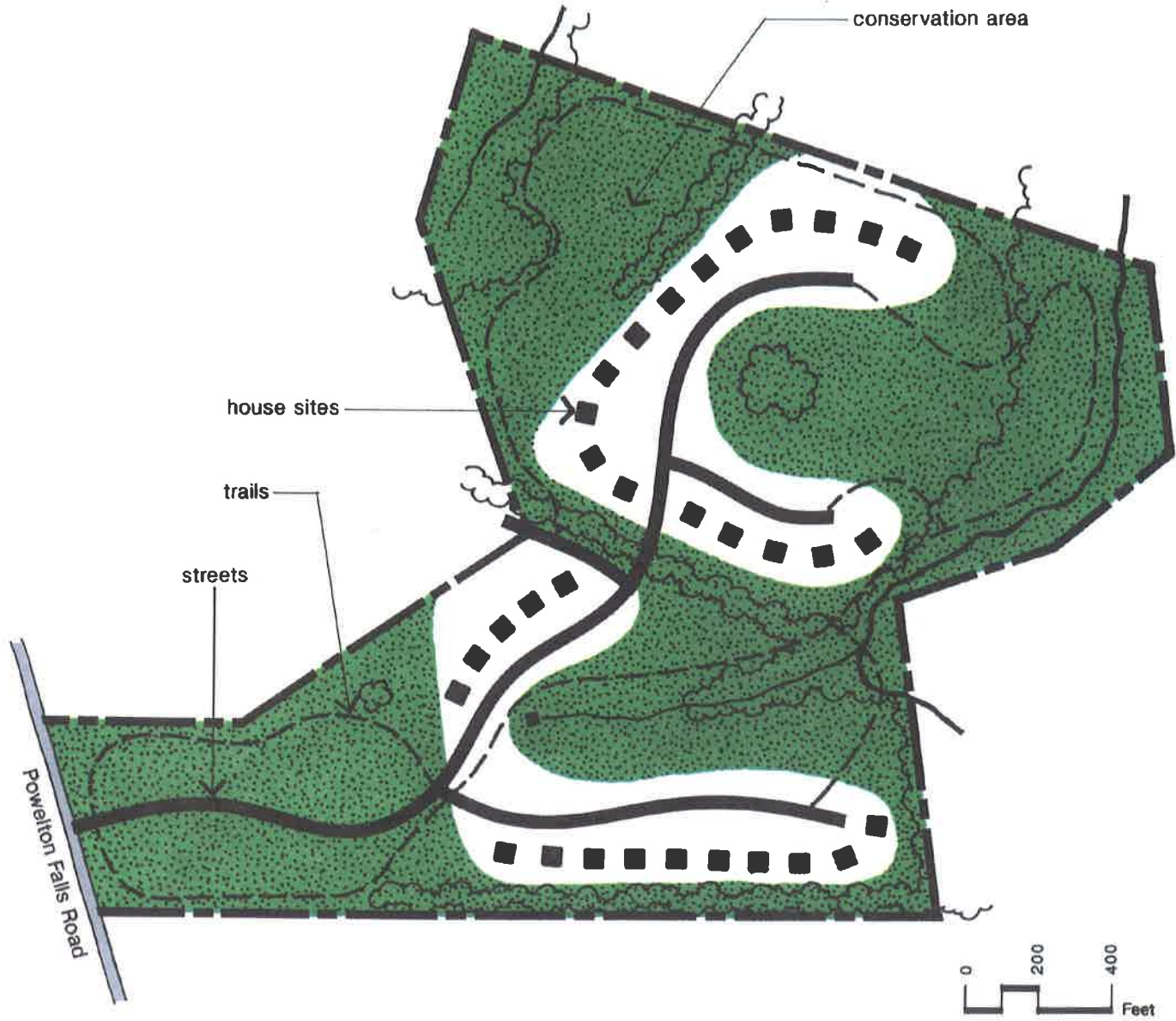


Figure 7A-8. Site A: Designing Road Alignments and Trails



Figure 7A-9. Site A: Drawing in the Lot Lines



**Figure 7A-10.** Site A: With Conservation Design

ing through the neighborhood provides both residents and visitors with a rewarding park-like experience.

### **Alternative Example: Increasing the Density by Changing the Scale of Site A**

It should be pointed out that this “conservation subdivision” approach is also viable at higher—and perhaps more common—densities in other unserved rural or suburban areas that might lie closer to urban centers. For example, if the illustrations for Site A had been drawn at the scale of 1 inch = 300 feet instead of 1 inch = 400 feet, the gross area of the property would have been approximately half the size (about 46 acres instead of 82, with 10 of them being constrained by wetlands, etc., and 36 considered “buildable”). If Site A had also been located in another township and zoned for a higher one-acre net density, the same number of conventional houselots (32) could have been created, with lots containing 40,000 square feet of net buildable land per dwelling (instead of two net acres per dwelling unit). Under this set of circumstances, a practical approach to “conservation subdivision design” would have been to propose half-acre lots with individual wells located in the undivided conservation areas (such as meadows, greens, or ballfields), close to but outside the lots they would serve. It should be noted that these smaller lots could be shaped and arranged in very much the same manner as the lots shown in Figure 7A-9, enabling the advantages and integrity of this layout to be maintained, with every lot facing or backing onto permanent open space. (See also Fig. 7A-10 for a bird’s-eye view of the property after conservation development.)

Other alternatives would include:

- locating individual septic systems in the undivided open space instead, with individual wells on each lot (assuming of course that the conservation land adjacent to each lot contains soils suitable for septic systems);

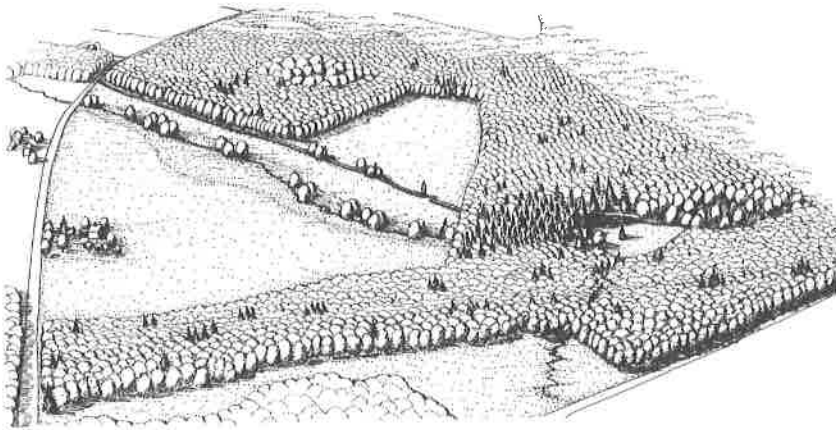
- serving lots from a central well-field in the conservation areas; and
- establishing a central sewage disposal facility (such as a community disposal field, or “spray irrigation”) on the conservation land.

These alternatives have been listed in ascending order of complexity, with the simplest and most straightforward arrangement being individual septic systems on each lot and individual wells within the conservation areas.

When individual wells or septic disposal fields are located within the undivided conservation land, the final plan must clearly show the specific areas that are being designated for such use by each houselot. These individual systems would normally be owned and maintained by each homeowner and would not, in this arrangement, belong to the homeowners’ association that owns the open space. This is not to suggest that wells or septic disposal facilities should not be owned and maintained by homeowners’ associations, but rather to point out that such community arrangements would not be necessary for the “conservation subdivision design” approach to work in unserved areas with one-acre zoning, where half-acre houselots in a “conservation subdivision” would not be large enough to accommodate both wells and septic systems.

### **Site B: MOSTLY WOODED SITE AT THE BASE OF THE FOOTHILLS**

The second site in this series consists of a 70-acre parcel situated in the foothills of the Berkshire Mountains in western Massachusetts. It is located in a formerly rural area that is steadily suburbanizing, with small subdivisions being built primarily for commuters to Amherst and Northampton to the south, Greenfield to the north, and Pittsfield to the west. Typical of much of the rural



**Figure 7B-1.** Site B: Before Development

New England landscape, this site is predominantly wooded, as is the majority of land in this part of the region. A twelve-acre field visible from Windsor Jambs Road and a five-acre field on the other side of a slough are all that remains of this pre-Revolutionary hill farm, which had been cropped intensively until the 1830s when many New England farmers migrated to western New York and beyond in search of more productive soils. A rough stone wall still marks the apparent division between a former pasture and a field.

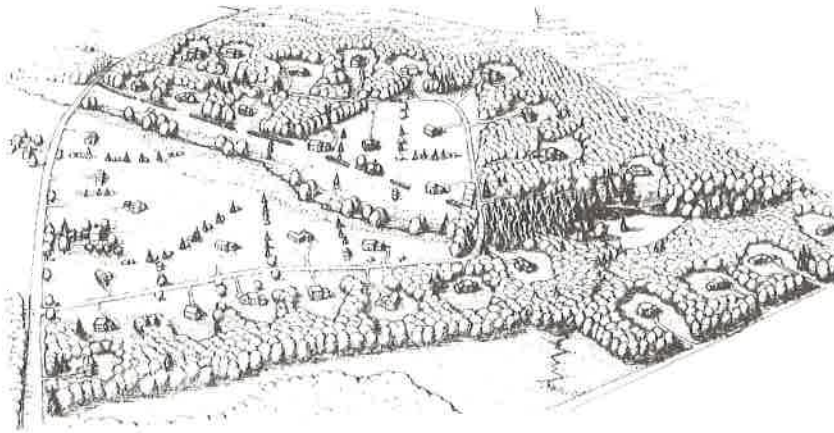
The site contains gradual to moderate slopes, the only areas of notable topography being a small knoll toward the northwest corner and some steep hillsides on both banks of Moulton Brook where it enters the property from the east. This brook flows through an old ice pond near a small grassy glade and a majestic grove of tall hemlocks, and meanders slowly through the slough where it is bordered by sunny wetlands filled with marsh marigolds, peppermint, coltsfoot, forget-me-nots, joe-pye weed, swamp candles, and red-twig dogwood. Along the upland margins are a variety of meadow flowers including brown-eyed susan, Queen Anne's lace, purple coneflower, violets, ox-eye daisy, and



**Figure 7B-2.** Site B: Yield Plan

coreopsis. Except for the hemlock grove and the knoll with tall oaks, the woodland is relatively undistinguished second- or third-growth, of mixed hardwoods and white pine.

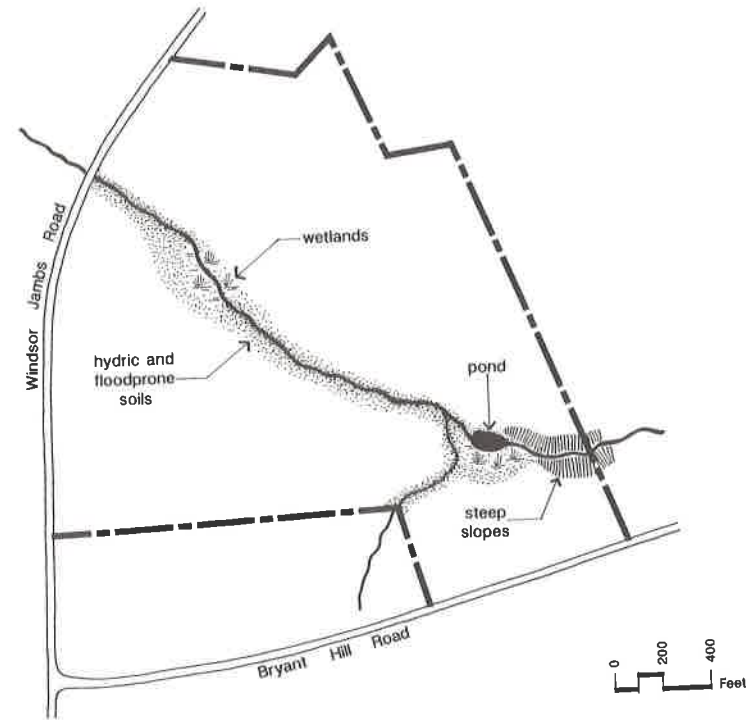
During a pre-submission walking tour of the site conducted by the applicant for the benefit of local officials, one planning board member (who was also an amateur lepidopterist) pointed out several great spangled fritillaries sipping nectar from joe-pye weed in the meadow, and a female viceroy laying eggs on the leaves of a cottonwood sapling along the brook. On their way back from the woods he also spotted a pale green monarch chrysalis dangling from the limb of a young white pine. Although none of the natural



**Figure 7B-3.** Site B: With Conventional Development

features or elements described in this or the preceding paragraph are normally protected from development, they can usually be “designed around” in such a way that they end up in future conservation areas, rather than within future houselots or street alignments.

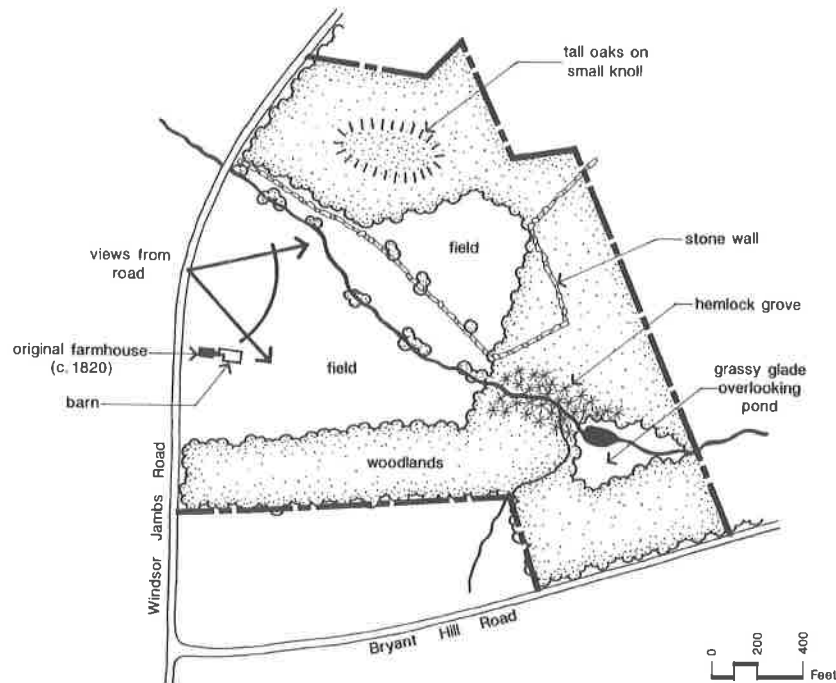
The first step in the design process involves a site analysis to identify Primary and Secondary Conservation Areas. In this case the analysis is reasonably straightforward, with wetlands limited to the stream corridor, bordered by a low-lying floodplain, and steep embankments north of the ice pond. These unbuildable features comprise the Primary Conservation Areas shown in Figure 7B-4. To these are added the Secondary Conservation Areas, including the two fields (one which affords long views into the property from Windsor Jambs Road), the knoll with tall oaks, the hemlock grove, a small gently sloping glade overlooking the pond, the old fieldstone wall, and the original farmhouse (Fig. 7B-5). From a legal standpoint, all these features could be totally disregarded (and often are) by surveyors and engineers hired by developers to



**Figure 7B-4.** Site B: Identifying Primary Conservation Areas

lay out subdivisions according to most zoning and subdivision ordinances in rural areas, because they are completely unprotected by existing regulations. Because they consist of or occupy legally buildable land, full density credit is given to Secondary Conservation Areas, and the total number of houselots that could be created on the property are accommodated on the remaining acreage, called “potential development areas” (Fig. 7B-6).

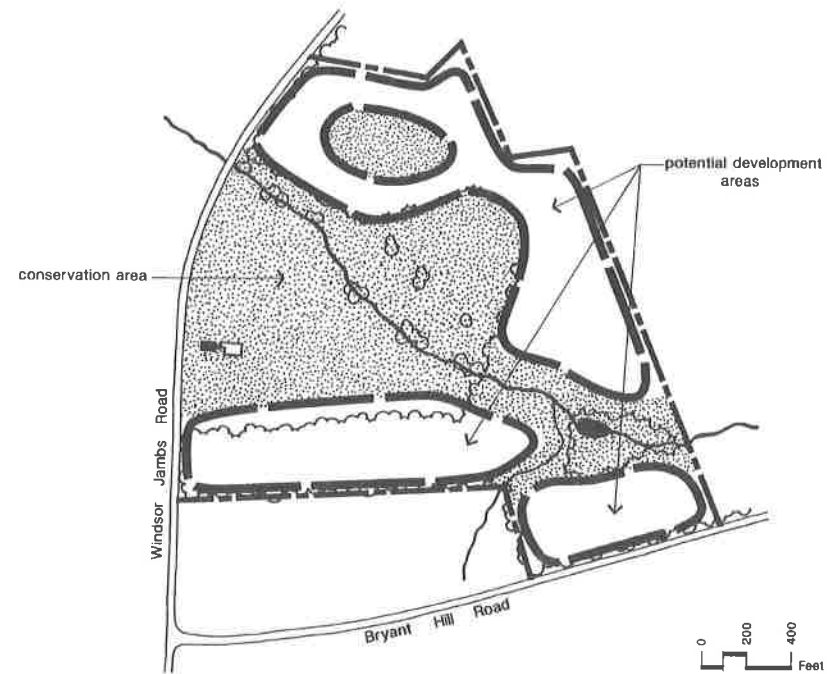
In order to determine the maximum number of houselots that could realistically be created on this 70-acre site, a “yield plan” can be prepared, or the density could be calculated arithmetically, based on a “net-out” formula provided in the zoning ordinance.



**Figure 7B-5.** Site B: Identifying Secondary Conservation Areas

The “yield plan” for this site shows 36 houselots varying in size from 1 acre to 3.5 acres, which is consistent with the yield produced by the formula<sup>1</sup> (Fig. 7B-2). In its road alignment and placement of houses it recognizes the location of the unbuildable fea-

<sup>1</sup> The zoning formula for determining density without drawing a yield plan in this New England town requires that all land classified as inherently unbuildable (wetlands, floodplains, and slopes exceeding 25%) be deducted from the site area, and that a further 10% be deducted from that net area to allow for land required for new streets. On this 70-acre site, 15 acres were identified as unbuildable, leaving 55 acres, and 5.5 acres were subtracted from that figure to allow for new streets, producing a new net area of 49.5 acres, which is rounded up to the next whole number, or 50 acres. These 50 acres are then divided by the minimum lot size of 60,000 square feet to produce a yield of 36 lots.



**Figure 7B-6.** Site B: Identifying Potential Development Areas

tures (wetlands, floodplains, and steep slopes). The only “creative” aspect of the zoning, as applied in this instance, is the provision for lot averaging, which frees the developer from having to maintain a two-acre minimum lot size as long as he does not increase the total number of lots created. However, the result produced by this provision is extremely disappointing, and it can be seen that this zoning flexibility has simply made it easier for the developer to divide the whole parcel into a checkerboard of large lots with homes more or less evenly spaced across the entire site, irrespective of its special features as identified in the Secondary Conservation Areas.

Returning to the preferred approach for designing rural subdivi-



**Figure 7B-7.** Site B: Locating Potential House Sites

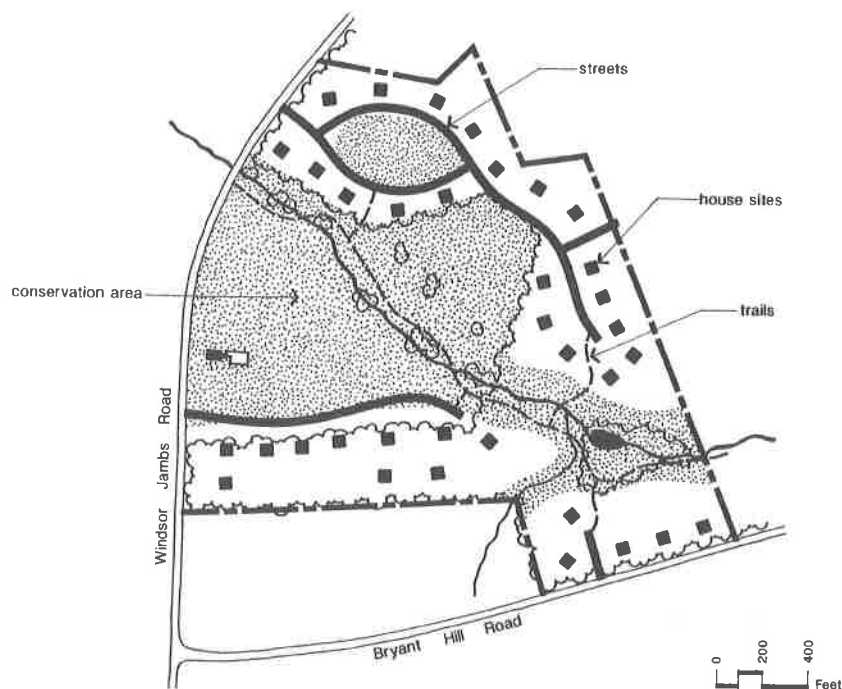
visions, the second step (after "greenlining" the open space that is to be "designed around") is to locate sites for the 36 houses that the formula and the yield plan inform us are the maximum legal density on this parcel (Fig. 7B-7). These house sites have been carefully located in order to avoid impacting the resources, but also in a manner that provides them with reasonable proximity to the special places on this site, thereby increasing both lot marketability and homeowner enjoyment.

The third step involves selecting a sensible street alignment to access all the proposed lots in a reasonable fashion (Fig. 7B-8).

Owing to a desire to avoid a wetland crossing and disturbance of the special site features in that part of the property, the preferred route consists of two cul-de-sacs off Windsor Jambs Road, plus a common driveway serving three houses off Bryant Hill Road. Both cul-de-sacs terminate with large asymmetrical loops within which existing trees have been preserved. The western cul-de-sac divides into two one-way lanes to provide access to lots on both sides of the oak knoll that has been "circumnavigated" and protected. In addition, an extensive network of footpaths and woodland trails connect residents living in all parts of the development.

All that remains to be done in the fourth and final step is to place the lot lines in a sensible manner between the 36 house sites. To a large extent, lot boundaries have been located to follow the edges of various site features such as the woodland, the hemlock grove, the grassy glade, the steep embankments, and the old fieldstone walls. Another aspect of the lot layout is that it contains two "flag lots," a shape that is often specifically prohibited by ordinance restrictions. If properly regulated, this design technique can benefit all parties by enabling site designers to locate a few homes in odd corners of a site where they can enjoy greater privacy without encroaching further into other parts of the property (Secondary Conservation Areas, for example), or requiring additional street length for lot frontage. On wooded lots nearly an acre in size there is usually sufficient vegetative screening to afford privacy between homes, especially when they have been sited with this consideration in mind.

The final layout contains 36 houses on lots of about 35,000 square feet (0.8 acres), all but six of which directly abut or face onto nearly 40 acres of protected open space. Twenty homes enjoy views of the open fields uncluttered with suburban development, two abut the majestic hemlock grove, two adjoin the preserved glade overlooking the ice pond, and eight are arranged around the two-acre knoll with tall oak trees. The two fields, to-



**Figure 7B-8.** Site B: Designing Road Alignments and Trails

talling just 17 acres, are leased on a long-term basis by the homeowners' association to the proud new owner of the original farmhouse, a local attorney who enjoys being a gentleman farmer evenings and weekends, tending two horses, a few Belted Galloway cows, and a small flock of Dorset sheep. Unlike the yield plan, where the old farmstead becomes just another house lining the existing town road, the preferred approach treats this fine vernacular building with the dignity it deserves, by preserving much of its rural context. (In actuality the farmstead is not simply a building but rather a complex of buildings constructed at different

times and physically connected in the venerable New England tradition of "big house, little house, back house, barn.")

Thus the ultimate development design has preserved the cultural landscape of a farmstead with old fields and rustic stone walls in addition to protecting several natural areas worthy of special treatment. For example, the simple act of drawing conservation areas to include the many small patches of violets helps provide essential habitat for the great spangled fritillary, a butterfly species that deposits its eggs only on that type of plant. Residents have the sense of living in the countryside rather than in a standard tract development, and opportunities to enjoy the outdoors and meet informally with neighbors are provided by the newly established trails connecting each street with the site's special features. The open space layout possesses many unique advantages over the alternative large-lot, cookie-cutter design, and it offers its residents a truly better place to live.

### *Postscript*

Appendix B contains three alternative layouts for Site B generated by three groups of citizen participants who attended a workshop on the "four-step" method of designing conservation subdivisions conducted by the author in January 1994. These designs were generated by applying the methodology in this handbook to the information contained on the maps of Primary and Secondary Conservation Areas for Site B (Figs. 7B-4 and 7B-5). Although none of the participants had previously seen any of the other drawings in this chapter for that site, their design solutions all strongly resembled the general pattern of houselots and conservation land shown in Figure 7B-9. Interestingly, the three solutions contained different street systems and different lot configurations, but they all exhibited similar conservation features and they all maximized the number of houses directly abutting the protected open space, affording rural views to the majority of homeowners.



Figure 7B-9. Site B: Drawing in the Lot Lines



**Figure 7B-10.** Site B: With Conservation Design

### Site C: ADJACENT TO A SHALLOW BAY AND TWO TIDAL CREEKS

This 58-acre site is located in the Lewes and Rehoboth Hundred<sup>2</sup> of Sussex County, Delaware, and is bordered on three sides by wetlands, floodplains, tidal creeks, and bayshore. The bay is one of the three "Inland Bays" of southern Delaware that are noted for their extremely shallow depth (averaging three feet) and their single outlet to the sea, which greatly limits the natural "flushing action" they receive. As a result, these bays are highly vulnerable to water quality degradation, and their habitat is considered to be quite fragile.

The central portion of the site, which is relatively high and dry, is about equally divided between woodland and farmland (see Fig. 7C-1). The property is served by public water and sewer, but if sewer were not available, "land treatment" (or "spray irrigation") would be the preferred alternative to scores of individual septic systems in this progressive county. This part of the Delmarva peninsula attracts large numbers of retirees, who choose to settle here because of its tranquility, access to the water, and mild winter temperatures (which permit year-round golfing, a favorite pastime in these parts).

The background stage begins with a site analysis and an understanding of the local context. Locationally, the site is notable for

<sup>2</sup>The ancient sub-county system of "hundreds" still survives in Delaware and parts of Virginia. Hundreds were originally the intermediate unit of government between village and shire in medieval England and were so called because they initially contained 100 free families, their dependents, and the land needed to support them—typically about 120 acres each (or nearly 20 square miles altogether). Monthly meetings were held in the open air in each hundred from the 10th century until the end of the Middle Ages, and at these "moots" or assemblies, justice was administered to cattle thieves, millers who took excessive toll of the flour they ground, and freemen who failed their community obligations in maintaining essential infrastructure such as public roads, sea dikes, and drainage ditches.

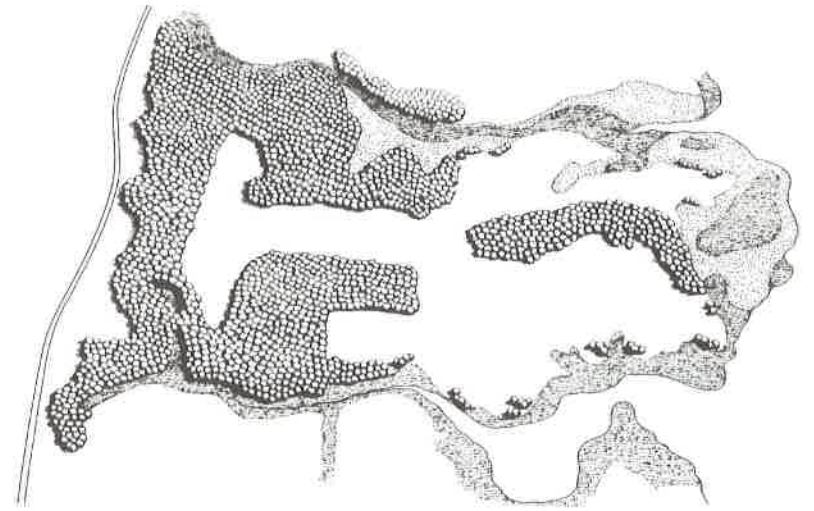


Figure 7C-1. Site C: Before Development

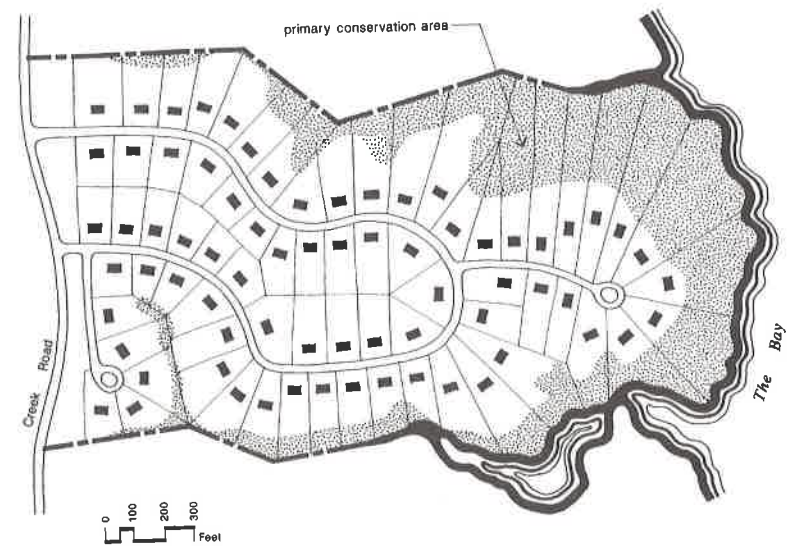


Figure 7C-2. Site C: Yield Plan



Figure 7C-3. Site C: With Conventional Development

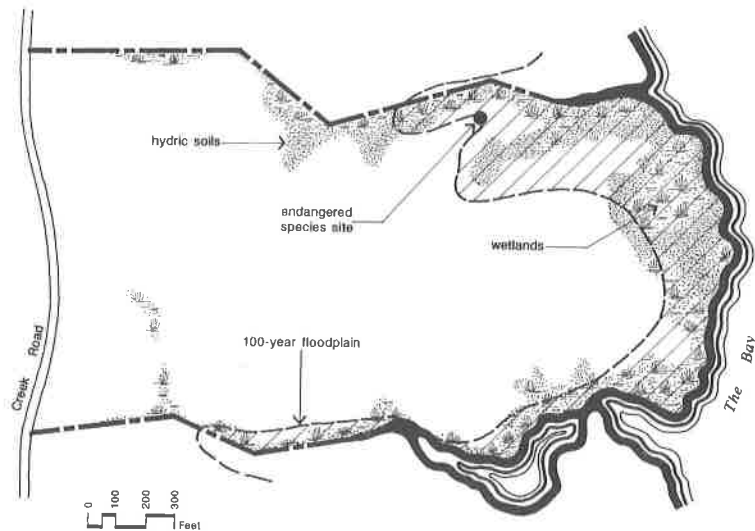


Figure 7C-4. Site C: Identifying Primary Conservation Areas

the high proportion of its perimeter that abuts environmentally sensitive land, where dry upland habitat meets low-lying wetland habitats. Even without a detailed wildlife study by a conservation biologist, there is a strong presumption of high wildlife value in these areas between the upland edge and the water. Such locations are typically used as travel corridors and nesting areas by local wildlife. Among the "Primary Conservation Areas" identified in Fig. 7C-4 are tidal wetlands, the 100-year floodplain, and three endangered species areas. This information, all from published or readily available sources (described in Chapter 5), is confirmed in conversations with the landowner and through a field check. The site analysis is completed with a second overlay sketch outlining "Secondary Conservation Areas," in this case an archaeological site (of Lenni-Lenape origin) and the upland woods that are a higher priority for conservation than the farmland because of their greater natural diversity and relative scarcity in this largely agricultural county. The exact location of these woodlands is determined by tracing enlargements of recent vertical aerial photographs. An informal vegetation survey has documented the presence of a rich variety of native trees, shrubs, and plants in these woodlands, including loblolly pine, pignut hickory, sweet gum, Southern red oak, tulip poplar, sassafras, sweetbay magnolia, American holly, evergreen bayberry, wax myrtle, winterberry, and red chokeberry. Among the meadow plants found along the field margins are chicory, goldenrod, milkweed, ox-eye daisy, bachelor's button, corpeopsis, and a strikingly beautiful reddish grass known as broomsedge or andropogon.

Areas deemed most suitable for development are the agricultural fields that occupy the remaining sections of the property. In addition to the fact that they do not provide critical habitat for the county's dwindling wildlife population, another environmental reason for favoring this part of the site for development is that commercial farming, as practiced in this area, unquestionably contributes to water quality problems in both the groundwater and

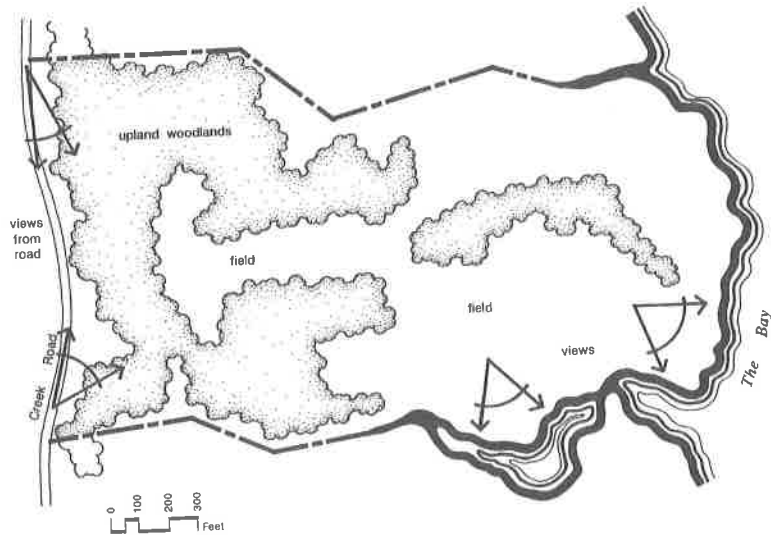


Figure 7C-5. Site C: Identifying Secondary Conservation Areas

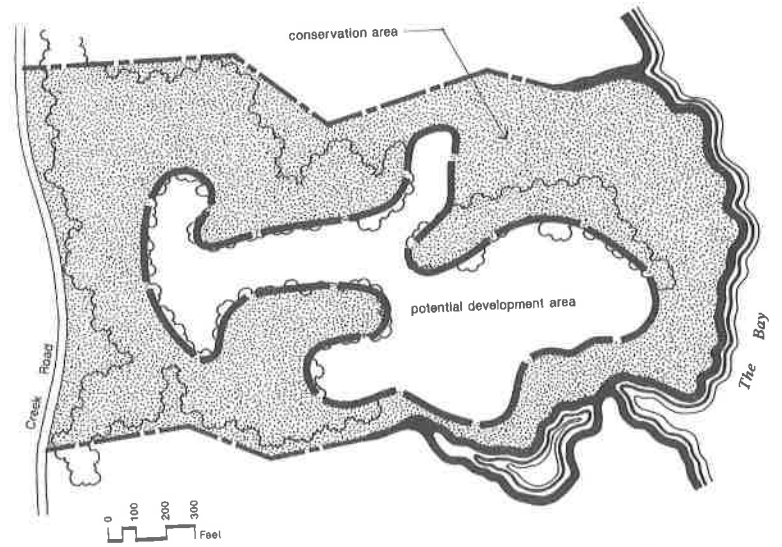


Figure 7C-6. Site C: Identifying Potential Development Areas

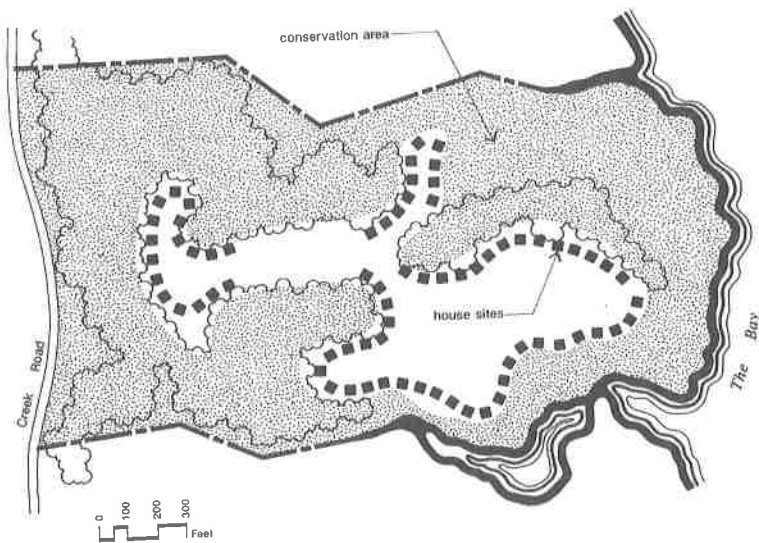


Figure 7C-7. Site C: Locating Potential House Sites

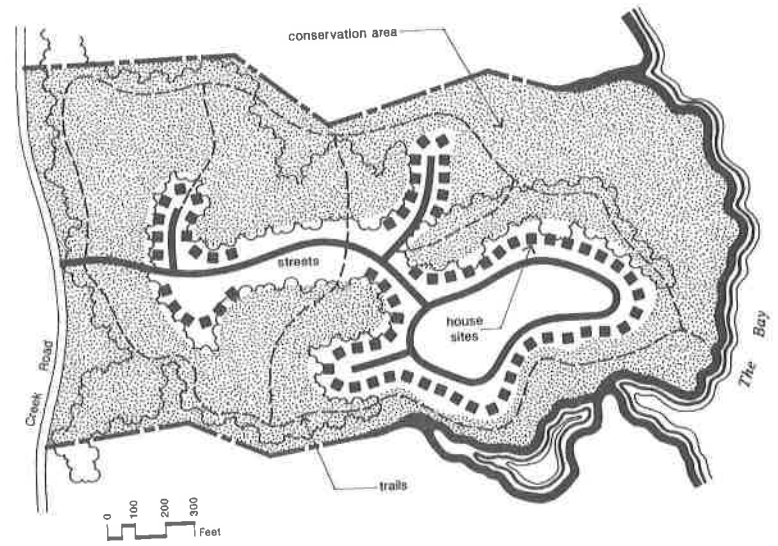


Figure 7C-8. Site C: Designing Road Alignments and Trails

surface waters. Conversion of such fields to residential development is preferable in the view of many observers because it is relatively easy to control stormwater runoff from new subdivisions, and because homeowners typically use fewer pesticides, herbicides, insecticides, and fertilizers than do most commercial farmers.

Outlining potential areas for conservation and construction constitutes the first step in the four-step design process for open space development. The second step consists of locating house sites within the proposed development areas. As in golf course communities, a principal consideration is maximizing the number of homes that will have pleasant views of the water, wetlands or interior open spaces. From a real estate perspective, homes without views should, whenever possible, at least abut wooded open space at the ends of their backyards for screening, privacy, and rural feeling. The total number of homes permitted is determined by a "yield plan" executed in a conventional "cookie-cutter" design. The conceptual "yield plan" for this site shows such a sketch, with 72 lots. (Of the 58 acres, only 40 were found to be buildable, and after deducting 10% for streets, 36 remained available for development. With Sussex County's half-acre zoning for fully serviced land, the yield would be 72 lots, as shown in Figs. 7C-2 and 7C-3.)

In place of standard 100 ft × 200 ft half-acre lots shown on the checkerboard "yield plan," the conservation subdivision approach in this case employs lots that are 50 to 60 feet wide and about 100 feet deep (5,000 to 6,000 square feet). At the present time Sussex does not allow cluster lots smaller than 7,500 square feet, but these drawings were prepared to illustrate the benefits of allowing more lot size flexibility, based on zoning recommendations made pursuant to the Recreation and Open Space Element of the *Coastal Sussex Land Use Plan*. These are substantially larger than townhouse lots in golf course communities in similar areas (which are extremely popular in the county), and are in fact large enough to permit single-family detached homes (as illustrated in Appendix

C). As discussed at the end of Chapter 5, to maximize livability such lots should be developed with the following principles in mind:

- To compensate for the lesser lot width, *houses should be located off-center* (zero to five foot setbacks on one side, with all or most of the side yard space provided on the other side).
- To compensate for the shorter lot depth and smaller back yards, *houses should be situated closer to local streets*—with modest 12-foot front setbacks from the sidewalk or right-of-way line—and should back up to open space or vegetative buffers wherever possible. (This last point is particularly significant because adjacent open space psychologically extends one's sense of boundaries, so that homeowners do not feel "closed in.")

After identifying potential conservation and development areas and locating proposed house sites, the third step in this creative design process is to access the homes with a street system (Fig. 7C-8), and the final step is to draw in the lot lines (Fig. 7C-9)—except in the case of condominiums.

Comparing the two broad alternatives (conventional and conservation design), 17 homes on the conservation plan (Figs. 7C-9 and 7C-10) enjoy direct views to the southern creek or westward to the bay, compared with 12 homes on the conventional layout. The northern creek is only a short inlet, just 300 or so feet in length, and is not a large factor in either layout. The greatest difference lies in the fact that *all but two of the houselots on the conservation plan face onto or abut the large six-acre central green, the long meadow, or the upland woods*, whereas 25 (more than a third) of the houselots on the conventional design are completely surrounded by other houselots, with no views of anything more uplifting than the street in front and neighbors' yards on the other three sides.

The fact that more than 70% of the site has been retained as open space on the recommended plan (with much of it visible from the street and from one's windows) offers a special market-

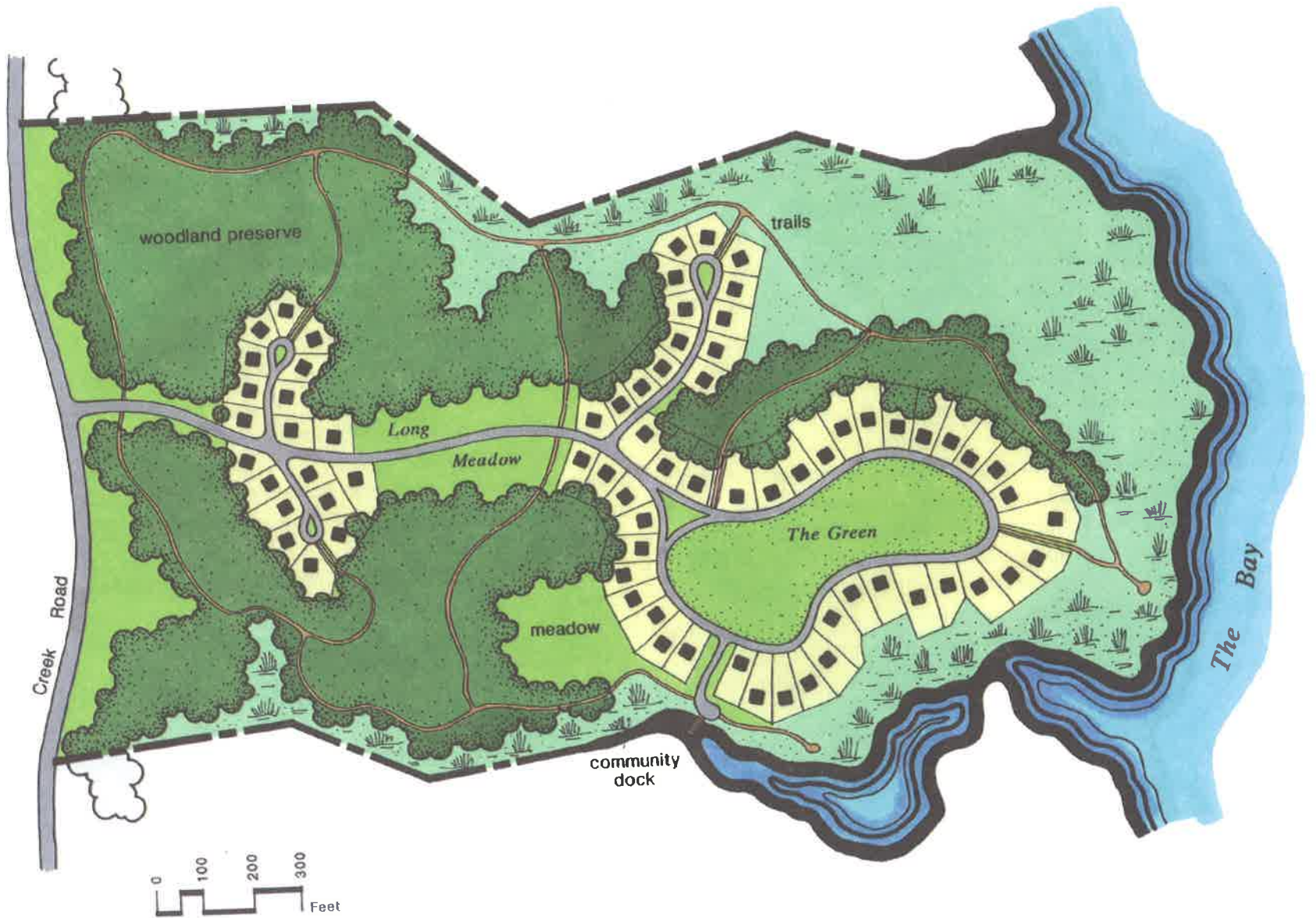
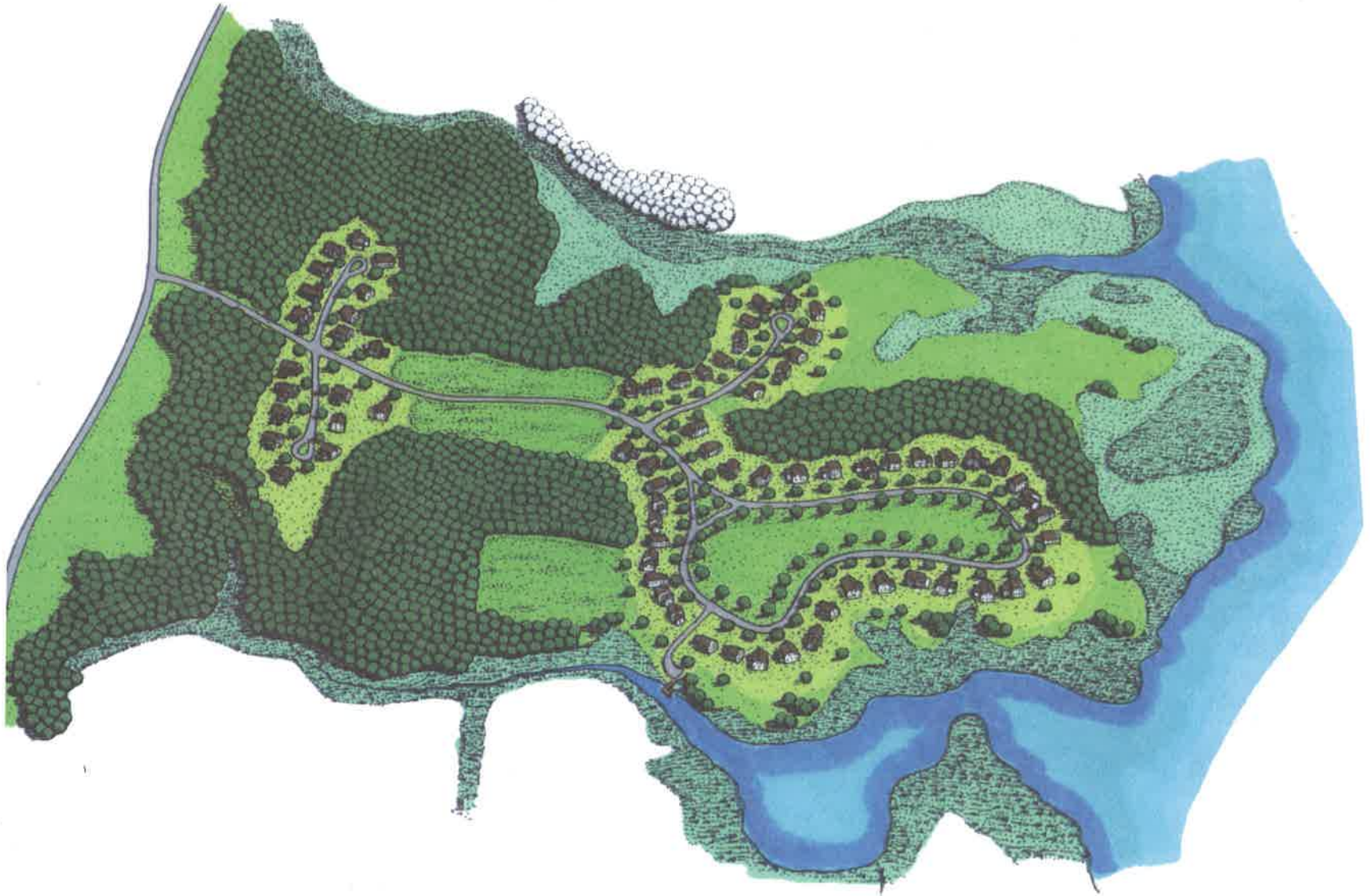


Figure 7C-9. Site C: Drawing in the Lot Lines



**Figure 7C-10.** Site C: With Conservation Design

ing strategy to a growing number of people who are seeking homes with less maintenance responsibility and greater opportunities to enjoy looking at and walking through natural areas, such as those located along the extensive soft-surfaced trail system provided by this successful developer. The woodland preservation areas and the continuous greenway buffer along the water comply fully with the recommendations of the state environmental agency, whose positive recommendation for plan approval can be expected to help smooth and expedite the review process. One of the concerns often raised by conservation biologists is that new development that fragments and diminishes formerly large woodland areas is having a negative impact on the “neo-tropical” songbirds that spend their summers here in North America, breeding and feeding, and which migrate to the southern hemisphere every fall. A development pattern such as the one illustrated on this site (and to a lesser extent on Sites A and D, as well) should mitigate those impacts and help to preserve the remaining woodlands in these predominantly agrarian areas.

On a more mundane level, street length is comparable in both plans—an estimated 5500 feet on the conventional layout versus 5400 feet on the conservation design layout. Street length could have been reduced on the conservation plan, but part of this design's attractiveness is due to the road segments that cross woodlands and meadows and have homes on only one side, rounding the central green. In the conventional layout the streetscape is always the same on both sides: lawns, housefronts, driveways, and garage doors.

### **Alternative Examples**

In closing, it should be noted that this design approach, conserving 75% of Site C as open space, would also work well in other areas with lower zoning densities. For example, with base zoning of one acre per dwelling, the resulting lots would be one-quarter

acre (instead of 5,000 square feet). Alternatively, with base zoning of two acres per dwelling, the lots would be one-half acre.

### **Site D: UPLAND PASTURE, WATER MEADOWS, AND SMALL CREEK**

This 63-acre site, located in the rolling Pennsylvania countryside, lies at the edge of the Philadelphia metropolitan area where suburban development pressures and rising land values have combined to discourage commercial agriculture, which is steadily declining. Serious farmers are gradually moving westward into Lancaster County, where many townships have enacted effective agricultural zoning ordinances (which keep land costs to a reasonable level related to their resource value), and further west into rural Ohio and Indiana, where farmland is still inexpensive because of its greater distance from growing metropolitan centers.

This particular property contains no soils rated “prime” or “of statewide importance” and was last used for haying as part of a former dairy operation. About 90% of the site has been cleared for agriculture, including (uncharacteristically) most of the low-lying land along Lyons Run, where water meadows provided fresh pasture during the late summer when other parts of the property were dry. This small creek, which is fed by springs rising from the underlying limestone formations, is known for its brook trout. A favorite fishing spot for local fishermen, the creek flows through the site from township-owned land on the east to a state forest on the west. For a bird's-eye view of the site, as it presently appears, see Figure 7D-1.

The “background stage” begins with a site analysis and an understanding of the local context. In terms of its principal features, the site is notable for its central watercourse, floodplain, and associated wetlands. Significantly, the creek's water quality rating is in the highest category set by the state environmental agency. (Fishermen have reported increased populations of trout and perch

since the dairying operation ceased eight years ago, with cows no longer stirring up the muddy bottom, trampling the highly erodible banks, and adding to background nitrogen loadings.) A quick botanical survey performed by a local high school biology teacher serving on the township's planning commission revealed the presence of a number of interesting plant and shrub species, including marsh buttercup, coreopsis, broomsedge (*Andropogon virginicus*), trout lily, buttonbush, swamp milkweed, Virgin's Bower, inkberry, silky dogwood, sweetspire, and winterberry. Locationally, the presence of public land on both the upstream and downstream ends of the property is an important feature. The potential of this corridor has been recognized by local planning officials as a high priority candidate for the township's first greenway trail project in their recent comprehensive plan.

According to the medium-intensity soil survey published by the USDA Natural Resources Conservation Service, only the higher land is at all suitable for on-site septic sewage disposal, and even then locations must be selected carefully. About one-third (19 acres) of the 63-acre site is constrained by periodic flooding, wet-

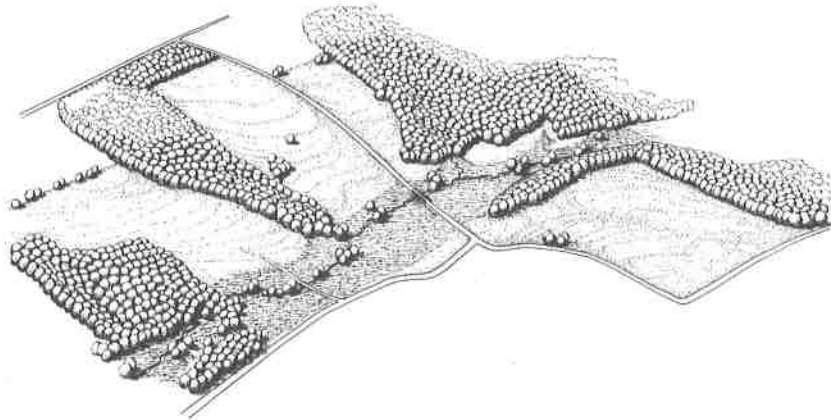


Figure 7D-1. Site D: Before Development

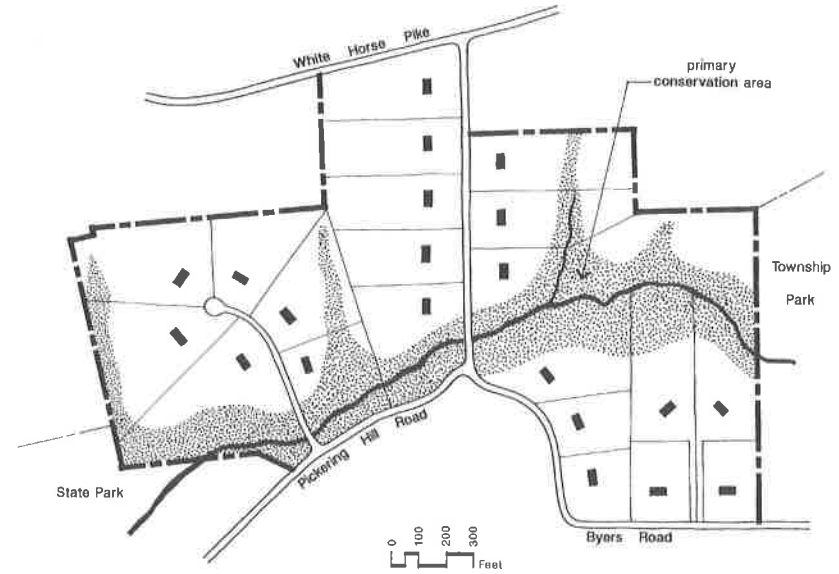


Figure 7D-2. Site D: Yield Plan

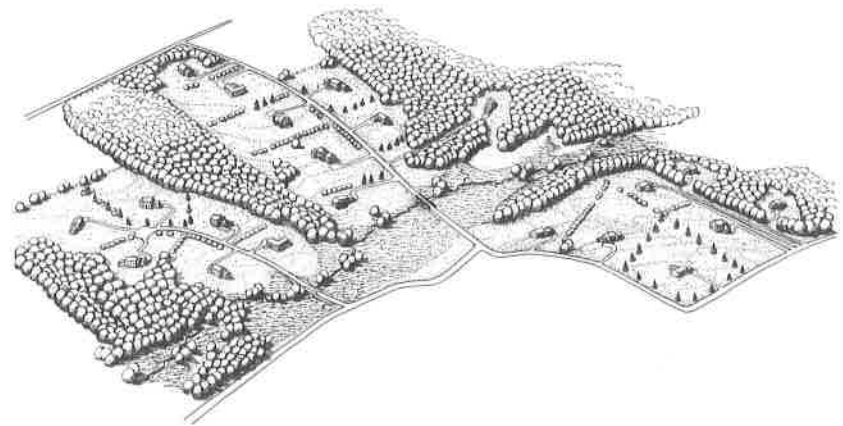


Figure 7D-3. Site D: With Conventional Development

lands, and hydric soils. These unbuildable soils constitute what is known as the "Primary Conservation Areas" on the site, shown in Figure 7D-4. To that are added the "Secondary Conservation Areas," which comprise roughly half the residual land (21 of the remaining 44 acres). Although by their nature these "Secondary Conservation Areas" encompass land that would otherwise be buildable, the landowner's development potential is not diminished because the open space design approach provides for full density to be accomplished on that part of the buildable land that is not designated for permanent conservation. On this relatively uncomplicated site, the obvious locations for designating "Secondary Conservation Areas" are the small wooded margins providing the only upland habitat on the parcel and the highly visible four-acre meadow located at a sharp right angle bend in Byers Mill Road. Within the woodland is a small area, less than half an acre, where the trees are skinnier and the ground layer of vegetation is not nearly as lush as it is in the surrounding woods. Several out-

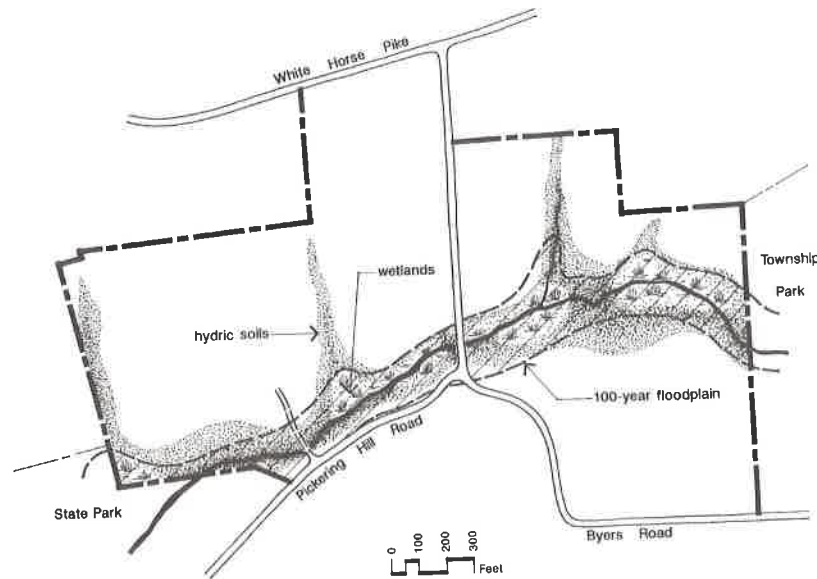


Figure 7D-4. Site D: Identifying Primary Conservation Areas

croppings of a greenish hue confirm that this area is underlain by serpentine bedrock, a crystalline formation whose chemical composition contains certain elements that inhibit most species of plant life. The relatively few plant species that do inhabit these areas (such as the mountain pink and the serpentine-barrens aster) are rather rare, and for this reason serpentine "barrens" (as they are called) are considered to be somewhat special places by botanists. In the absence of any historic, archaeological, or cultural features, or any other notable wildlife habitats, the Secondary Conservation Areas are as shown in Figure 7D-3.

Outlining potential areas for conservation and development, as described above, constitutes the first step in the four-step design process. This step is shown in Figures 7D-4 through 7D-6.

The second step consists of locating house sites within the proposed development areas (Fig. 7D-7). As in golf course communities, a principal consideration involves maximizing the number of homes that will have views of the creek and the surrounding pro-

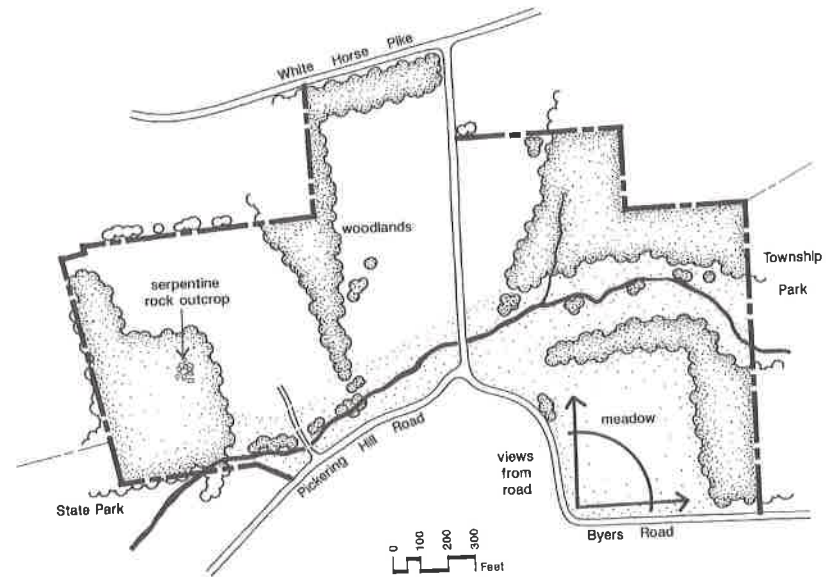


Figure 7D-5. Site D: Identifying Secondary Conservation Areas

tected open space. The total number of homes in a conservation design should be equal to the number that could realistically be built in a conventional “cookie-cutter” design. The conceptual “yield plan” in Figure 7D-2 shows that no more than 21 houselots could be created on this unserved parcel, owing to environmental constraints and the township’s density requirements for conventional subdivisions (two acres per dwelling, exclusive of wetlands, floodplains, and steep slopes on each lot). This pattern of “wall-to-wall houselots” is graphically illustrated in Figure 7D-3.

It should be noted that this result is consistent with that obtained by using the township’s zoning formula for determining the number of allowable houselots in conservation subdivisions. According to that formula, the 63-acre site’s net buildable area is calculated by first subtracting the 19 acres of wetlands, floodplains, hydric soils, and steep slopes and then deducting 10% of the remaining land to allow for new street rights-of-way. This exercise produces a net buildable area of 39.6 acres (63 minus 19 equals 44,

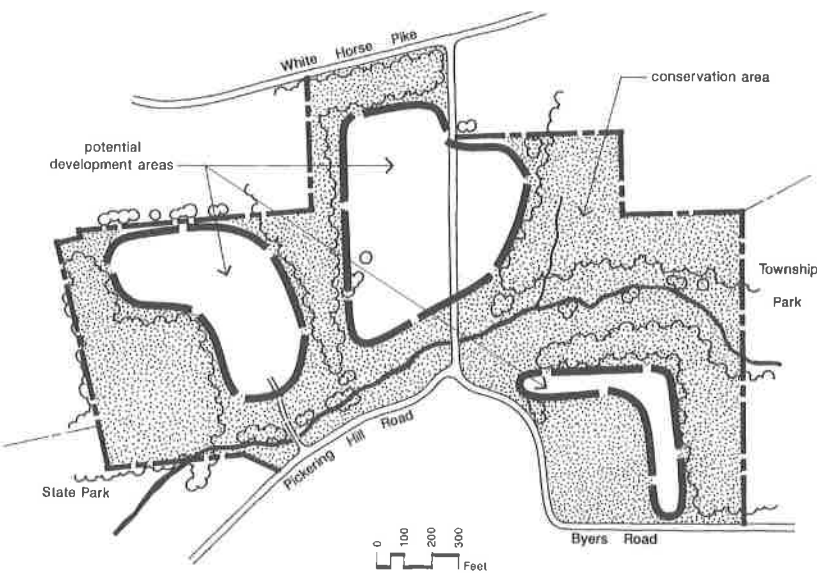


Figure 7D-6. Site D: Identifying Potential Development Areas

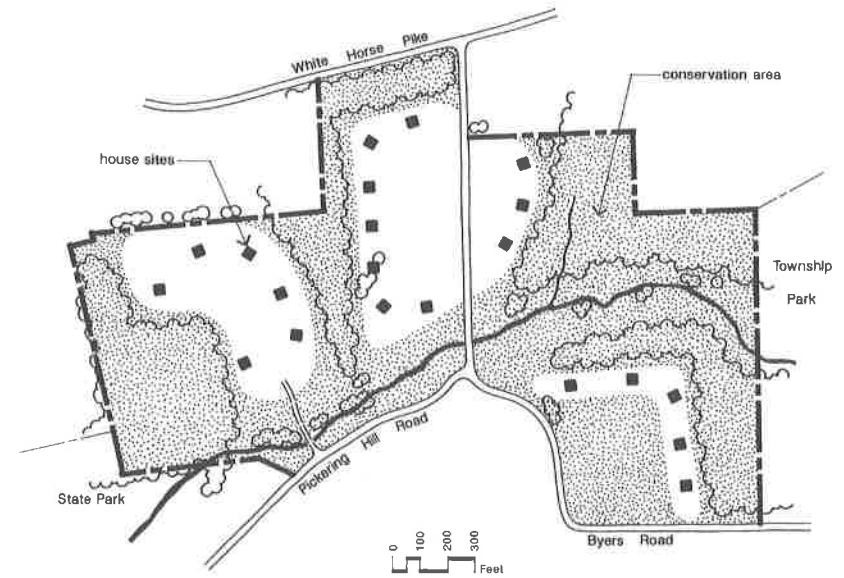


Figure 7D-7. Site D: Locating Potential House Sites

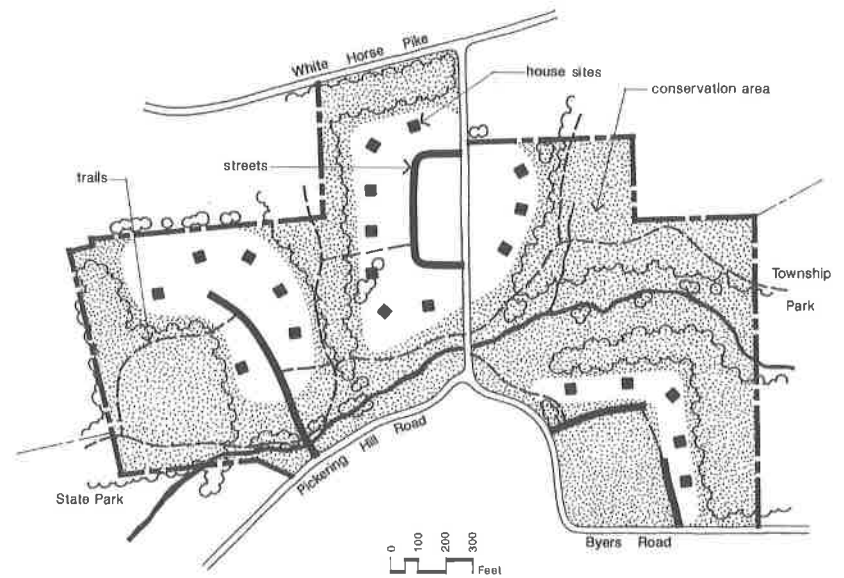
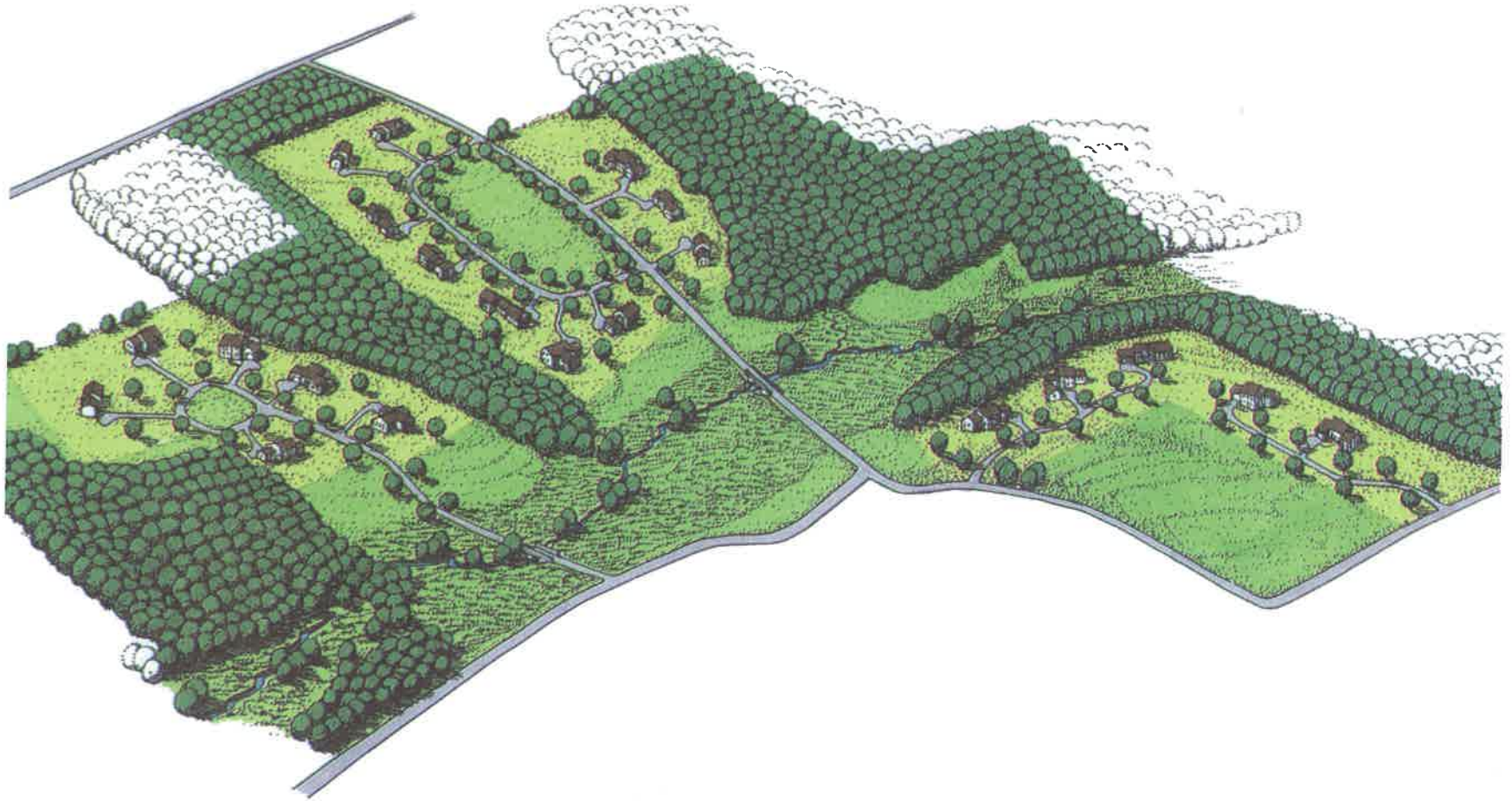


Figure 7D-8. Site D: Designing Road Alignments and Trails



Figure 7D-9. Site D: Drawing in the Lot Lines



**Figure 7D-10.** Site D: With Conservation Design

minus 10% equals 39.6). Dividing 39.6 acres by the minimum amount of unconstrained land required per dwelling unit in this township in open space developments (82,000 square feet) produces a yield of 21 houselots.

The conventional layout on the "yield plan" observes the Primary Conservation Areas and locates the homes away from them, but it does nothing more in the way of resource protection or neighborhood access to the stream corridor. The entire site is divided into a large checkerboard pattern of houselots and streets, with lots typically ranging from two to three acres each, segmenting the stream into seven separate ownerships in a most unnatural and unneighborly way.

After identifying potential conservation and development areas and locating proposed house sites, the third step in this innovative design process is to access the homes with streets and common driveways (Fig. 7D-8), and the final step is to draw in the lot lines (Fig. 7D-9).

In contrast to the oversized "houselots" on the conventional layout—which are too large to mow but too small to plow—the conservation subdivision design provides more reasonably sized one-acre lots on the land that is most suitable for individual wells and septic systems. Each of these lots faces onto or abuts 40 acres of protected greenway open space, and a larger number (eight) enjoy views of the creek, compared with six or seven in the standard layout. Four homes along Byers Mill Road are located well back from the roadway at the far edge of a four-acre meadow whose permanent protection ensures that the scenic vistas from the public thoroughfare will always be enjoyed by passing motorists. The 1.5-acre "common" along Pickering Hill Road buffers a group of seven houses from traffic noise and creates a village-like setting for these homes that would otherwise be lined up along this fairly busy connector street. In addition to introducing fewer new driveway entrances along existing township roads, the conservation layout creates an extensive trail system linking every house with the creekside footpath, the state forest, and the future municipal park

to the west. In addition, the serpentine area and its associated plant community have remained undisturbed, instead of being cleared, loamed, and converted into a suburban backyard.

Although the conventional layout possesses the same overall density, its checkerboard development pattern with no undivided common land forecloses the possibility of a neighborhood footpath system and precludes the opportunity to manage the bulk of the property in an environmentally responsible manner. Instead of huge lawns around every house, with fertilizers and weed killers applied to the grass right down to the edge of the creek, the 40-acre conservation area will be managed according to a model *Maintenance and Operations Plan*, which the township has adopted to help developers prepare a mechanism and game plan to look after the open space in a way that will enlarge the wildlife habitat and help keep excessive nutrients from reaching the creek (see Chapter 9 for further details on such management plans). For example, part of that management plan would probably be to allow indigenous plants and shrubs to continue growing in the water meadows and upland margins along the creek, and it might also include the judicious introduction of compatible species from other areas to further certain wildlife objectives (such as planting buddleia bushes to supplement native milkweed, goldenrod, spearmint, red clover, and Queen Anne's lace, enhancing the habitat for monarch, swallowtail, and fritillary butterflies).

Both the conventional and the conservation layouts include several "flag-lots," a harmless variation on the ubiquitous "pie-shaped" lot found at the end of many cul-de-sacs. Although they are not inherently defective or detrimental, many jurisdictions prohibit lots resembling flags, pork chops, or pipe stems, as these shapes are variously referred to. Concerns about such lots containing excessively long extensions, providing too little land around their house sites, or reducing the backyard privacy of people living in homes in front of them are more appropriately addressed through design standards establishing parameters for the way such lots are laid out.

## Site E: LAKEFRONT SITE IN THE NORTHERN WOODS

The fifth site in this series consists of a 46-acre parcel located alongside one of the many glacial lakes found in central Wisconsin. The parcel is heavily wooded except for an interior meadow and a small boggy area in which rises the headwaters spring for the small unnamed brook that flows diagonally across the site into Lake Leopold. Mixed hardwoods and conifers such as sugar maple, white pine, hemlock, and balsam fir dominate the second-growth woodland that is fairly typical of this part of the state. Several locations on the property, however, contain small groups of unusually tall and mature specimens.

The subject property is part of a much larger parcel owned by a prominent Milwaukee family that has maintained a large estate and hunting lodge on the lake for several generations, but which for financial reasons is compelled to liquidate part of its lakefront for development. Fortunately the family's orientation has traditionally been toward conservation, an approach that has been in-

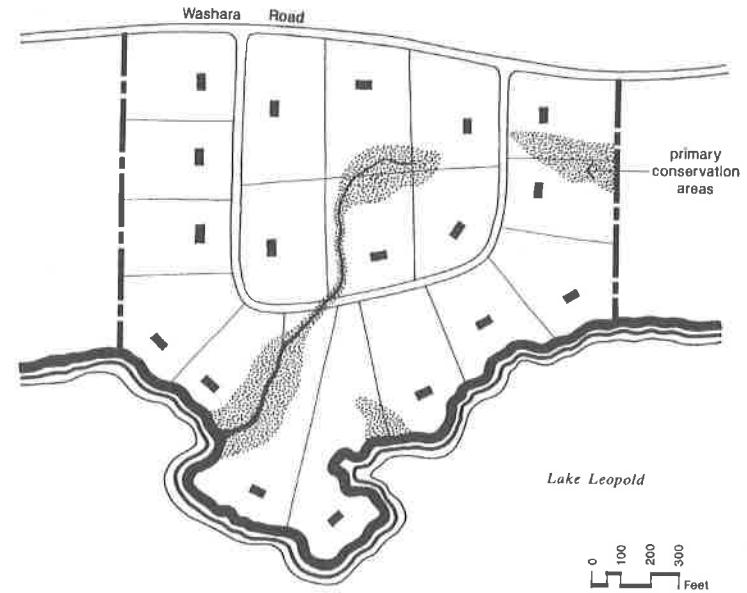


Figure 7E-2. Site E: Yield Plan

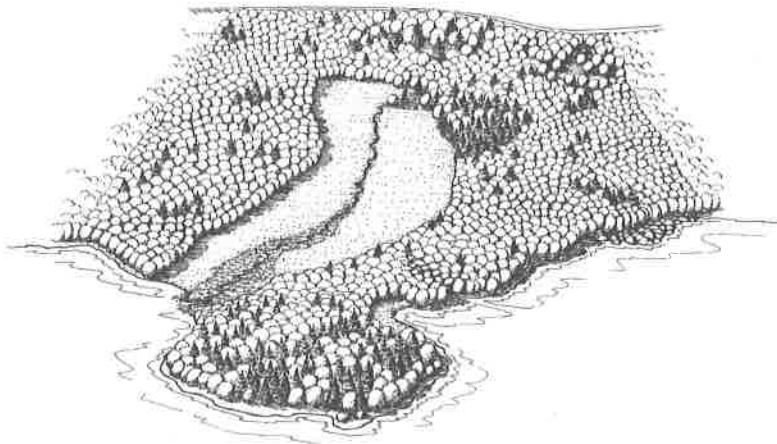


Figure 7E-1. Site E: Before Development

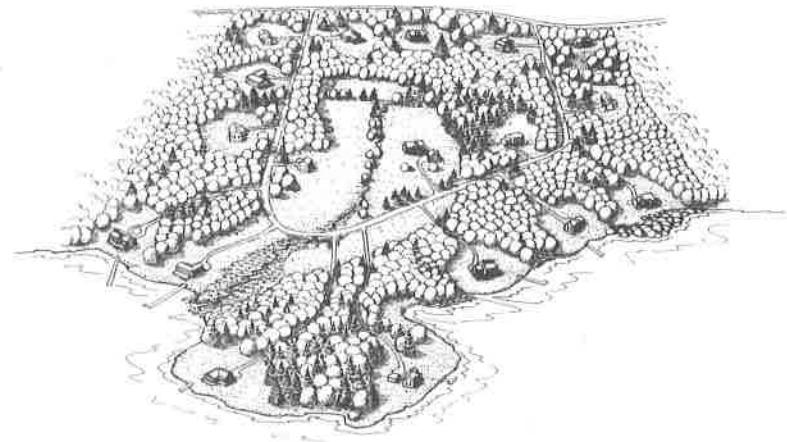


Figure 7E-3. Site E: With Conventional Development

fluenced by its long association with the Washington Highlands, a planned suburb of Milwaukee designed in 1916 on part of the old Pabst Farm by the distinguished team of Werner Hegemann and Elbert Peets, who incorporated parks and greenways into their original layout. Several generations of the family have all grown up in this neighborhood where the preservation of many natural features is a given fact. Therefore, when the family first considered the idea of selling part of their lake frontage, there was no question that a greenway approach would be taken.

The design team hired by the family was headed by a landscape architect working with a surveyor, engineer, and a conservation biologist. Their first task was to identify the legally unbuildable parts of the site, as defined by local ordinances and state law. The kinds of land categorized as "primary environmental corridors" in Wisconsin relate closely to the types of resource areas that are called "Primary Conservation Areas" in this handbook: bogs, flood-

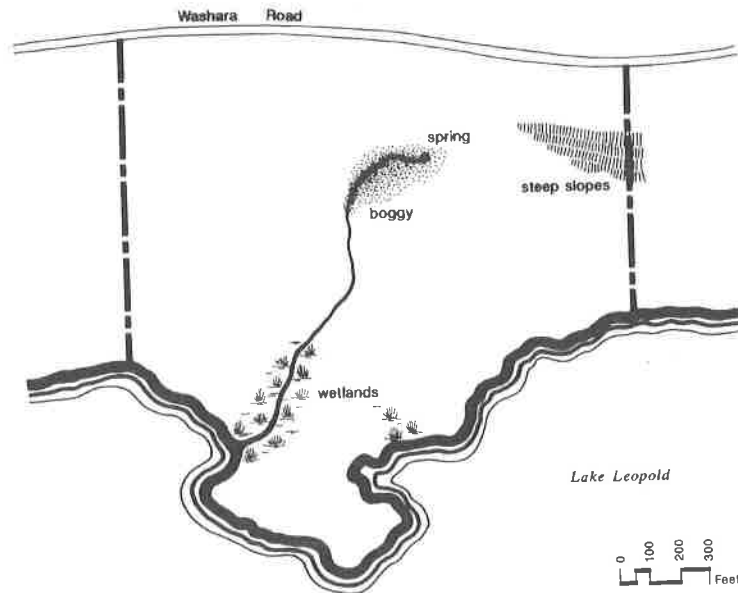


Figure 7E-4. Site E: Identifying Primary Conservation Areas

plains, stream valleys, and steep slopes (shown in Fig. 7E-4). Of the 46 acres on the site, 5 were so classified, leaving 41 developable acres, of which a further 4.1 (10%) were deducted for new streets. Dividing the net land area of 36.9 acres by the two-acre minimum land requirement per dwelling produces a total of 18 potential houses. In order to demonstrate the feasibility of this to the local planning board, a "yield plan" was prepared, as shown in Figures 7E-2 and 7E-3. Because the property is located in an outlying section of an incorporated village that was exempted from the Wisconsin law mandating shoreline setbacks and severely limiting vegetative clearing within a buffer zone, the "yield plan" reflected a very conventional and insensitive approach.

No one was impressed by this layout, especially the design team members who were looking forward to doing something quite special with this property. Members of the local planning board were greatly relieved to learn that the family had no intention of sim-

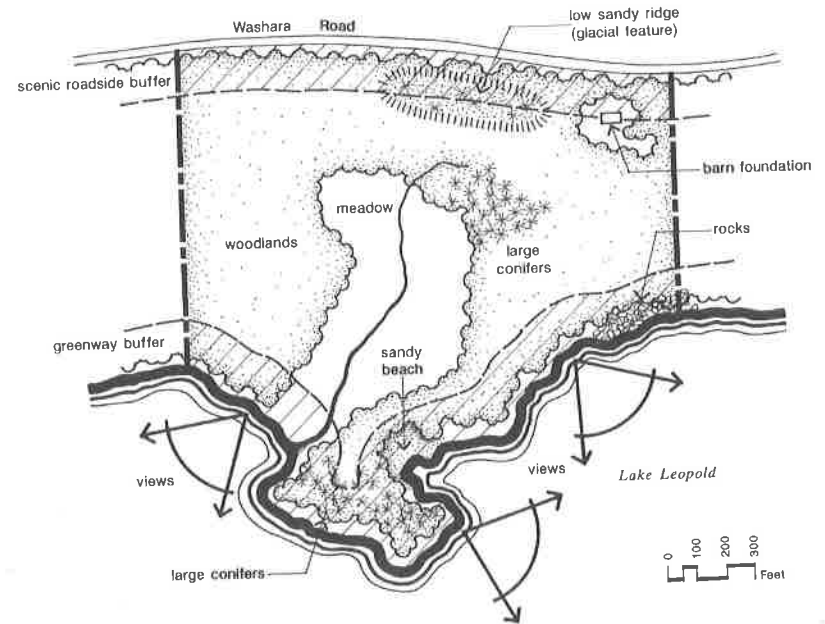
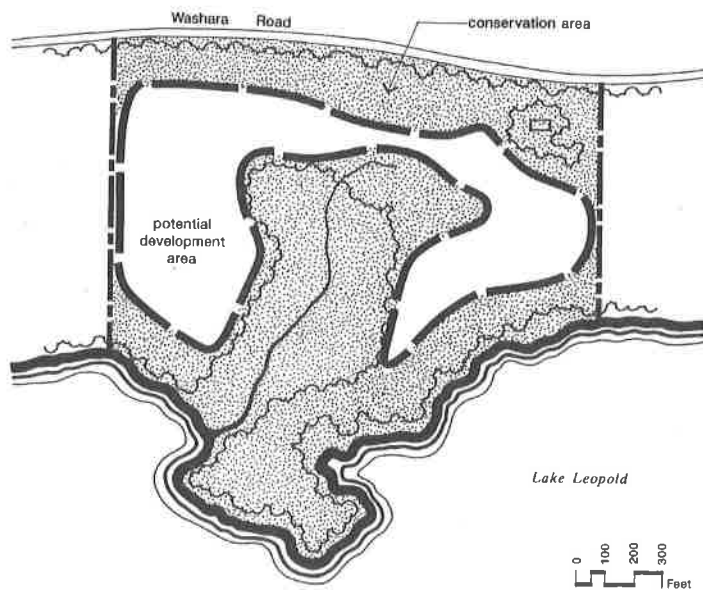


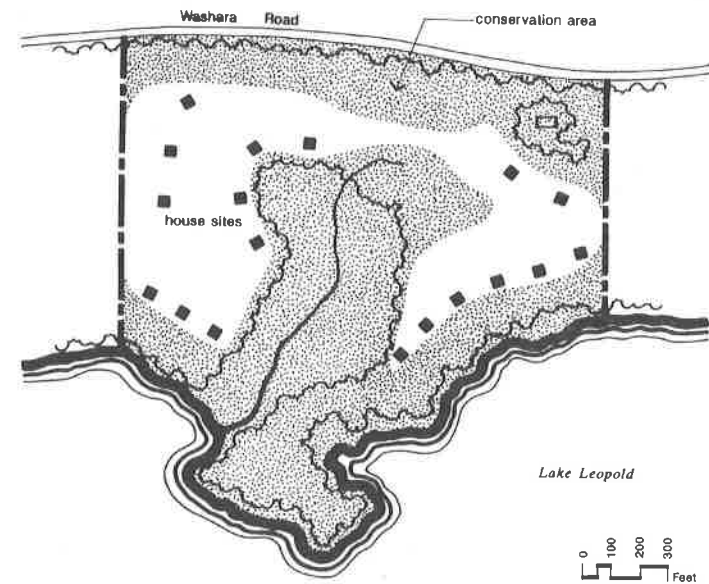
Figure 7E-5. Site E: Identifying Secondary Conservation Areas

ply refining this checkerboard layout as a preliminary plan submission—as local regulations in that village would allow, and as most developers would do.

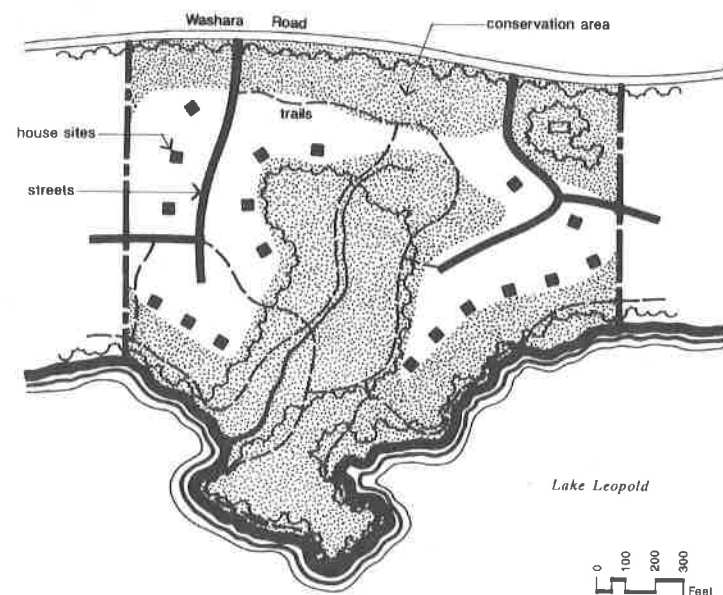
After walking the site with board members and discussing the property's special features with members of the family—who seemed to know the location of every rock outcrop, large tree, and scenic viewpoint—the design team completed the first step by delineating “Secondary Conservation Areas.” These areas included the upland meadow, a low sandy ridge created during the retreat of the last glacier, the most notable groupings of mature trees, the small sandy beach, an old barn foundation, an area parallel to Washara Road critical for screening and buffering purposes, a wooded lakeside greenway between the waterview lots and the shoreline, and several prominent viewpoints on the peninsula (Fig. 7E-5). In fact, the Secondary Conservation Areas identified during this stage involved even more resources than would have been protected had the village adopted the state's normal shore-



**Figure 7E-6.** Site E: Identifying Potential Development Areas



**Figure 7E-7.** Site E: Locating Potential House Sites



**Figure 7E-8.** Site E: Designing Road Alignments and Trails



Figure 7E-9. Site E: Drawing in the Lot Lines



**Figure 7E-10.** Site E: With Conservation Design

land standards (but without reducing the site's overall building potential). Among the plant species identified in the Secondary Conservation Areas were leatherwood, beaked filbert, dwarf bush-honeysuckle, Solomon's seal, trillium, bloodroot, hepatica, wood anemone, Dutchmen's breeches, cinnamon fern, wintergreen, partridgeberry, coreopsis, sundrops, coneflower, Indian grass, and big bluestem (*Andropogon gerardii*), none of which are listed in the state as rare or endangered species but all of which are certainly worth the effort of designing around wherever possible.

After greenlining half the site as potential open space and identifying "potential development areas" (Fig. 7E-6), the second major step—locating house sites—is undertaken. Here the skills of the landscape architect and the real estate professional come into full play, finding the most attractive settings on the property and maximizing the number of sites that would enjoy views of the water and/or the preserved open space. *Experienced developers recognize the importance of siting the homes before street alignments and lot lines have been set, because they realize that their principal sales products are the homes and not the street system or the lot boundaries.* Members of the family intuitively knew this and above all wanted the new houses on this property to fit comfortably onto the land in a low-key manner—in a way that would not dominate either the terrain or the lake itself. The approach they settled upon involved carefully opening up deliberate vistas to the lake from the nine lots nearest the water, through narrow "view tunnels" in which many lower limbs would be trimmed and a minimal number of trees would be removed.

The third and fourth steps were fairly straightforward at this advanced stage of the site analysis and design, and they were in fact simply the logical extension of the work that had already taken place. The street system was laid out to avoid disturbing the low sandy ridge (which could easily have been bulldozed and removed to another development site for fill) and to eliminate the need for

a costly and potentially contentious wetland crossing. Although the two streets do not connect with each other, trail linkages provide the opportunity for the neighborhood to function as a whole, through pedestrian movement (see Fig. 7E-8). The lot lines themselves are far less regular than those shown on the yield plan but relate well to the actual house sites, which is the most important thing (Fig. 7E-9). Several "flag lot" shapes were used to eliminate unnecessary street paving that might otherwise dominate the site. And members of the local planning board recognized the counter-productivity of requiring full street frontage on each lot simply for bureaucratic purposes. Ample room for emergency vehicle access and turning is provided by large asymmetrical cul-de-sac ends, which include generously proportioned wooded islands in their centers.

Altogether the development contains 13 view-lots, nine with water views (compared with seven on the conventional yield plan) plus four others that face onto the interior meadow. In addition, there is an extensive network of informal neighborhood footpaths leading to the sandy beach that all 18 families can enjoy, plus a tennis court and a small ballfield where residents can play softball in the spring or touch football in the autumn.

## Site F: FARM WITH CIVIL WAR BATTLE-RELATED RESOURCES

The sixth site to be considered blends natural resource conservation with the preservation of significant historic features. Unlike the other properties examined in this handbook, Site F is a composite, incorporating attributes of several different farms in Spotsylvania County, Virginia, that witnessed troop movements and hosted army encampments during the Civil War. A great many farms and woodlands in the Old Dominion and other southern states possess "battle-related resources" that have not been incor-

porated into the network of historic properties administered by the National Park Service because they were the scene of minor skirmishes rather than major engagements, or because they represent positions where soldiers created such intimidating fortifications that those on the other side were deflected away and initiated battle action elsewhere. Alternatively, the historic significance of a property may lie in the fact that a certain division marched across it en route to or from some particularly bloody encounter, or because wounded soldiers received makeshift medical attention at a farmhouse hastily converted to serve as an emergency field hospital. The point here is that the historic resources need not be connected with any particular event, or listed on a state or national inventory of historic places, in order for them to merit sensitive and respectful treatment during the development design process.

Unlike predominantly wooded areas where the typical objective is to conserve open fields or pastures, and unlike agrarian regions where woodlands and tree groupings are often regarded as the most significant natural resources to be “designed around,” on properties adjoining or near Civil War battlefields the historic and cultural features surviving from the 1860s are accorded the highest priority status when identifying the “Secondary Conservation Areas.” These features include military fortifications (or “earthworks”), civilian structures (or their ruins), hedgerows, “traces” of old roads, the historic landscape, archaeological evidence of 1860s events, and a presumed cemetery.

This 130-acre site, known as the old Harrison homestead, is characterized by gently rolling terrain with gradual slopes, and it possesses only a small linear wetland running along both sides of Landrum Brook, a tributary of the Po River. The majority of the property lies in open field and pasture as it did in 1863 when soldiers in General Robert E. Lee’s Army of Northern Virginia hurriedly dug a line of infantry and artillery fortifications running in

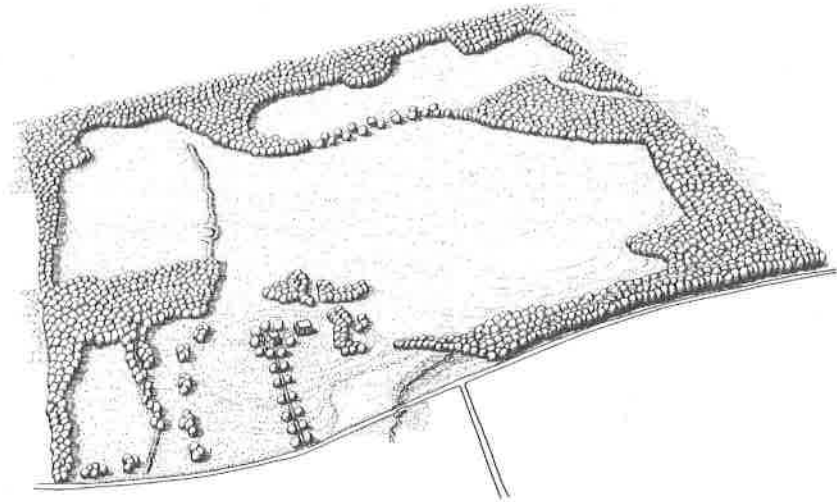


Figure 7F-1. Site F: Before Development



Figure 7F-2. Site F: Yield Plan

a general north-south direction across the western third of the farm. Although their design afforded reasonable cover at the time, 130 years of weathering has eroded these primitive earthworks substantially, so that much of what remains today appears to the untrained eye to be minor mounds and shallow depressions. There the troops remained in a blocking position for several days while other Confederate divisions maneuvered and fought around Chancellorsville, 12 miles to the northwest. When they departed the Confederates followed an old roadway that was abandoned thirty years later but whose visible remains survive as a dirt track or "trace," still deeply rutted by heavy wagon wheels that regularly sank into its muddy surface. The house and barn sit atop a slight knoll. Standing at the end of a long avenue of oak trees, this vernacular antebellum residence served as both a Confederate headquarters, during the construction and occupation of the nearby

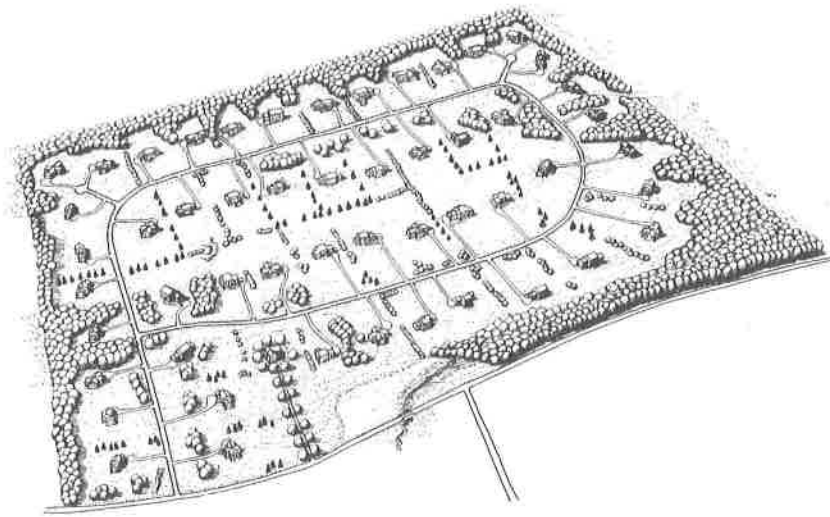


Figure 7F-3. Site F: With Conventional Development

fortifications line, and as a Confederate field hospital during an earlier battle. These facts are not officially commemorated by even a roadside historic marker, so numerous were such informal care facilities during the war.

In addition to the wetlands associated with Landrum Brook, the site's natural features include hedgerows, copses, several small woodlands, and a shady grove of tall oak trees where a number of Confederates who died in the hospital are believed to have been buried (and never disinterred). The wooded area along the brook provides habitat for a rich variety of trees, including red maple, shagbark hickory, persimmon, eastern redbud, tulip poplar, and flowering dogwood. Among the species found among the shrub layer are mapleleaf viburnum, elderberry, and sweetshrub *Carolina allspice*. Of the herbaceous plants the most notable are Virginia bluebells, columbine, wild snakeroot, spiderwort, and maidenhair fern. Along the field edges are found several varieties of wildflowers, including coreopsis, chicory, milkweed, Queen Anne's lace, brown-eyed susan, yarrow, and Indian blanket.

Despite their beauty and ecological value, none of these natural areas (except the actual wetland and floodplain) are protected under current county zoning or subdivision ordinances—a situation that is typical in rural areas across the country. A similar situation exists regarding many nonstructural historic resources, which Virginia law requires to be only studied and noted in county comprehensive plans (although counties have the legal authority to create historic districts to protect such features). On the Harrison Farm, only the presumed cemetery is necessarily protected under state law, if a survey documents its existence.

The first step in the design process consists of identifying both the Primary and Secondary Conservation Areas, which together comprise the features normally shown on a good site analysis map. This site is relatively uncomplicated in terms of Primary Conservation Areas, which consist of just the brook and its ad-

joining wetlands and floodplain, shown in Figure 7F-4. Of the various features that could be included in the Secondary Conservation Areas, the most significant in this context are the battle-related resources (earthworks, trace, hospital, and suspected burial area), closely followed by the hedgerows and woodlands, which offer the opportunity to enclose the new development from public view. (Please see Fig. 7F-5.)

From the standpoint of the county chamber of commerce and the National Park Service, protecting views from the well-travelled Fredericksburg Road (itself of post-Civil War vintage) is particularly important, given the large number of tourists who drive along this rural highway every year, travelling between the area's numerous Civil War battlefields. Although this thoroughfare has been officially named a Virginia Scenic Byway, the state legisla-

tion supporting that designation is rather toothless, and the scenic byway status is given real meaning only through the goodwill of adjoining landowners and/or special land-use development standards contained in local zoning and subdivision regulations.

Because most of the natural and historic resources on the property are unprotected under state and county laws, the land they occupy is included in the acreage figures used for computing permitted development density. However, in order to minimize the impact of new subdivisions on those resources, the new development is limited in its areal extent to the "potential development areas" outlined in Figure 7F-6. Under Spotsylvania's new comprehensive plan, new standards for development along such highways are being considered as part of the county's overall economic

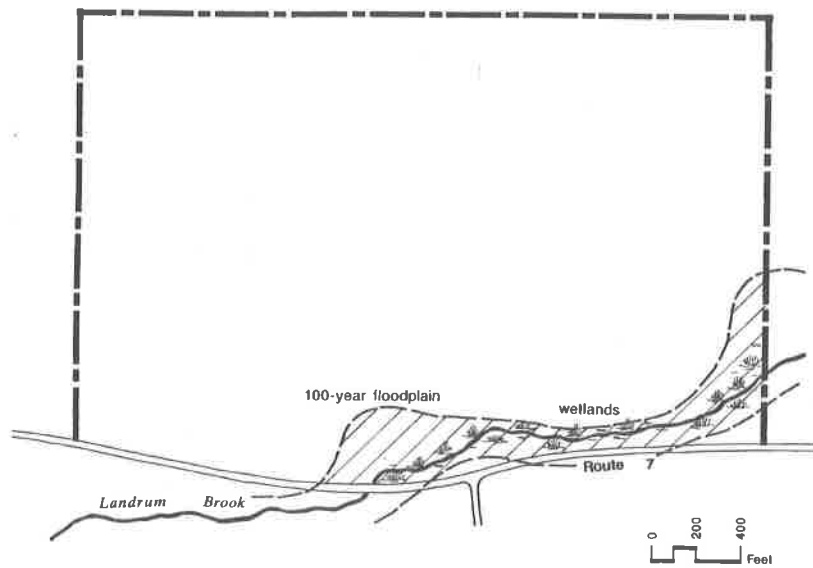


Figure 7F-4. Site F: Identifying Primary Conservation Areas

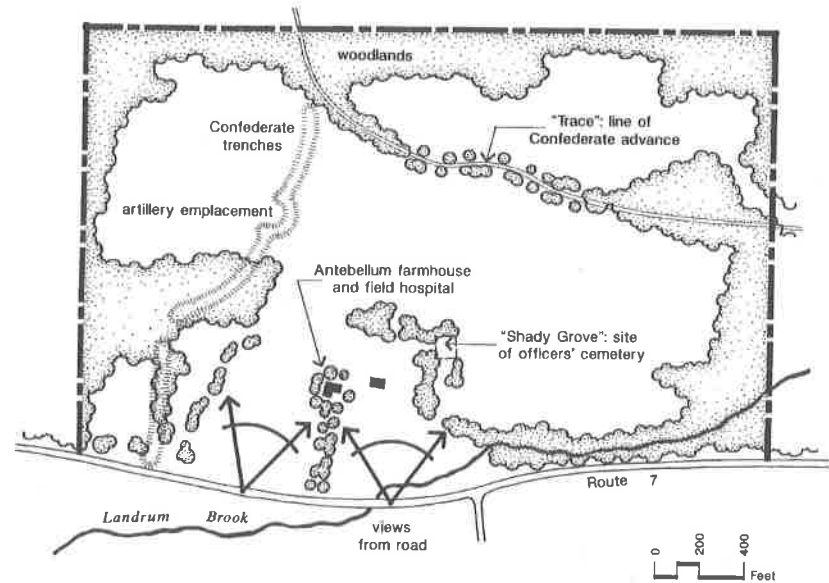


Figure 7F-5. Site F: Identifying Secondary Conservation Areas

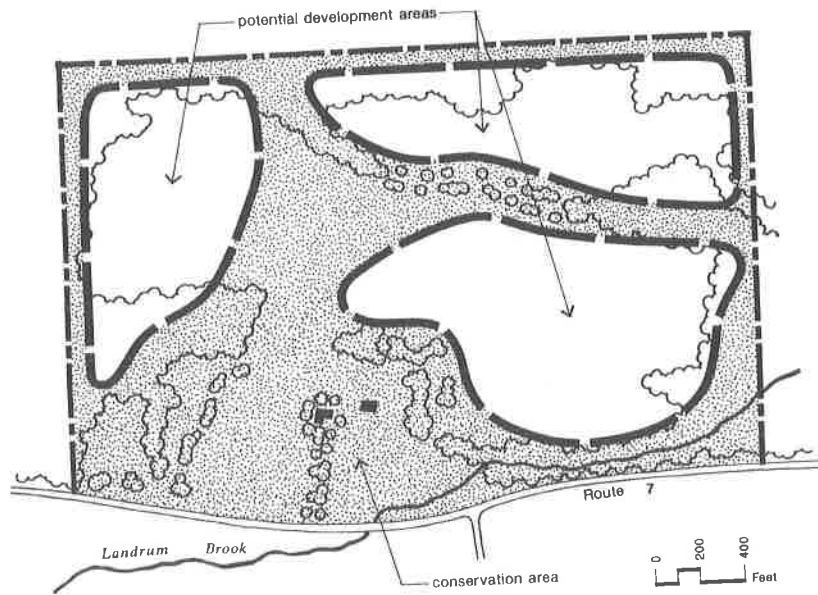


Figure 7F-6. Site F: Identifying Potential Development Areas

development strategy, recognizing the dollar value of tourism to the regional economy.

One process of computing the legal maximum number of homes allowed on this farm consists of drawing a simple "yield plan" showing lots with two or more acres of land, not including wetlands, floodplains, and steep slopes. The results of such an exercise show that 54 houselots could be created on the parcel. This agrees with the density formula contained in the county's new zoning ordinance for this transition zone (between more urban areas to the east and more rural lands to the west), allowing one houselot for every 88,000 square feet of net buildable land, less 10% for streets (130 acres minus 10 acres of wetland equals 120 acres, minus 12 acres for street circulation equals 108 acres, di-

vided by 2 acres per lot equals 54 lots). The "yield plan" for Site F shows 54 lots, all of which contain two acres exclusive of land that is wet, floodprone, or steep (see Figs. 7F-2 and 7F-3). The consequences of this large-lot checkerboard pattern is that virtually all of the special site features, both environmental and historic, would be destroyed—replaced with suburban lawns, driveways, and streets.

Locating the 54 new home sites comprises the second step in the design process, and they are arranged in such a way that nearly all of them face onto or back up to open space, in the manner of the choicest lots in golf course developments where views and convenient access are premium features. Both the earthworks and the trace are preserved intact, except for one minor segment in each case where the linear feature had to be breached to accommodate new street connections.

The third step consists of aligning those streets and informal walking trails, which follow both the trace and the trenches. In two instances the new streets also enclose central greens or commons, where neighborhood children may enjoy games of catch or throw frisbees in the afternoon light.

A special feature of the new regulations is a *density bonus* rewarding developers who create special viewsapes by "single-loading" their streets, a more expensive practice that maximizes the number of new homes enjoying views of the protected conservation lands. In this case the bonus consists of the historic farmhouse set on its own 16-acre mini-farm, an exceptionally valuable and marketable property which is additional to the 54 new houselots created behind it. (Needless to say, a permanent conservation easement, such as those required to be placed on the undivided open space, will be placed on the mini-farm as well, as a condition of approval.)

The main access street to the Fredericksburg Road has been concealed between two groups of trees and follows a somewhat

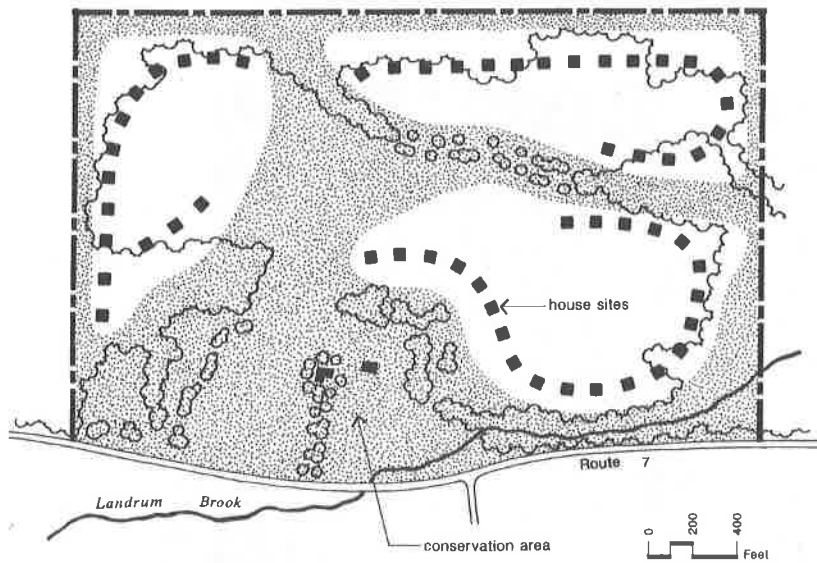


Figure 7F-7. Site F: Locating Potential House Sites

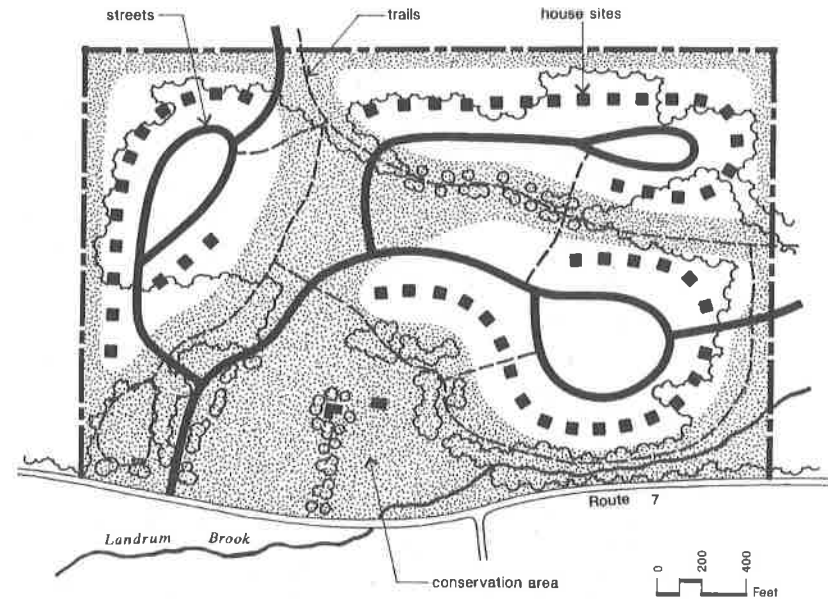


Figure 7F-8. Site F: Designing Road Alignments and Trails

curving path offering changing vistas of the open space. Historical markers with interpretive texts are placed where the new streets cross the 1860s trace and the fortification line and at a wayside offering a panoramic view of the farmhouse, thus emphasizing the uniqueness of this development: *this ground, and no other, was the scene of these historic events.*

After locating house positions and street alignments, the last step consists merely of setting in the lot lines. Lots in this example are 30,000 square feet (approximately 125 ft × 240 ft), large enough to accommodate individual wells and septic systems. Alternatively, either the individual wells or the individual septic fields could be located within the adjoining undivided open space, in specific places designated for such use on the final plan.

As a result of scaling houselots down to 30,000 square feet from

88,000 square feet, almost two-thirds of the site can be preserved as permanent open space. Views from the highway are protected, battle-related resources remain essentially undisturbed, the developer obtains a unique marketing advantage, and residents enjoy living in a truly parklike setting. Equally as important, the current owner of this hypothetical composite site, a locally prominent gentleman named Robbie McAllister, will receive full value for the property when he sells it to a developer from Richmond, ensuring that his retirement years will be financially secure. He will also be able to look back on the transaction with a large measure of pride because the design solution outlined here has preserved the rural character of his property as well as all of its most significant natural and historic features.



Figure 7F-9. Site F: Drawing in the Lot Lines



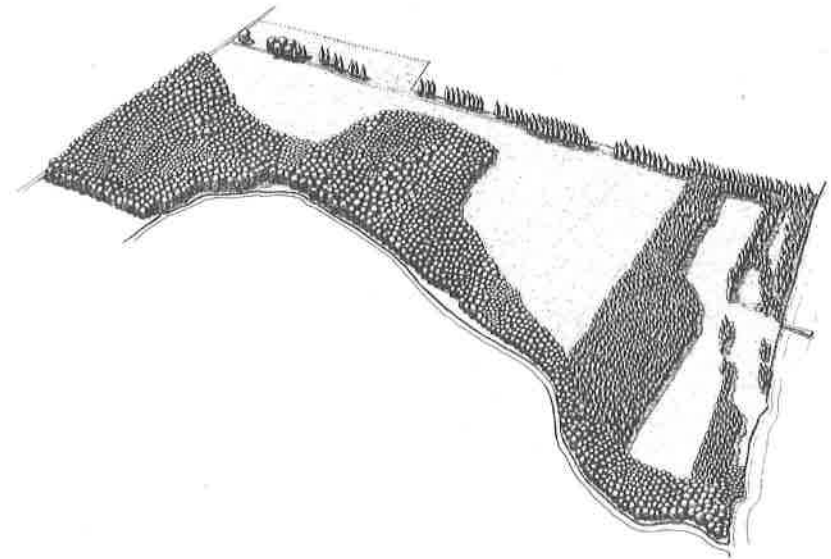
Figure 7F-10. Site F: With Conservation Design

## Site G: OLD FIELDS, SWAMP FOREST, AND ARCHAEOLOGICAL SITES ON THE SOUND

This 50-acre site is situated along the lower reaches of the North Landing River as it enters Currituck Sound, part of the huge Albemarle-Pamlico estuarine system that dominates the low country of northeastern North Carolina (see Fig. 7G-1). This extensive estuary provides vital resources for the farming, recreation, and fishing industries that form the region's economic base. As family farms continue to decline in number, much of the land they formerly occupied is gradually being converted to new subdivisions serving commuters to the Hampton Roads area of Chesapeake, Norfolk, and Virginia Beach, Virginia, and both vacationers and retirees who are drawn by the area's peaceful atmosphere, plentiful fishing, and quietly attractive coastal scenery.

This part of North Carolina is also particularly rich in archaeological and historic resources, reflecting the close relationship of older cultures and peoples with the sound. The property examined in this case study demonstrates how new development can be readily accommodated in a practical way that protects historic and prehistoric resources and also respects the natural and scenic qualities that continually draw visitors and new residents to this remarkable corner of the state.

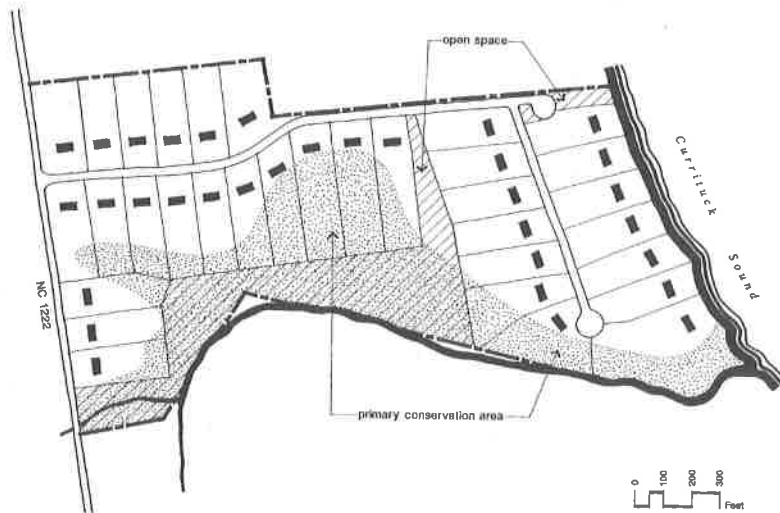
Currituck County is experiencing tremendous development pressure due to its location between Hampton Roads, Virginia, and North Carolina's Outer Banks. With 1200 feet of frontage on the sound and its close proximity to the Virginia state line, this site is almost certain to be subdivided within the near future. On coastal properties such as this one, the typical development pattern is for the valuable waterfront lots to be "stripped off" and sold first. Afterward, the remaining backland is gradually developed according to standard suburban subdivision practices but, without views of the sound and with limited water access, these interior lots command far lower prices than do those on the water. Furthermore,



**Figure 7G-1.** Site G: Before Development

the resulting pattern of standard houselots and streets is completely out of character with the traditional rural landscapes it replaces.

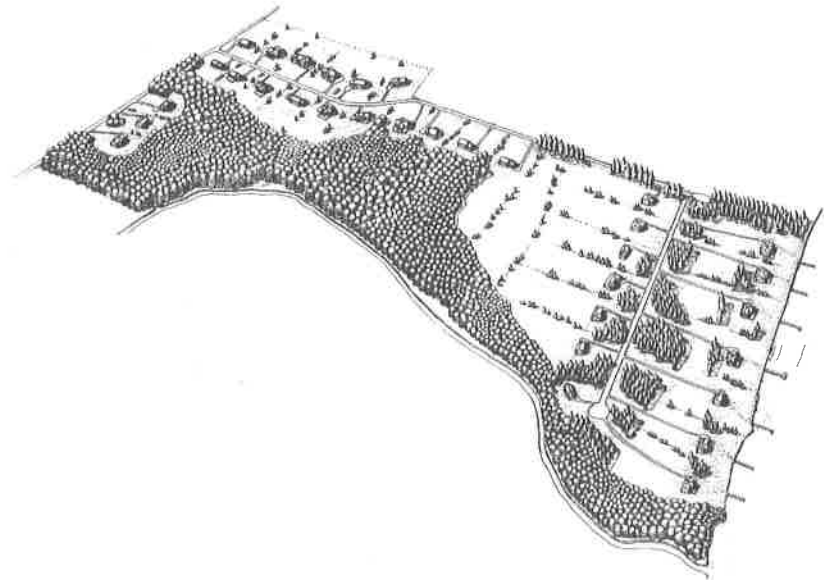
In contrast, by thoughtfully siting the same number of homes on selected parts of a property, and by preserving the remaining land as an amenity for all the residents to enjoy, conservation subdivision design can enable landowners and developers to meet or exceed the net financial return likely to be produced by conventional development plans. To ensure that the conservation subdivision plan will realize the full development potential offered by this property, a maximum-yield layout based on lot standards in the existing zoning ordinance and following conventional "cookie-cutter" design methods is drawn up. This "standard" pattern is illustrated in the "yield plan" (Fig. 7G-2) and in the aerial sketch of that layout (Fig. 7G-3).



**Figure 7G-2.** Site G: Yield Plan

The maximum density allowed in this part of the county is one house per 40,000 square feet of land, with a minimum lot width of 125 feet. All lots must contain an adequate area of dry upland soils to accommodate septic drain fields. However, as public water is available, private wells are not needed. Finally, street standards limit cul-de-sacs to 1000 feet in length, for emergency access reasons. These regulations also require that at least five percent of the total parcel area must be left as usable open space, no less than half of which must consist of buildable land. Within this required open space there must also be at least 20,000 square feet of land providing public water access. Under these conditions, 33 lots could be created on this property, seven of which could have water frontage. This lot count is then used as the target to be achieved using the conservation subdivision design process.

The conservation subdivision design process begins with a fairly thorough site analysis and investigation of the local context. This property, like many in the area, is comprised largely of wet-



**Figure 7G-3.** Site G: With Conventional Development

lands and farm fields. The traditional land-use pattern, which shows up very clearly on aerial photographs, is determined by the large, irregular areas of swamp and hardwood forest with high water tables at or near the surface. Farm fields are located on upland areas of sandy loam and are often drained by ditches that help remove excessive moisture from the seasonally wet soils. Farm boundaries follow the natural landscape units, with roads and homes generally located on the highest points.

At one time this property was part of a larger farm, but it now contains a single contemporary house near the water and a few small watermelon fields. Almost half the site is covered by swamp forest adjacent to a small creek that defines the southern edge of the property, with the remainder in fields or pine woods. An entrance drive lined with oaks and pines, displaying the characteristics of a rural lane or farm road, parallels the north property line,

turning near the water to reach the house. The adjacent property to the north has already been divided into the conventional pattern of farm fields along the state road and residential lots along the waterfront.

The site can be best described in terms of three distinct open areas—or “outdoor rooms”—bounded by the wet woods and the pine stands. The upper field, adjacent to the public road, enjoys views across neighboring farmland and encompasses a small stand of oaks lining the existing drive. The central field, bordered on three sides by woods and on the fourth by the drive, is a comfortably enclosed space focused inwardly on itself. And the waterfront area possesses a park-like quality with its tall pines, meadow grasses, and wildflowers framing outward views across the sound.

The grouping of mature oak trees on the small rise near the road suggests that a farmhouse might once have been located on this property. Most significant historically, however, is the presence near the shore of a Native American archaeological site. Remains have been found dating back to the Woodland period (1000 B.C. to 1000 A.D.), including shell middens and pottery. Remarkably intact pieces have been unearthed, suggesting that the site is largely undisturbed and could be of National Register significance. Sites of this kind are in extreme danger of being destroyed by earth-moving and excavation machinery during the “normal” course of development, or of being lost to coastal erosion. Like habitat areas, archaeological sites are threatened by fragmentation resulting from development. Subdivision of large farms into many private hands reduces the chance that evidence will ever be pieced together to form a coherent picture of past activities.

Following conventional development techniques, this important resource would clearly be endangered. By contrast, the conservation subdivision design process makes it possible to preserve not only the entire archaeological site but also the property's natural and scenic features—such as the entrance drive, the formal line of oaks and pines, and the small fields that create the feeling

of “outdoor rooms”—all subtle elements of the property's traditional landscape that collectively form its rural character, and none of which are afforded any protection by existing county regulations. Conservation subdivision design also helps protect water quality and wetland and upland ecosystems, since large areas of the site could easily be left undisturbed, with development shifted to the least sensitive and best suited areas. Under a conventional layout such as typified by the “yield plan,” it is likely that individual owners would gradually clear and fill much of the swamp forest vegetation occupying the back portions of their deep house-lots, compromising the wildlife habitat and possibly lowering the water quality (through lawn runoff rich with fertilizers and weed-killing agents). In contrast to the methods used in laying out conventional plans, *the process of designing conservation subdivisions begins by prioritizing the site features most worthy of protection and then fitting development areas around them.*

The first step in the design process is therefore to delineate the Primary and Secondary Conservation Areas noted in the site analysis. The Primary Conservation Area encompasses the wetlands along the creek where the water table is at or near the surface throughout the year (Fig. 7G-4). The native swamp forest in this part of the property consists of a canopy layer of bald cypress, water tupelo, red maple, American elm, loblolly pine, pond pine, sweetgum, tulip poplar, and several species of oak. The understory contains ironwood, American holly, sweetbay, and red bay.

Shrubs and vines are quite dense, with fetterbush, highbush blueberry, Virginia sweetspire, and titi entwined with catbrier, Virginia creeper, muscadine, and trumpetvine. Several fern species are present including cinnamon fern and Virginia chainfern, while maidencane, pickerelweed, and green arrow-arum inhabit the wettest places. Other species observed nearby were sugar hackberry, mulberry, inkberry, black cherry, yaupon, sassafras, and loblolly bay.

These native plants provide an extensive palette that could be

selectively used in landscaping developed areas so they may blend more successfully into the natural landscape and extend the habitat for local wildlife. A mix of native species that approximates the layered structure of the natural forest offers a much richer and more productive landscape system than the typical pruned and mulched collection of exotic tropical species seen in so many coastal developments in the South. This kind of mix would also be more resistant to drought and low temperatures, less vulnerable to insects and disease, and would require far less maintenance than would nonnative plants and trees. In addition, it would blend in with the surrounding natural areas much more successfully than would standard suburban landscape treatments, capturing "the spirit of the place." These characteristics offer clear advantages for developments with landscaped areas that must be maintained by homeowners' associations.

The Secondary Conservation Areas are identified by delineating

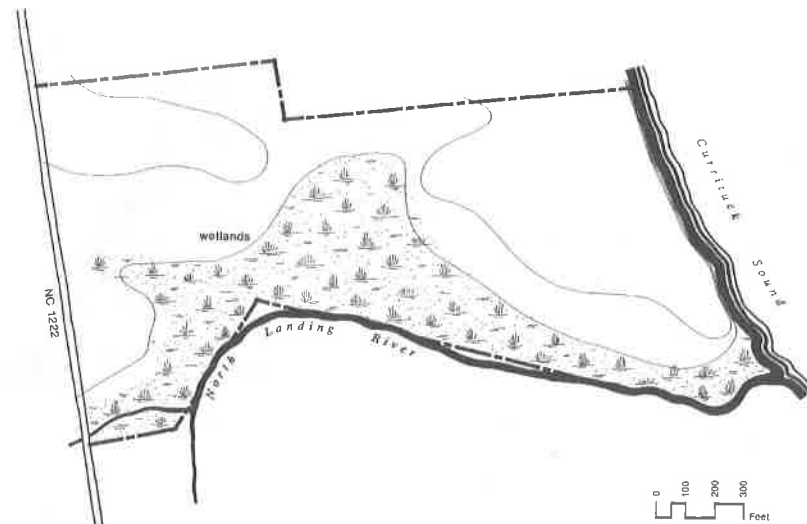


Figure 7G-4. Site G: Identifying Primary Conservation Areas

the other features of the site that are noteworthy for their historic or scenic values, or that contribute significantly to its rural character, such as the property's "outdoor rooms" (open fields bounded by "walls" of trees). Among the Secondary Conservation Areas are the public viewshed from the state road (including the foreground meadow and most of the oaks and pines that line the entrance drive), parts of the inner field and the pines that frame its eastern edge, the views outward toward the sound, the pine grove and meadow near the water, and, most importantly, the Woodland-era archaeological site. This site has been determined to contain unusual flat-bottomed shell-tempered ceramic beakers and bowls in a variety of sizes and styles, according to the North Carolina Department of Cultural Resources, and is wholly unprotected.

Once these conservation areas have been mapped (see Fig. 7G-5), those parts of the site that are best suited for development can be identified as "potential development areas" (see Fig. 7G-6), with

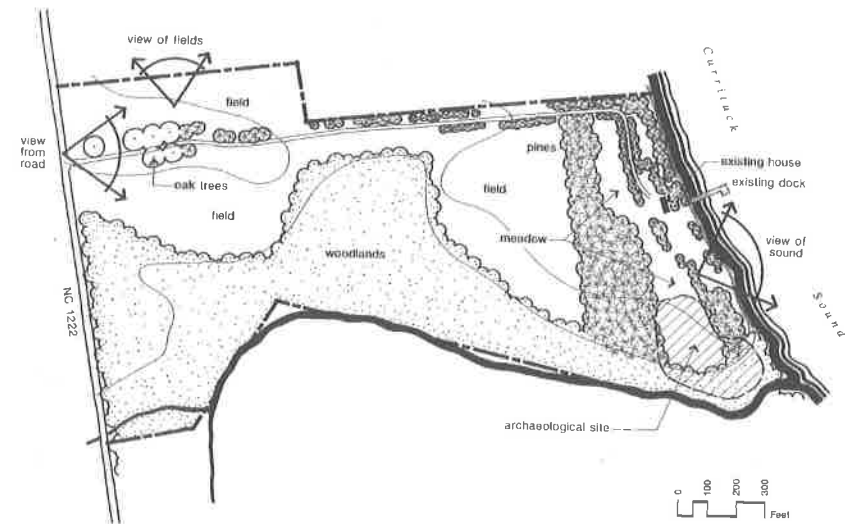


Figure 7G-5. Site G: Identifying Secondary Conservation Areas

house sites and streets located thereafter. Another criterion for Secondary Conservation Areas on this particular property should include soil conditions that are highly appropriate for individual or shared septic leaching fields, within several large common conservation meadows or neighborhood "greens." These portions of the parcel should not be used for house sites or streets and constitute another significant resource that should be deliberately "designed around."

The second step in the design process involves locating house sites around the edges of the various conservation areas. Although potential development areas readily emerge once the property's conservation elements have been prioritized, when locating the home sites care must be taken to maximize homeowners' views of the special site features. The waterfront area, typically divided into a few exclusive lots for the sole use of their owners, becomes instead a resource for the entire neighborhood to enjoy. When wa-

terview lots are substituted for waterfront lots, the land along the shoreline can be conserved as a private park for use by *all* residents of the subdivision. Taking advantage of the county's planned residential development (PRD) ordinance that allows lot sizes to be reduced to one-quarter acre (10,000 square feet), ten lots with direct views and easy access to the water can be created, three more than would be possible under the conventional yield plan. The value of the remaining lots is also increased by the presence of a neighborhood park along the water's edge (which could also accommodate individual or shared septic systems, except at the southern end where the archaeological remains are located). The archaeological site, once mapped, could be covered with a layer of turf and used as a softball field, which would not disturb any remaining prehistoric artifacts.

The other 25 homesites are situated around the edges of the two upper fields, so that their central areas may be managed as mead-

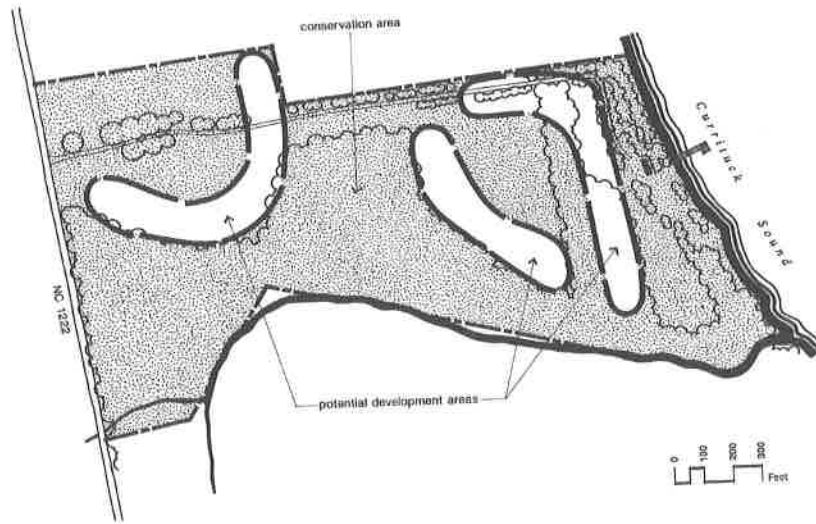


Figure 7G-6. Site G: Identifying Potential Development Areas

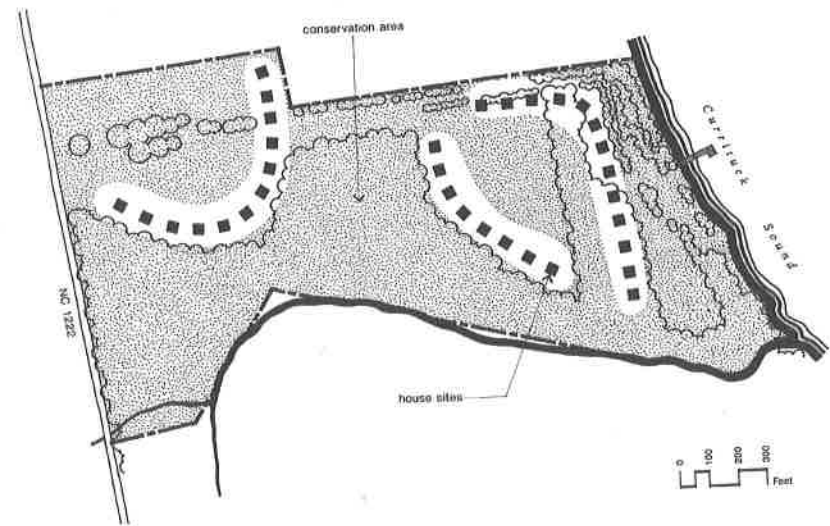
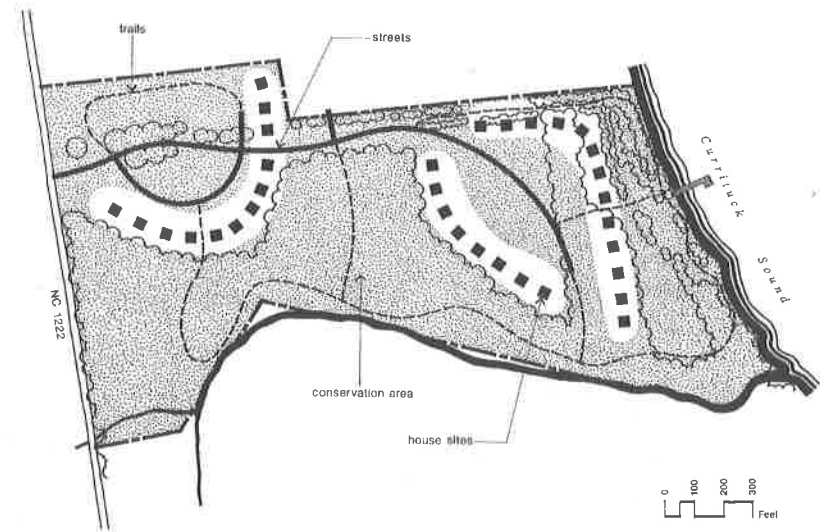


Figure 7G-7. Site G: Locating Potential House Sites

ows or “village greens” for visual enjoyment, casual recreational use, and subsurface sewage disposal (Fig. 7G-6). Each of these housing groups possesses a slightly different character, providing residents with a stronger community atmosphere, a greater sense of place, and a real appreciation for the fields, woods, and shoreland that comprise their very special neighborhood. Sadly, basic elements such as these are missing in most conventional subdivisions where every street tends to look just like every other, and where most of the natural landscape features have been swept away by layouts insensitive to them. The interior lots in the conservation design are slightly larger than those on the waterfront and are extended psychologically and visually by the adjacent open land in front and in back. As a result, residents should perceive a greater sense of space than they would in standard subdivisions, where front windows stare blankly at garage doors across the street and where rear decks often look out over one another.

Step Three involves laying out a street and pathway network to access the proposed homes and recreation areas (see Fig. 7G-8). The principal street follows the existing “country lane” (or drive) under the large oak trees. Care should be taken to minimize root damage during construction by directing heavy vehicle traffic and utility trenching outside the root zone. A stub connection to the adjoining property keeps the street from exceeding the maximum length allowed for cul-de-sacs. Pavement widths on the two short streets, which serve only five homes each, could be allowed to be as little as 12 feet because of their low traffic levels, with gravel shoulders provided to create 20 feet of vehicle-bearing surface. (Those shoulders could be surfaced with traditional materials such as clamshells or could be covered with several inches of loam and seeded with a tough but attractive groundcover, such as white clover, to reduce dust and help retain the site’s rural character.) Curbs and gutters should not be necessary at these overall building densities on such sandy soils, and casual footpaths of clamshell or beach gravel could be substituted for suburban side-



**Figure 7G-8.** Site G: Designing Road Alignments and Trails

walks of asphalt or concrete. Woodland trails could simply be cleared, slightly mounded, and mulched so they will remain dry, allowing residents to stroll about the open space while enjoying the property’s natural features and outward views.

Finally, in Step Four, all that remains is to draw in the lot lines, making sure that each lot possesses at least 10,000 square feet, as required by the PRD ordinance (see Fig. 7G-9). Individual lots may vary in size according to the features of the site and market demands, thereby appealing to a broad spectrum of home buyers. Two “flag-lots” have been created at the eastern end of the upper green so that these homes can face this open space. (Had these lots been located at the opposite end of this green near the road, their owners would have had less backyard privacy and their houses would have obstructed public views of this conservation area.) In other instances this creative lot shape has been used to reduce cul-de-sac length, thereby reducing future public street



Figure 7G-9. Site G: Drawing in the Lot Lines



**Figure 7G-10.** Site G: With Conservation Design

maintenance costs and the total amount of site disturbance. In areas where lots extend into the woodlands, it would be desirable to require that residents respect the existing forest edge, while allowing some additional plantings or selective cutting to occur. The goal is to blend the new development into the existing landscape rather than to impose a new geometry onto the traditional pattern.

In unsewered developments with lots of the size shown here (10,000 square feet), it is also important that lot lines should be drawn so that each house/lot will have fairly direct access to contiguous open space, where individual (or shared) off-lot septic drainage fields can be situated, within the open space, in locations earmarked for such use on the final plan.

This four-step process maintains much of the original character of the property while accommodating a substantial change in land use, as illustrated in the third aerial perspective sketch (Fig. 7G-10). Development blends more gracefully into the surrounding landscape and has less negative impact on the site's cultural and natural resources, as compared with the conventional "checkerboard" approach. All this is accomplished by making certain design improvements that increase real estate values, produce faster sales, and create a greater sense of community for the new residents who can also enjoy more of the rural landscape views that originally attracted them to the area.