C: Better Site Design reprint

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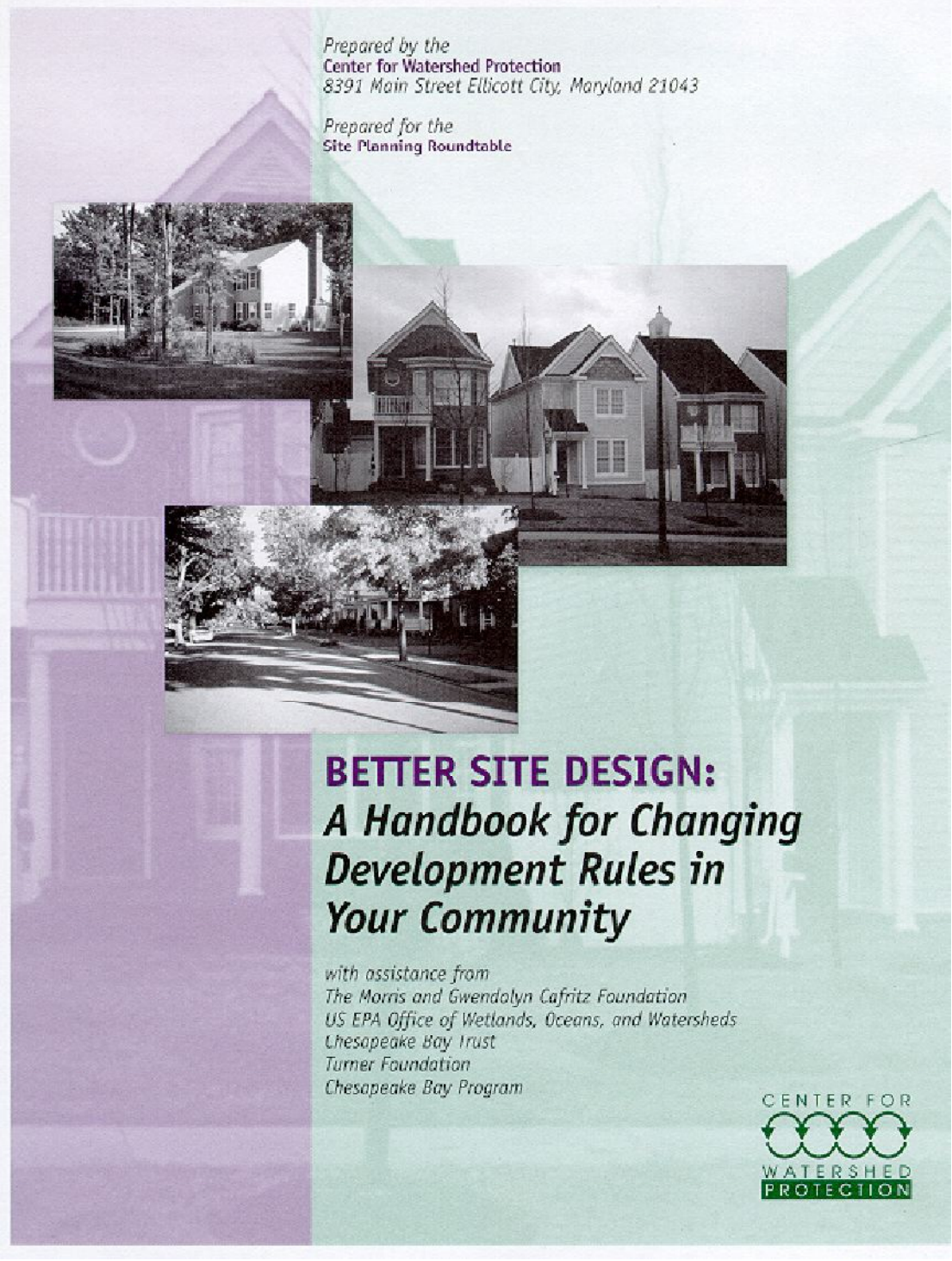


Source: Arendt 1996

PRINCIPLE NO. 11

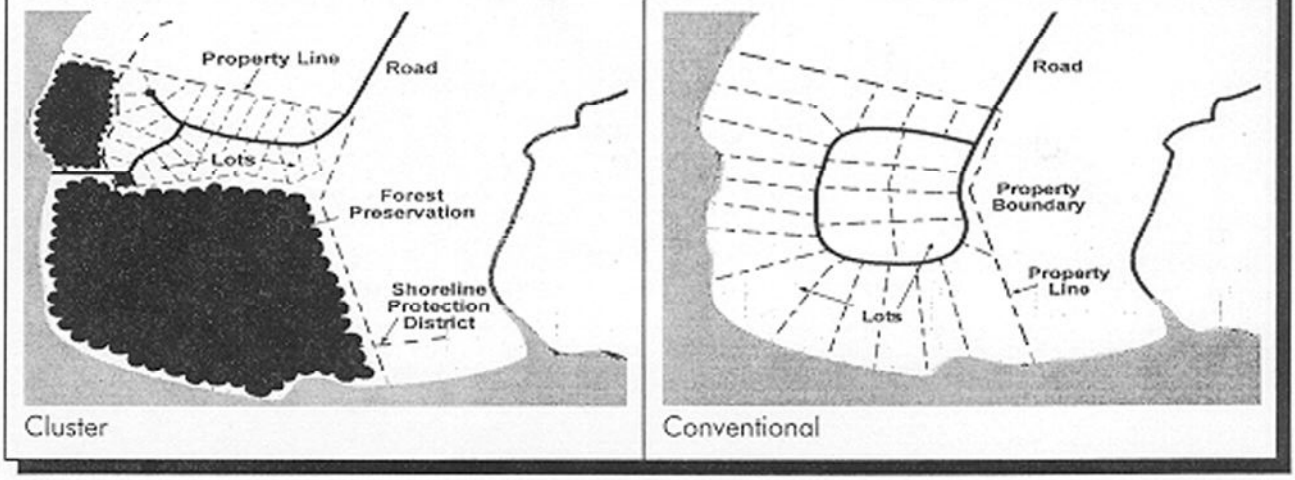
Advocate open space development that incorporates smaller lot sizes to minimize total impervious area, reduce total construction costs, conserve natural areas, provide community recreational space, and promote watershed protection.

CURRENT PRACTICE

Open space development, also known as cluster design, is a compact form of development that concentrates density on one portion of the site in exchange for reduced density elsewhere. Minimum lot sizes, setbacks and frontage distances are relaxed to provide common open space (see Figure 11.1).

Although open space development has been advocated by planners for many years, they are not included in the zoning regulations in all communities. Those communities that do allow open space development have done so for reasons largely unrelated to stream protection such as community design, preservation of rural character, or creation of affordable housing (Heraty, 1992). Fifteen percent of communities that allow open space development also provide density bonuses as an incentive which could actually increase the amount of impervious cover created at a site.

Figure 11.1 Open Space (Cluster) Development versus Conventional Development



When communities allow open space development it is usually the exception rather than the rule. In 95% of communities surveyed by Heraty (1992), clustering is a voluntary, rather than a mandatory, development option.

As it turns out, open space development is not always a widely exercised option by developers. Open space designs often require a special permit exception or zoning variance (i.e., they are not a by-right form of development). On the average, only 37% of all new subdivisions in these communities were clustered. Further, 18% of the communities reported that they had yet to receive a cluster proposal since first implementing the cluster program. Developers using open space designs often must submit more studies and undergo closer review than developers of conventional developments.

Some early cluster developments were badly designed, made poor use of open space, and were not marketable. In addition, adjacent residents frequently opposed cluster developments due to fears about density, traffic congestion, and property values.

Recommended Practice

Communities that currently allow open space development or cluster designs may wish to re-evaluate their current criteria to determine if they really meet impervious cover reduction and land conservation goals. In addition, they may want to implement program changes that will provide additional incentives to developers to make greater use of this option. In particular, communities should consider making open space development a "by-right" development option. Many communities impose an extended special review process on developers of open space developments. The certainty and speed of project approval are a prime consideration for developers, and until both become comparable to conventional subdivisions, it is not likely that many developers will choose to use cluster designs.

Arendt (1994) has suggested that the side-by-side, visual comparison of open space and conventional subdivisions will go a long way toward gaining acceptance for these new concepts by plan reviewers and developers.

The ability to implement open space designs depends to a great extent on the base zoning density of the open space design. Flexibility sharply declines as the density of the base zone increases. Generally, high density residential zones (more than six dwelling units per acre) are not feasible for open space developments simply due to the lack of space.

Benefits Provided by Open Space Design

Some measure of the value of open space design in reducing impervious cover can be gleaned from a series of "redesign" analyses (see Table 11.1). In each case, an existing conventional residential sub-division was "redesigned" using open space design, and the resulting change in impervious cover was measured from the two plans. These studies suggest that open space designs can reduce impervious cover by 40 to 60%, when compared to conventional subdivision designs, particularly if narrow streets can also be utilized at the site. The value of open space designs in reducing impervious cover is evident over most residential zones, although only minor reductions in impervious cover occur in areas which used very small lot size (1/8 acre lots and smaller) in the original zoning.

Less impervious cover translates directly into less stormwater runoff. According to the redesign analysis presented in Table 11.1, open space designs can produce about a 20 to 60% reduction in the annual runoff volume from a site. A corresponding increase in the amount of infiltration and groundwater recharge is also predicted by hydrologic models for the site.

Table 11.1: Redesign Analyses Comparing Impervious Cover and Stormwater Runoff from Conventional and Open Space Subdivisions

Residential Subdivision	Conventional Zoning for Subdivision	Impervious Cover at the Site			% Reduction in Stormwater Runoff
		Conventional Design	Open Space Design	Net Change	
Remlik Hall [1]	5 acre lots	5.4 %	3.7%	- 31%	20%
Duck Crossing [2]	3-5 acre lots	8.3 %	5.4 %	- 35%	23%
Tharpe Knoll [3]	1 acre lots	13%	7%	- 46%	44%
Chapel Run [3]	½ acre lots	29%	17%	- 41%	31%
Pleasant Hill [3]	½ acre lots	26%	11%	- 58%	54%
Prairie Crossing [4]	½ to ⅓	20%	18%	- 20%	66%
Rapahannock [2]	⅓ acre lots	27%	20%	- 24%	25%
Buckingham Greene [3]	⅛ acre lots	23%	21%	- 7%	8%
Belle-Hall [5]	High Density	35%	20% *	- 43%	31%

Sources: [1] Maurer, 1996; [2] CWP, 1998a; [3] DE DNREC, 1997; [4] Dreher, 1994; and [5] SCCCL, 1995.

Decreased stormwater runoff translates to less stormwater pollution. Again, several redesign analyses have compared the stormwater pollution loads of conventional and open space developments using simple models (see Table 11.2). As can be seen, significant reductions in stormwater pollutant loadings generally occur when open space designs are used— roughly on the order of what can be achieved if stormwater best management practices were installed at the conventional site.

Table 11.2: Redesign Analyses Comparing Stormwater Pollution Loads from Conventional and Open Space Subdivisions

Residential Subdivision	Change in Phosphorous Load	Change in Nitrogen Load	Other
Remlik Hall [1]	-42%	-42%	
Prairie Crossing [2]	-81%	N/A	92% TSS reduction
Rapahannock [3]	-60%	-45%	
Belle-Hall [4]	-67%	-69%	

Sources: [1] Maurer, 1996; [2] Dreher, 1994; [3] CWP, 1998; and [4] SCCCL, 1995.

PERCEPTIONS AND REALITIES ABOUT OPEN SPACE DEVELOPMENT

Despite the apparent benefits of open space design, there are many barriers and impediments toward its widespread use. Developers, for example, are often reluctant to use open space design. Smaller lot sizes and compact development are sometimes perceived as less marketable, and the lack of speed and certainty in the review process can be a concern. Prospective homebuyers may be reluctant to purchase homes in open space developments due to concerns regarding management of the community open space. Open space developments are also often perceived as applying only to upscale and affluent consumers. Finally, local governments may be reluctant to promote open space development because they believe the public is opposed to open space design. Open space developments are sometimes opposed due to concerns about incompatibility with older developments and traffic noise and congestion. As several case studies have shown, many of these impediments can be successfully addressed through thoughtful site design and a clear local ordinance (see Table 11.4).

Table 11.4: Perceived Impediments to Open Space Development

Perception	Facts, Case Studies, and Challenges	
1. Smaller lot sizes and compact development are perceived as less marketable.	FACT:	Many studies show that open space designs are highly desirable and have economic advantages including cost savings and higher market appreciation.
	FACT:	A survey of recent home buyers conducted by American Lives, Inc. noted that 77% of the respondents rated natural open space as extremely important (Fletcher, 1997).
2. Open space developments often require a special exception approval process.	CHALLENGE:	Generally, additional time, public hearings, and special reviews are required to implement open space designs, even when the community has an open space ordinance (see Principle No. 21). While developers are interested in reduced construction costs and market absorption rate, the total amount of time required for the project is a major driving force.
3. Community association management of open space areas can be unreliable.	FACT:	There are several options for maintaining open space which can be reliable when properly implemented (see Principle No. 17).
	FACT:	Natural open space reduces maintenance costs and can help keep community association fees down (Arendt et al., 1994).
4. Open space developments are perceived as applicable only for upper income housing.	FACT:	There are many examples of moderate and lower income open space developments (see Table 11.6).

Table 11.4: Perceived Impediments to Open Space Development (Continued)

Perception	Facts, Case Studies, and Challenges
5. Open space developments are perceived as incompatible with adjacent land uses and are often equated with increased noise and traffic.	FACT: Open space design allows preservation of natural areas, using less space for streets, sidewalks, parking lots, and driveways (BASMAA, 1997). FACT: A good design utilizing buffers can help alleviate incompatibility with adjacent land uses and still maintain the character of the area (NEIPC, 1997). FACT: Sound level is measured as a function of vehicle speed (AASHTO, 1994). Open space designs include skinnier streets and other traffic calming features which decrease the speed of cars (FHA, 1996), and consequently, the level of sound. FACT: If the number of residential units built is kept the same as the non open space designs, traffic impacts on the surrounding area should be similar.

Marketability of Open Space Development

Many studies have shown that a well designed and marketed open space developments can be very desirable to home buyers. A few examples of successful open space developments are presented in Table 11.5.

Table 11.5: Some Examples of Successful Open Space Developments

Subdivision	Location	% Open Space	Notes
Farmview	Bucks County, PA	*	The fastest selling subdivision in its price range with lots from ½ to ⅓ the size of competing projects (Arendt, et al., 1994)
Haile Plantation	Gainesville, FL	29%	Captured 14% of the Gainesville market in 1994 (Ewing, 1996)
Palmer Ranch	Sarasota, FL	36%	93% of existing wetlands at the site preserved Accounted for 30% of new home market in Sarasota in 1994 Developer has experienced positive cash flow every year (Ewing, 1996)
Fields of St. Croix	Lake Elmo, MN	60%	80% of home sites in first phase sold within 6 months (NAHB, 1997)
Chatman Village	Pittsburgh, PA	64%	Built during the Depression Earned a 4.32% return on investment (NAHB, 1997)
Westgreen	Leesburg, VA	39%	Targeted to young professionals and empty-nesters Every lot in Phase I sold during first weekend (ULI, 1992)

* More than 23% was preserved as open space and 31% was preserved as productive farm land.

Table 11.5: Some Examples of Successful Open Space Developments (Continued)

Subdivision	Location	% Open Space	Notes
Spinnaker Ridge	Gig Harbor, WA	45%	Targeted to young professionals and older families Successful marketing campaign included radio and newspaper ads (ULI, 1992)
Apple Hill Lane	Duxbury, MA	55%	Built in 1981, one of the first cluster developments in Duxbury Approved within 2 months (Porter et al.,1988)
Chinook Way at Fairview Village	Fairview, OR	40%	Targeted to high wage earners and empty nesters Mix of apartments and townhomes

Open Space Management

Community associations are just one of several options for open space management. Other options include dedication to land trusts, establishing conservation easements. and local, state, or federal ownership. These various options are discussed in detail in Principle No. 15.

Affordable Housing

Since housing prices tend to decrease as housing density increases, open space development could be used as one method for promoting affordable housing within local communities. The Haile Plantation development near Gainesville, Florida, represents one such community where the use of open space design techniques has yielded a variety of lot sizes and preserved significant expanses of agricultural, natural, and recreational open space areas (Ewing, 1996). As shown in Figure 11.2, several of the neighborhoods in Haile Plantation fall within the moderate income price range. These homes correspond to net densities of approximately two to five units per acre. Other examples of successful moderate- and lower-income open space developments are presented in Table 11.6.

Quality of Life

A well designed open space development can enhance the quality of life in neighborhoods and communities. A 1996 homeowner survey revealed that 75% of all buyers would pay more to live in a community where one could walk and bike everywhere (Harney, 1996). Studies also show that traditional big lawns are not necessarily desirable by all prospective homeowners. In fact, a 1996 homeowner survey found that many homeowners are willing to tradeoff the bigger yard to upgrade housing amenities and housing design (Probuilder Magazine, 1997). Another study found that in households where both members of the couple are working, there is a strong preference for smaller lawns to keep lawn maintenance minimal (Newsweek, 1995).

Table 11.6: Moderate and Lower Income Open Space Developments*

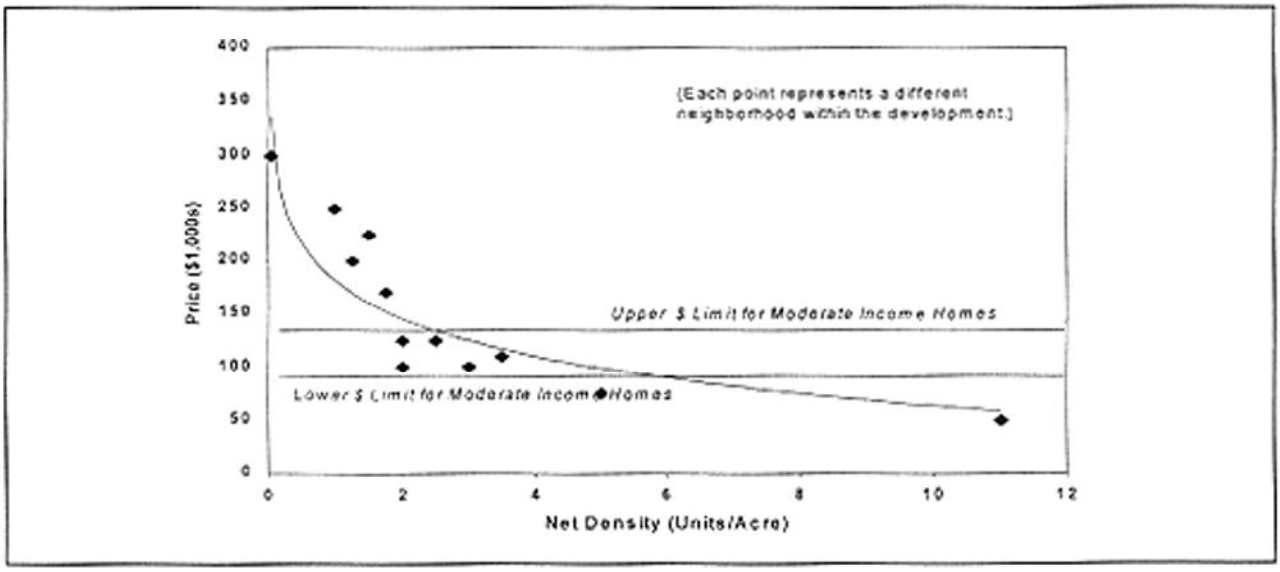
Development Name	Location	Base Price Range	Source
Haile Plantation	Gainesville, FL	$89,000 - $134,000	Ewing, 1996
Oakbridge	Lakeland, FL	$50,000 - $70,000	Ewing, 1996
Spinnaker Ridge	Gig Harbor, WA	$122,000 - $153,000	ULI, 1988
Westgreen	Leesburg, VA	$108,500 - $119,500	ULI, 1988
Casa Del Cielo	Scottsdale, AR	$118,900 - $135,900	ULI, 1988
California Meadows	Freemont, CA	$130,000 - $171,000	ULI, 1988
Coach Houses of Town Place	Boca Raton, FL	$ 97,500 - $143,000	ULI, 1988
Riverplace	New Haven, CN	$79,900 - $179,900	ULI, 1988
Sea Colony	San Diego, CA	$34,500 - $49,000	ULI, 1988

* *The 1996 national average price for a new home was $165,800 and $144,600 for an existing home (NAHB, 1997)*

Economic Benefits

Open space development can be significantly less expensive to build than conventional subdivision developments. Most of the cost savings are due to savings in road building and stormwater management conveyance costs. The use of open space design techniques at a residential development in Davis, California provided an estimated infrastructure construction costs savings of $800 per home (Liptan and Brown, 1996). Other examples demonstrate infrastructure costs savings ranging from 11 to 66%. Table 11.7 lists some of the projected construction cost savings generated by the use of open space redesign at several residential sites.

Figure 11.2: New Home Prices Versus Net Density at Haile Plantation (Florida), based on Ewing (1996)



As the number of housing units per acre increases, the price of a new home drops.

Table 11.7 : Projected Construction Cost Savings for Open Space Designs from Redesign Analyses

Residential Development	% Construction Savings	Notes
Remlik Hall [1]	52%	Includes costs for engineering, road construction, and obtaining water and sewer permits
Duck Crossing [2]	12%	Includes roads stormwater management, and reforestation
Tharpe Knoll [3]	56%	Includes roads and stormwater management
Chapel Run [3]	64%	Includes roads, stormwater management, and reforestation
Pleasant Hill [3]	43%	Includes roads, stormwater management, and reforestation
Rapahannock [2]	20%	Includes roads, stormwater management, and reforestation
Buckingham Greene [3]	63%	Includes roads and stormwater management
Canton, Ohio[4]	66%	Includes roads and stormwater management
Sources: [1] Maurer, 1996; [2] CWP, 1998; [3] DE DNREC, 1997; [4] NAHB, 1986		

CASE STUDY: FIELDS OF SAINT CROIX

The Fields of Saint Croix is an open space development in Lake Elmo, Minnesota. More than 60% of the 226-acre site is open space. Included in the open space is farmland, horticultural gardens, wooded slopes, and restored prairie (NAHB, 1998). Specific open space design techniques that are incorporated into the Field's of Saint Croix include:

- irregular-shaped and narrow lots
- a density transfer
- onsite treatment of stormwater runoff (Principle No. 22);
- thirty acres of prairie restored with native vegetation (Principle No. 20);
- a public transit stop located at the entrance to the development (Principle No. 7);
- miles of pathways through the common open areas (Principle No. 13); and
- a conservation easement guaranteeing the open space owned by the community association and the developer (Principle No. 15).

Eighty percent of the homes offered during the first phase of the development sold within six months. The second phase is expected to do equally as well.

While reviewing the Field's of St. Croix proposal, and based on the success of similar developments, the City of Lake Elmo decided to develop a comprehensive open space development ordinance. The ordinance provides a base density of six dwelling units per 20 acres with a density bonus for common areas, pathways, and historic preservation. This ordinance covers residential development in 4,400 acres of the city.

WHERE TO GET STARTED

Suggested Resources	How to Get a Copy
Guidelines for Open Space Management in the Land Preservation District by the Montgomery County (Pennsylvania) Planning Commission	Montgomery County (Pennsylvania) Planning Commission Courthouse Norristown, PA 19404 215-278-3722
Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks (1996) by Randall Arendt Discusses how to rearrange housing density so that no more than half of the buildable land becomes developed. Includes model zoning and subdivision ordinance provisions.	American Planning Association Planners Book Service 122 S. Michigan Avenue Suite 1600 Chicago, IL 60603 312-786-6344
Rural by Design (1994) by Randall Arendt Provides information on alternative neighborhood designs, including open space design, street design, greenways, zoning, and growth management.	American Planning Association Planners Book Service 122 S. Michigan Avenue Suite 1600 Chicago, IL 60603 312-786-6344
Site Planning for Urban Stream Protection. (1995) by Thomas R. Schueler Chapter 3 examines how conventional zoning techniques relate to stream quality and how local governments can institute watershed-based zoning.	Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323
Conservation Design for Stormwater Management (1997) by the Delaware Department of Natural Resources and Environmental Control and The Environmental Management Center of the Brandywine Conservancy Provides guidance for site design that incorporates conservation into land development. Emphasis is on retaining natural features in the development process to reduce the need for structural stormwater management controls.	Delaware Department of Natural Resources and Environmental Control Division of Soil and Water Conservation Sediment and Stormwater Program 89 Kings Highway Dover, DE 19901